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Fungicidal activity of 2-amino-4,6-dinitrophenol and its derivatives

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Abstract

Technologies of cultivation of agricultural products in the closed ground are one of the most demanded directions of development of plant growing. The limited and relative isolation of greenhouse areas creates a number of difficulties for normal growth and plant fructification, including the active development of various fungal diseases. In addition, hydroponic technologies involve the use of artificial growth stimulants to shorten the periods of the main stages of plant growth and development. All this dictates the need to develop drugs that have a complex effect on the process of growing and preserving crop production.

Studies conducted at the Department of Chemistry are devoted to the analysis of the fungicidal and biological activity of substances of various classes of organic compounds. Previously published data on the fungicidal activity of aminophenol and its nitroderivatives showed that the introduction of one, let alone two, nitro groups into the molecule significantly reduces the fungicidal activity of the parent compound. However, the study of the biological activity of nitroderivatives of aminophenol demonstrated that the ability to stimulate plant growth directly depends on the number of nitro groups in the aminophenol molecule. This article is devoted to one of the stages of research – to study the possibility of increasing the fungicidal activity of dinitrophenol by selecting substitutes of various types.

For the experiment, 2-amino-4,6-dinitrophenol, 2-chloro-3,5-dinitroaniline, *N*-(2-hydroxy-3,5-dinitrophenyl)formamide, *N*-(2-hydroxy-3,5-dinitrophenyl)acetamide and *N*-(2-hydroxy-3,5-dinitrophenyl)benzamide. Thus, the effect of the replacement of the phenyl group by the chlorine atom on the fungicidal activity was analyzed, and the effect of 2-amino-4,6-dinitrophenol on fungi-phytopathogens as a result of the introduction of the formamide, acetamide and benzamide substituents was studied.

For the initial assessment of the biological activity of the compounds studied, computer simulations were carried out using the PASS (Prediction of Activity Spectra for Substances) system.

During the experiment, all analytes were tested for fungicidal activity in vitro on six fungi-phytopathogens from different taxonomic groups, which are among the most common pathogens of agricultural plants in the Central region of Russia. For the experiment, fungi were used: *V. inaequalis* – apple apple scab, *R. solani* – causative agent of rhizoctonia, *F. oxysporum*, *F. moniliforme* – causative agents of fusariosis of cereal crops, B. sorokiniana – causative agent of root rot and *S. sclerotiorum* – causative agent of white rot.

Fungicidal activity was studied by fixing the radial growth of the mycelium. For comparison, the activity of reference preparations from the list of permitted and the use of fungicides was studied.

Analysis of the data obtained in the experiment demonstrates that the highest fungicidal activity with respect to *B. sorokiniana* is *N*-(2-hydroxy-3,5-dinitrophenyl)formamide, *N*-(2-hydroxy-3,5-dinitrophenyl)acetamide and *N*-(2-hydroxy-3,5-dinitrophenyl)benzamide; in relation to *V. Inaequalis* – 2-amino-4,6-dinitrophenol and *N*-(2-hydroxy-3,5-dinitrophenyl)acetamide; in relation to *R. solani* – 2-chloro-3,5-dinitroaniline.

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