



The Antioxidant Effect of *Rosmarinus officinalis* L. Hydro Alcoholic Extract on Wheat

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Dear Editor-in-Chief

Using on a bigger scale in agriculture of the substances like pesticides which, besides, the benefit effects that exert on the cultures, present, more often than not, also a toxicity degree unusually high, due to the fact that these substances are absorbed at the different tissues and organs and, in the same time with the ingestion of the fruits and of the vegetables treated, these compounds get into the human organism and animal organism where pop up disequilibrium of metabolic reactions. On the other hand, the risen remanence of these substances in the soil determines perturbations of its quality through the straight effect on the microbial communities (1).

The dinitrophenol (DNP) and its esters proved to be efficient like pesticides due to the multiple biological actions that manifests, their toxicity being particularly high, reason for what they are considered pollutant factors for human and its environment (2).

In the last two years, the free radicals and the oxidative stress polarized the attention of researchers due to their involvement in the starting of a huge number of affections, a lot of researchers from medical and biologic domains orienting towards the decipherment of the mechanisms which are at the base of this process, taken into account the increasing importance of

oxidative stress in multiple degenerative diseases and mental illness (3).

The huge contrast between the vegetable potential of our country and the lower number of species valued in medical purpose on the strength of scientific fundamentation, impose the intensification of phytochemical researches in the aim of identifying some new sources of natural compounds, efficient from therapeutically point of view. The rosemary belongs to *Lamiaceae* family and exerts strongly antioxidant effects (4, 5) due to active principles that contains, of volatile oil type, phenolic compounds, flavonoides and diterpenes (6).

We tested the antioxidant capacity of *Rosmarinus officinalis* L. hydro-alcoholic extract in wheat seeds from Putna variety derived from the Research Resort and Agricultural Development Suceava. The caryopses were submitted to germination in lab conditions after a preliminary consecutive imbibition with DNP 10^{-3} M solution, followed by the rosemary hydro-alcoholic extract (RHE) in 0.5% concentration, obtained at cold with 70% ethanol in a 1:7 rapport. After 7 d from the debut of germination process were harvested the viable seedling and was determined the peroxidase's activity (POX) through o-dianisidine method, catalase's activity (CAT) through Sinha method

and of superoxide-dismutase (SOD) through nitro-blue-tetrazolium method (7).

At Putna variety, the POX activity reached the medium value of 10.568 ± 0.211 U/ μ g protein in control plot, while apply of DNP 10^{-3} M solution induced the apparition of a significant strong oxidative stress evaluated through a peroxidase activity of 23.377 ± 0.553 U/ μ g protein (Fig. 1). In return, apply of DNP + RHE treatment manifested through a level of activity with a little superior to reference (13.044 ± 0.233 U/ μ g protein), being visible, in this way, the reparatory" capacity of active principles from rosemary.

In what concerns CAT, the same tendency to decreasing the level of oxidative stress in wheat seedlings pre-treated with DNP + RHE, in the sense that the activity of this enzyme reached values approximately two times bigger in DNP samples (56.788 ± 0.274 U/ μ g protein) compar-

tively with the control (29.039 ± 0.748 U/ μ g protein), while at the variants with DNP + RHE the activity's average was of 40.147 ± 0.436 U/ μ g protein, the limits of reference interval varying between 39.159 – 41.134 U/ μ g protein.

The SOD activity in Putna variety, laid out differences less striking comparatively with the reference batch, the minimum value, registered in control variant, being of 7.276 ± 0.023 U/ μ g protein, and the maximum of 11.222 ± 0.097 U/ μ g protein in seedlings grew in DNP environment ($P < 0.001$).

The major differences of activity between the batches treated with DNP and those of reference, the variants treated with DNP + RHE and those treated only with DNP, suggest the intense toxicity of DNP, with consequences on producing free radicals, but also the rosemary's capacity of counteract the negative effects of this agent.

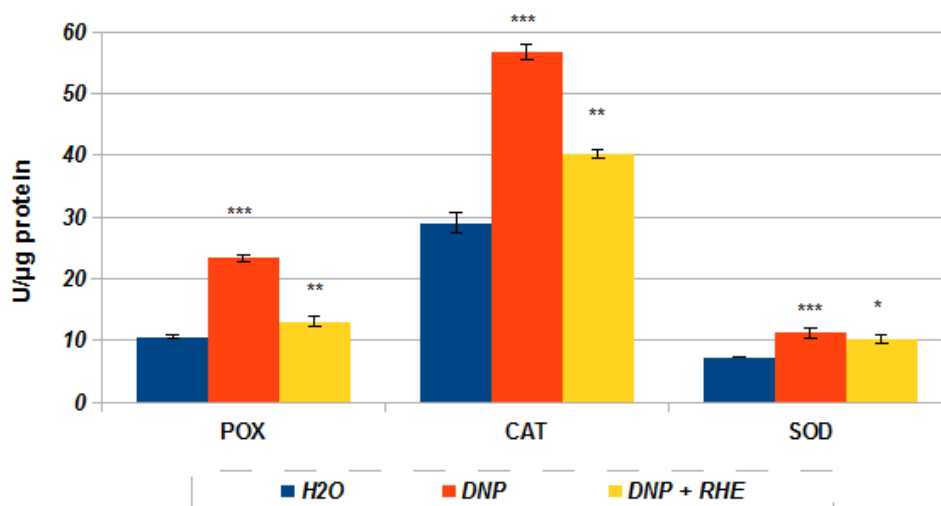


Fig. 1: The influence of dinitrophenol and rosemary hydro-alcoholic extract on the activity of oxidative stress enzymes' activity in wheat seedlings §

t-test (* $P < 0.05$ —less significant; ** $P < 0.01$ —significant; *** $P < 0.001$ —very significant)

§ The results were expressed as means of three parallel determinations

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