

ВЕСТНИ

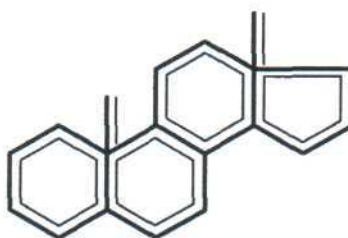


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СЕРЫЯ ХІМІЧНЫХ НАВУК

ИЗВЕСТИЯ
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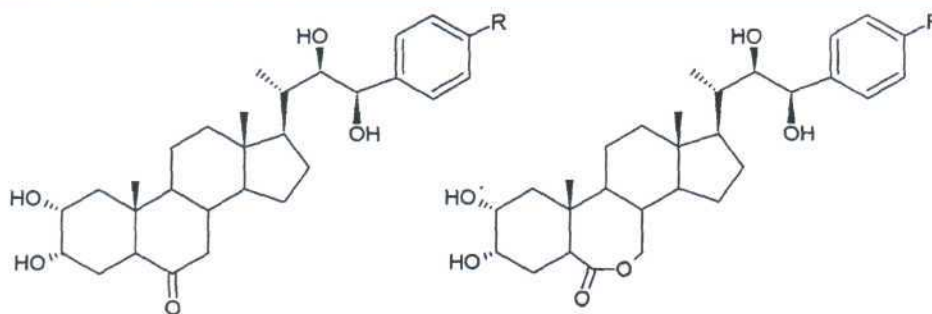


Fig.1: General structures of new brassinosteroid analogues.

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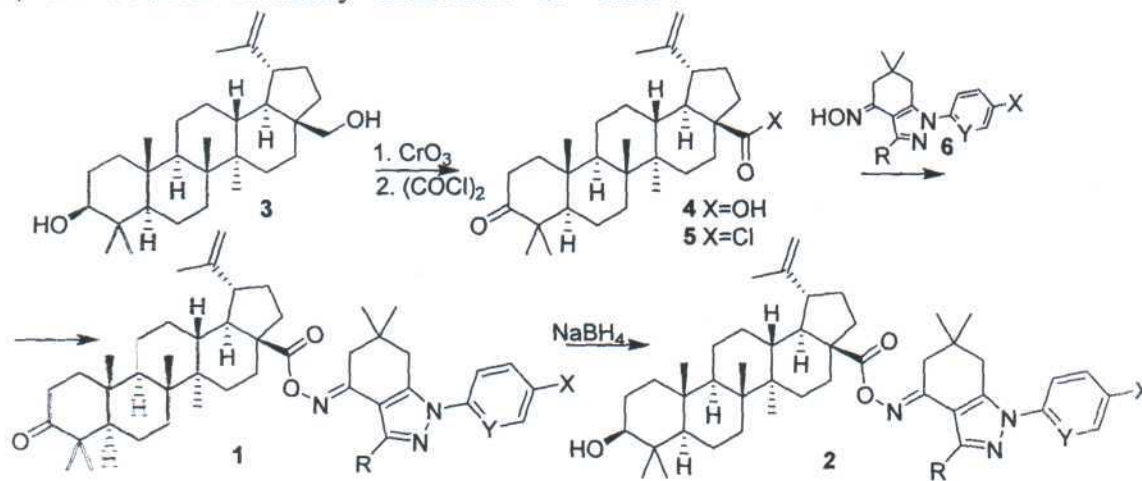
SYNTHESIS OF NOVEL LUPANE TRITERPENOID-INDAZOLONE HYBRIDS WITH OXIME ESTER LINKAGE

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The hybridization of bioactive natural and unnatural compounds is one of the most promising for the design of new leading structures and the discovery of new and potent drugs in the field of medicinal chemistry. Betulin, betulonic and betulinic acids, naturally occurring pentacyclic lupane triterpenoids, are common secondary metabolites of

plants, primarily from *Betula* species (Betulaceae), that exhibit a variety of biological activities¹. An indazole skeleton is an attractive structural scaffold in medicinal chemistry. In particular, variously substituted tetrahydroindazolones were recently recognized as important anticancer drug candidates².



R = aryl, perfluoroalkyl, 2-furyl, cyclopropyl; X = H, F; Y = H, N

An efficient protocol for the synthesis of novel lupane triterpenoid-indazolone hybrids **1,2** with oxime ester linkage has been developed from naturally accessible precursor betulin **3**. The synthetic pathway includes oxidation of betulin **3** to betulonic acid **4**, purification of the latter *via* its cyclohexylammonium salt, transformation of betulonic acid **4** into acid chloride **5**. For the first

time a series of betulonic acid-indazolone hybrids **1** have been synthesized *via* an acylation of corresponding 6,7-dihydro-1*H*-indazol-4(5*H*)-one oximes^{3,4} with betulonic acid chloride. Reduction of **1** with NaBH₄ in dry isopropanol occurred with full diastereoselectivity at C3 and led to the formation of betulonic acid-indazolone hybrids **2** in excellent yields.

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EFFICIENCY OF PLANT GROWTH REGULATOR «EPIN PLUS» (HOMOBRASSINOLIDE) ON CABBAGE

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In modern vegetable growing, much attention is paid to plant growth regulators (PGR) because of their important role in the increasing of biological plant productivity. There are examples of successive application of PGR in production of cereal, vegetables, technical and other crops. Brassinosteroids and the preparations on their basis currently have scientific and practical interest.^{1,2} Our scientific research provided creation of new methods and regiments of application of preparation on the basis of brassinosteroids in vegetable growing with the aim of extension of their application sphere. In controlled conditions of laboratory experiment, effect of preparation Epin plus (0,25 g/l of homobrassinolide) was studied on sowing quality of cabbage seeds. It was estimated that optimal dose of the preparation for activation of seeds germination was 0,4 ml/kg. Energy of germination and laboratory germination capacity increased by 4 % in comparison with the control. A stimulating effect of phytohormone on seedlings growth was shown. In variant with PGR the length of seedlings exceeded control value up to 31,6 %. Also decrease of affection of seedlings by complex of diseases

was marked in experimental variants (1,1-1,2 times). In field conditions Epin Plus also increased germination capacity up to 88 % in comparison with 79 % in control, and have positive influence in sprout period. To the moment of formation of 5-7 real leaf, the plant height increased by 17,7 % relative to the control and assimilation surface of seedlings also increased by 1,4 times. The presowing treatment of seeds by preparation exerted sanitary influence resulted in decrease of seedlings affection by blackleg (8,2–9,3 % in experiment, 14,7 % in control) that favored to increase the yield of healthy seedlings from area unity by 12,8 %.

In the vegetation period Epin Plus was applied to cabbage plants in the phase of head setting. As a result of the treatment, the increase of head weight and its diameter by 20,7 % and the yield increase by 44,0 c/ha was observed.

In conclusion, based on the results of our study, the preparation "Epin plus" has been recommended for registration and for the use in cultivation of cabbage.