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BIOLOGICAL ACTIVITY OF (1,2-DISUBSTITUTED)-BENZIMIDAZOLES

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Abstract*. This article is devoted to analyze the activities of synthesized 1-(3,4-dimethoxybenzyl)-2-(3,4-dimethoxyphenyl)-benzimidazole (I) and 1-(4-methoxybenzyl)-2-(4-methoxyphenyl)-benzimidazole (II) against pathogenic fungi. In this case, the synthesized substances were dissolved in DMSO and tested for their fungicidal activity at different concentrations against Fusarium oxysporum, Aspergillus niger pathogenic fungi by disk diffusion method. According to the research results, the synthesized 1-(3,4-dimethoxybenzyl)-2-(3,4-dimethoxyphenyl)-benzimidazole is effective against the growth of all plant pathogenic fungi while 1-(4-methoxybenzyl)-2-(4-methoxyphenyl) -benzimidazole was found to have a weak effect.*

Keywords*: o-phenylenediamine, 4-methoxybenzoic aldehyde, 3,4-dimethoxybenzoic aldehyde, 1-(4-methoxybenzyl)-2-(4-methoxyphenyl)-benzimidazole, 1-(3,4-dimethoxybenzyl)-2-(3,4 -dimethoxyphenyl)-benzimidazole, fungicide, plant pathogenic fungi, Disk diffusion, fusarium oxysporum, aspergillus niger.*

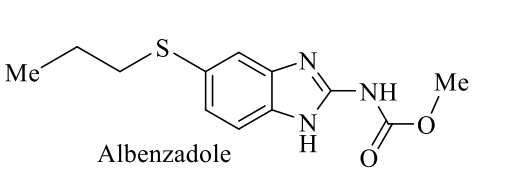
Introduction: Today, one of the important issues is the targeted synthesis of new promising biologically active compounds, their successful use in agriculture and medicine against various harmful insects and diseases. In this regard, it is especially important to create cheap, highly effective and environmentally friendly local preparations, to improve their physico-chemical, biological and pharmacological properties. Medicines created on the basis of heterocyclic compounds – benzimidazoles formed by the condensation of the benzene ring with imidazole rings are widely used in agriculture, medicine and veterinary practice in the world. In particular, drugs created on the basis of compounds of this class are used as herbicides, fungicides (carbendazim, benomyl), bactericidal, anthelmintic (albendazole), hypotensive (bendazole) drugs. Therefore, scientific research is going to be carried out on the purposeful synthesis and modification of new derivatives of compounds containing these heterocyclic fragments, determining their structure using modern methods, checking the various biological properties of the obtained compounds, and creating new drugs based on selected biologically active substances.

In our republic, in the direction of developing the creation of medicines based on local raw materials, comprehensive measures are being taken to organize scientific research at a high level and to provide the pharmaceutical market with quality drugs, and as a result, significant results have been achieved in the creation of competitive drugs based on both natural raw materials and synthetic organic chemical products. is being achieved. In the strategy of Actions for the further development of the Republic of Uzbekistan, the tasks of "Further development of the pharmaceutical industry, improvement of the provision of cheap, high-quality drugs to the population and medical institutions" are defined. In this regard, scientific and practical research is important to aim the determining the specific aspects of favorable synthesis, structure and

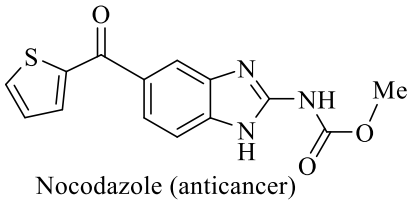
reactivity of benzimidazoles and their new derivatives, as well as creation of biologically active substances containing new pharmacophore fragments, is important.

In recent years, benzimidazole derivatives have attracted the attention of scientists due to the fact that they demonstrate unique nuclear structure and low toxicity in the fight against various diseases due to their various biological activities and clinical results. Benzimidazole derivatives are useful intermediates for the development of molecules of pharmaceutical or biological importance (1). Benzimidazoles include compounds with high anti-cancer (2), anti-inflammatory (3), antiviral (4), herbicide (5,6), growth, fungicidal and insecticidal (7) activity. Benzimidazoles [8-11] are widely used in theoretical and practical organic chemistry due to their versatile reactivity.

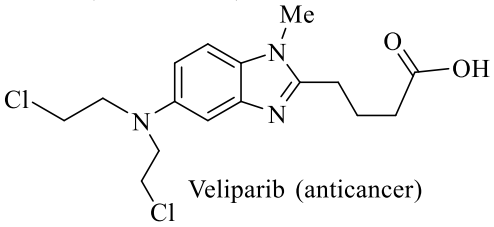
Since the compounds containing the benzimidazole hetero ring have been used effectively in medicine and agriculture (veterinary field), the benzimidazole ring is considered as a pharmacophore ring and takes a part in various drugs. [12]



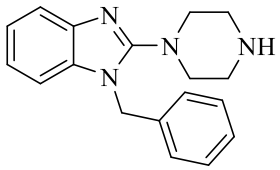
Albenzadole (Anthelmintic)



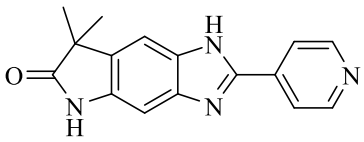
Nocodazole (anticancer)



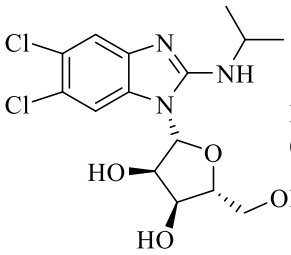
Veliparib (anticancer)



Lercitrone (Anthelmintic)



Adibendan (Phosphodiesterase inhibitor)



Maribavir (Antiviral)

Moreover, among nitrogen-containing heterocyclic compounds, benzimidazoles are an important class of substances, which serve as important building blocks not only from the point of view of organic synthesis, but also in the development of pharmaceuticals, agrochemicals, and various special materials (antioxidants, vulcanization accelerators) (13., 14 , 15.).

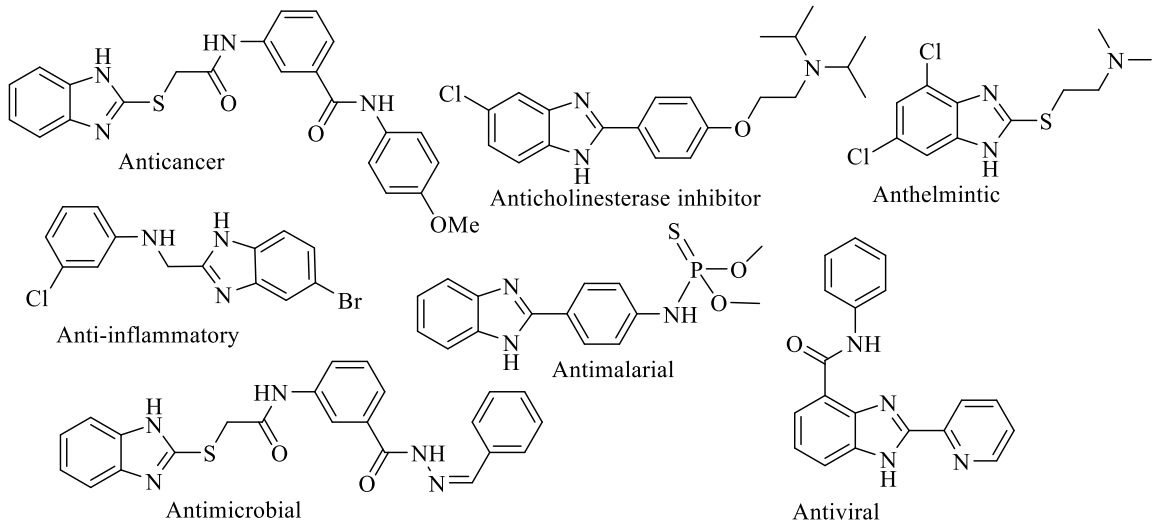
Research shows that compounds containing various functional groups (halogen, sulfur and phosphorus atoms, as well as amide, hydrazide, O-, N- or S-alkyl (aryl)) or aromatic and heterocyclic fragments are promising substances. For instance:

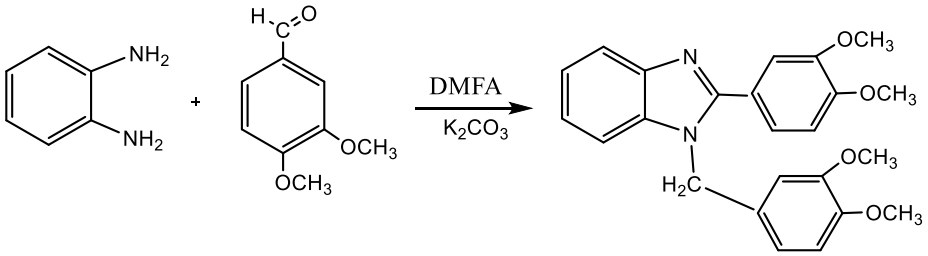
This means that targeted research is being conducted in proper direction.

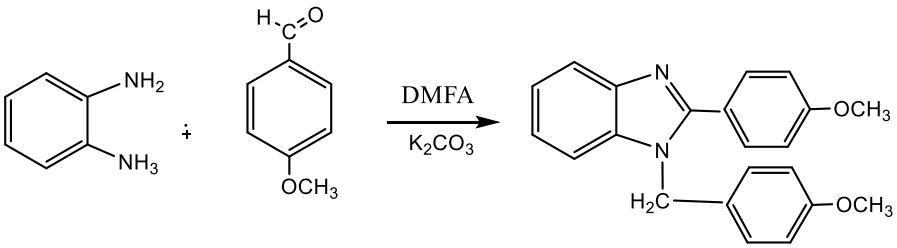
Research materials and methodology: This means that targeted research is being conducted in this direction.

Research materials and methodology: Today, modern methods are used against various disease-causing pathogenic bacteria and fungi in many laboratories. The fight against these pathogens is developing especially in European and American countries, and these pathogens are used in clinical laboratories. Current research studies have been conducted in search of chemically effective compounds. The mixture of reaction reagents: different substituted aldehydes in an

equimolar (1:1) ratio is heated for 8 hours. As a result, (1,2-disubstituted)-benzimidazoles is synthesized with good yield.

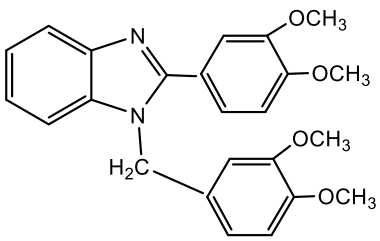




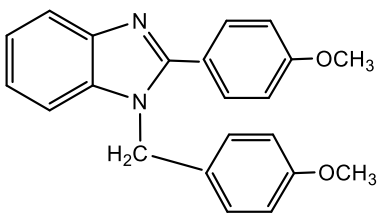


The activity of 1-(3,4-dimethoxybenzyl)-2-(3,4-dimethoxyphenyl)-benzimidazole (I) and 1-(4-methoxybenzyl)-2-(4-methoxyphenyl)-benzimidazole (II) formed by the reaction of reaction with o-phenylenediamine, 3,4-dimethoxybenzoic aldehyde and 4-methoxybenzoic aldehyde was studied in the presence of DMFA.

In this case, the synthesized substances were dissolved in DMSO and tested for fungicidal activity at different concentrations against Fusarium oxysporum, aspergillus niger pathogenic fungi by disk diffusion method [16].



I



II

Research results: The synthesized substances were dissolved in DMSO and tested for fungicidal activity at different concentrations (1%, 0.1%, 0.01%) against pathogenic fungi Fusarium oxysporum, aspergillus niger by disk diffusion method [16]. In this method, firstly, the nutrient medium is prepared. Potato dextrose agar (PDA) nutrient medium is used as nutrient

medium. In this feed, caffeine, glucose and agar were utilized. The prepared feed was poured into pert bottles. Then, discs were placed in this nutrient medium and the obtained results were analyzed.

Table 1.

		Concentration in %	Zone of inhibition in mm and %				Error indicator (±)
			Fusarium oxysporum		Aspergillus niger		
			in mm	in %	in mm	in %	
	Tebucanazol	1	15	100	15	100	0.9
		0.1	14	93.3	15	100	0.6
		0.01	12	80	14	93.3	0.6
	I	1	12	80	12	80	1.2
		0.1	10	66.6	12	80	0.5
		0.01	8	53.3	10	66.6	0.7
	II	1	3.5	23.3	3.5	23.3	1.2
		0.1	3	20	4	26.6	0.5
		0.01	2	13.3	6	40	0.7

To sum up, it was established that synthesized 1-(3,4-dimethoxybenzyl)-2-(3,4-dimethoxyphenyl)-benzimidazole (I) is found as effective against the growth of all plant pathogenic fungi whereas 1-(4-methoxybenzyl)-2-(4-methoxyphenyl) -benzimidazole (II) show weak fungicidal activity.

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