World Journal of Pharmacology & Toxicology

Tsygankova V.A, World J Pharmacol Toxicol
2020, 3:2

Research Article

The New Plant Growth Regulators Based On Derivatives Of Oxazole And Oxazolopyrimidine

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Received Date: May 25, 2020 / Accepted Date: June 14, 2020 / Published Date: July 14, 2020

Abstract

In our work to study cytokinin-like activity of chemical low molecular weight heterocyclic compounds, derivatives of oxazolopyrimidine and oxazole we used the specifc bioassay conducted on the cotyledons isolated from seeds of muscat pumpkin (Cucurbita moschata Duch. et Poir.) cultivar Gilea. The activity of derivatives of oxazolopyrimidine and oxazole was compared with the activity of plant hormone cytokinin Kinetin. The specifc bioassay on cytokinin-like activity showed that among derivatives of oxazolopyrimidine and oxazole, used at the concentration 10-9M in water solution, the highest activity on the growth of biomass of cotyledons isolated from seed of muscat pumpkin demonstrated the compounds: the compound №2 - 2,5-diphenyl[1,3]oxazolo[5,4-d]pyrimidin-7(6H)-one, which contains phenyl substituent at the 5th position of pyrimidine fragment, the compound №4 - 7-amino-5-(4-ethylphenyl)-2-phenyl[1,3]oxazolo[5,4-d]pyrimidine, which contains amino group at the 7th position of pyrimidine fragment, and the compound №6 - 2-tolyl-5-(piperidin-1-ylsulfonyl)-1,3-oxazole-4-carbonitrile, which contains tolyl substituent at the 2nd position of oxazole. It is obvious that cytokinin-like activity on the growth of the biomass of cotyledons isolated from seed of muscat pumpkin of derivatives of oxazolopyrimidine may depend on substituents at the 5th and 7th positions of pyrimidine fragment, while as activity of compounds, derivatives of oxazole may depend on substituents at the 2th position of oxazole. The obtained results confrmed the cytokinin-like effect of derivatives of oxazolopyrimidine and oxazole on plant cell elongation, division, and differentiation that are the basic processes of plant growth. The practical application of derivatives of oxazolopyrimidine and oxazole as new plant growth regulators was proposed.

Keywords: Cucurbita moschata Duch. et Poir., cytokinin-like activity, Kinetin, oxazolopyrimidine, oxazole, plant growth regulators

Introduction:

Plant hormones cytokinins take an important part in control of embryo patterning, seed germination, de-etiolation, cell cycle control and protein synthesis, chloroplast di erentiation, overcoming of apical dominance, releasing of lateral buds from dormancy, ower and fruit development, delaying of leaf senescence, plant-pathogen interactions, and in vitro morphogenesis in plants [1-5]. In recent years the considerable attention is focused on study of plant growth regulating activity of different classes of low-molecular weight heterocyclic compounds, some of them, belonging to derivatives of oxazolopyrimidine and oxazole, have already found practical application in the agriculture as e ective substitutes of plant hormones, herbicides, and antimicrobial agents [6-9].

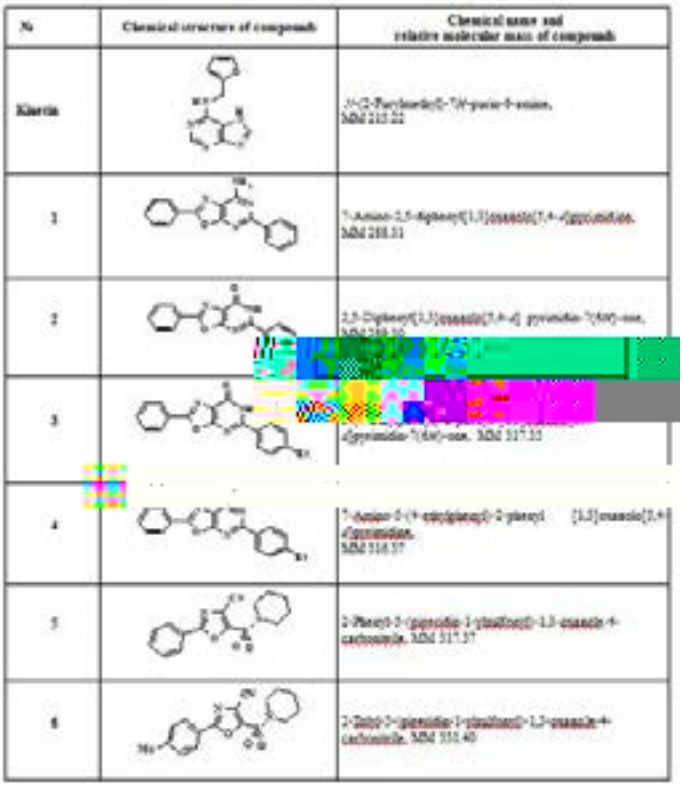
Today the new classes of the plant growth regulating substances are elaborated on the base of chemical low molecular weight ve and six-membered heterocyclic compounds synthesized in the Institute of Bioorganic Chemistry and Petrochemistry of National Academy of Sciences of Ukraine. Our numerous researchers showed that di erent classes of chemical low molecular weight heterocyclic compounds, derivatives of oxazolopyrimidine and oxazole revealed a high stimulating auxin-like and cytokinin-like e ect on seed germination and vegetative growth of various agricultural crops [10-14].

e main task of present work was study of the cytokinin-like activities of new chemical low molecular weight heterocyclic compounds, derivatives of oxazolopyrimidine and oxazole using speci c bioassay on the isolated organs of pumpkin plants.

Materials and methods:

In our work to study cytokinin-like activity of chemical heterocyclic compounds, derivatives of oxazolopyrimidine and oxazole we used speci c bioassay conducted on the cotyledons (i.e. food-storage organs) isolated from seeds of muscat pumpkin (Cucurbita moschata Duch. et Poir.) cultivar Gilea. As is known, this bioassay is based on key role of cytokinins in regulation of cell division in isolated plant organs, which leads to an increase in their biomass [1, 15]. e activity of chemical heterocyclic compounds was compared with the activity of plant hormone cytokinin Kinetin. e chemical structure, chemical name and molecular mass (MM) of plant hormone cytokinin Kinetin (N-(2-Furylmethyl)-7H-purin-6-amine), and tested chemical heterocyclic compounds, derivatives of oxazolopyrimidine (compounds № 1-4) and oxazole (compounds № 5 and 6) are shown in the Table 1.

Table 1. Chemical structure of plant hormone cytokinin and chemical heterocyclic compounds, derivatives of oxazolopyrimidine and oxazole



To study cytokinin-like activity of chemical low molecular weight heterocyclic compounds, seeds of muscat pumpkin (Cucurbita moschata

oxazolo[5,4-d]pyrimidin-7(6H)-one, compound №3 - 5-(4-ethyl