

## Study of the biological activity of anionic adducts of 5,7-dinitrobenz[*d*]oxazole

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**Keywords:** germination, germination energy, biometrics, amylase activity, 2-methoxy-5,7-dinitro-2-(piperidin-1-yl)-2,3 dihydrobenzo[*d*]oxazole, 2-methoxy-5,7-sodium dinitro-1,2-dihydrobenzo[*d*]oxazolide, 2-methyl-2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]cesium oxazolide, 2-phenyl-2-methoxy-5,7-sodium dinitro-1,2-dihydrobenzo[*d*]oxazolide, 2-methyl-2-ethoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]cesium oxazolide.

### Abstract

In this paper, we studied the effect of anionic adducts of 5,7-dinitrobenz[*d*]oxazole on the sowing properties of wheat seeds (germination energy and germination), the growth rate of wheat shoots, amylase activity in the roots and shoots of wheat. The evaluation of the toxicity of the tested compounds was carried out using the GUSAR on-line computer program. A prediction was made of bioaccumulation factor (BCF), the average lethal concentration for daphnia and minnow (LD50), the concentration of half-maximal growth inhibition (IGC50) and the acute toxicity indicators (LD50) for rats with different routes of administration.

For the study were selected: 2-methoxy-5,7-dinitro-2 (piperidin-1-yl)-2,3-dihydrobenzo[*d*]oxazole, 2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]sodium oxazolide, 2-methyl-2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]cesium oxazolide, 2-phenyl-2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]sodium oxazolide and 2-methyl-2-ethoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]oxazolide cesium. Biological activity was analyzed on wheat seeds of the winter variety *Moskovskaya 39*. Aqueous solutions of the studied substances were used with concentrations:  $1 \cdot 10^{-4}$  mol/l,  $1 \cdot 10^{-6}$  mol/l,  $1 \cdot 10^{-8}$  mol/l,  $1 \cdot 10^{-10}$  mol/l,  $1 \cdot 10^{-12}$  mol/l and  $1 \cdot 10^{-14}$  mol/l. The germination energy of wheat seeds was determined on day 3, and germination on the 9th day after sowing by counting germinated seeds. Values are expressed as a percentage of the total number of seeds sown. Biometric indicators (height of shoots) were determined on the 9th day after sowing. Amylase activity was measured in the roots and shoots of wheat plants by the amount of undecomposed starch using spectrophotometry.

The data obtained allow us to conclude that different substituents in the anionic adducts of 5,7-dinitrobenz[*d*]oxazole in varying degrees contribute to the manifestation of biological activity at different stages of wheat plant growth. During the first three days, 2-methyl-2-ethoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]oxazolide cesium affects the growth processes in wheat seeds most actively. The growth of wheat shoots is stimulated to a greater extent by solutions of 2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]oxazolide sodium with concentrations of  $1 \cdot 10^{-4}$  and  $1 \cdot 10^{-6}$  mol/l and solution 2-phenyl-2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]oxazolide sodium with a concentration of  $1 \cdot 10^{-8}$  mol/l. Amylase activity in wheat roots is increased by solutions of 2-methyl-2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]cesium oxazolide in the whole range of concentrations used, and in the shoots – solutions of 2-methoxy-5,7-dinitro-1,2-dihydrobenzo[*d*]oxazolide sodium in the range of all tested concentrations. In general, anionic adducts of 5,7-dinitrobenz[*d*]oxazole exhibit high biological activity in relation to wheat plants in the early stages of development.

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