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Influence Of Different Determination Of 1,2,4-Triazols On The Growth, Development And Yield Of Grain Sorghum.

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ABSTRACT

The publishing activity of scientists practically around the world about the properties of derivatives of 1,2,4-triazole makes it possible to assert with certainty that this class of heterocyclic systems is very promising. 1,2,4-triazoles have proven themselves as biologically active compounds, plant growth regulators, anti-corrosion agents, plastic plasticizers, and other. In addition, they are practically non-toxic and highly reactive due to the presence of reactionary centers in them [1, 2].

Keywords: yield of sorghum, hybrids of Keiras and Fulgus, water soluble derivatives of 1,2,4-triazole, growth stimulating properties.

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INTRODUCTION

The heterocyclic system of 1,2,4-triazole is the source of infinite possibilities in search of a new biologically active molecules [1, 7, 8]. The unique physical, chemical, biological and pharmacological properties inherent in the derivatives of 1,2,4-triazole make this system very attractive [11, 12]. The most obvious examples are: Trifuzol-neo, Avesstim, Fortis Combi, they are registered veterinary medicines and fertilizers in Ukraine, the active substance of which are water-soluble derivatives of 1,2,4-triazolo.

Particular attention deserves the scientific research dedicated to finding compounds among derivatives of 1,2,4-triazole, which increase the yield of crops [3, 4]. It should be noted that today there is a lot of information from various sources that refers to the presence of growth stimulating properties in substituted 1,2,4-triazolo [2, 9]. The authors prove the effectiveness of the use of derivatives of 1,2,4-triazole on different plants [3, 10]. The peculiarity of such use is the fact that the compounds are active in minimum concentrations, increasing the quality of plants by 5-20% under different treatment schemes [4, 5].

Using the results of previous studies [6], we considered it expedient to investigate the presence of growth stimulating activity in new water-soluble fluorophenyl derivatives and the theophylline derivatives of 1,2,4-triazole.

Therefore, the purpose of the work was to investigate the effect of new derivatives of 1,2,4-triazoles on the growth, development and yield of grain sorghum.

MATERIALS AND METHODS OF RESEARCH

The homeland of this one-year-old plant is East Africa, where this culture was grown even in the IV century BC. Then the plant was widely distributed in India, in countries of the European continent, in Asia and America. Thanks to the resistance to dry and hot climates, sorghum has long been considered the most valuable food product and is still the main source of food for the nations representing the African continent. Today sorghum is among the five most popular plants in the world and has found application in a wide range of human activities. This culture is well-grown in Ukraine (especially in the southern regions).

It is known that the highest indices of growth-stimulating activity are inherent in a water-soluble derivative of 1,2,4-triazole [2-6]. Using previous toxicity studies and taking into account the results of a computerized prediction of the presence of biological properties, it is precisely two compounds (1, 2, Fig. 1) that have been studied.

The synthesis of salts is 2-hydroxyethylammonium 2-((5-(theophyllin-7'-yl) methyl)-4-phenyl-1,2,4-triazol-3-yl)thio)acetate (1) and morpholine 2-(5)(2-fluorophenyl)-1,2,4-triazole-4-amino-3-ylthio)acetate (2) (Fig. 1) used in the experiment was carried out according to the scheme of Figure 1. Structure and individuality the obtained compounds is confirmed by modern physico-chemical methods of analysis.

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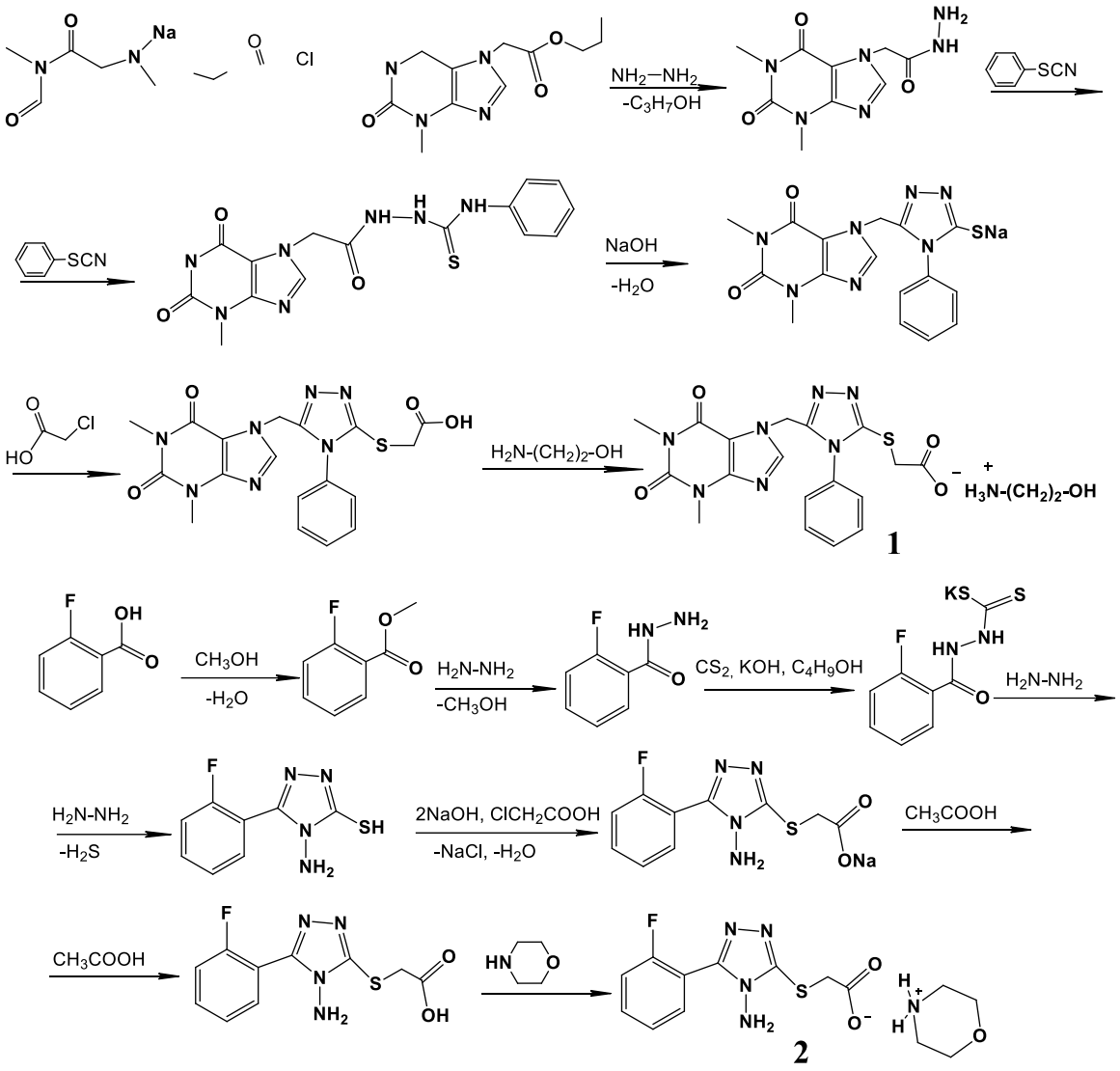

Fig. 1 Synthesis scheme for 2-hydroxyethylammonium 2-((5-(theophyllin-7'-yl)methyl)-4-phenyl-1,2,4-triazol-3-yl)thio)acetate (1) and morpholine 2-((5-(2-fluorophenyl)-1,2,4-triazole-4-amino-3-ylthio)acetate (2).

Experiments were laid in the crop rotation of the Department of Plant Science of the Dnipro State Agroeconomic University. The predecessor was linseed oil. After harvesting, the field was cultivate at 6-8 cm, with the appearance of weeds, cultivating repeated to a depth of 8-10 cm. According to the experimental scheme, at the end of September - early October, plowing was carried out at 20-22 cm in spring. In the spring, with the physical The soil maturity was harvested by heavy toothbrushes and two cultivations. The second cultivation was pre-sowing, it was carried out at a depth of 6-8 cm. The sorghum seedlings SUN-8 were sown on a depth of 5-6 cm. The research program did not foresee the study of the effect of inbredness on the grain harvest of sorghum. Therefore, the field was maintained in a clean state. The first inter-row cultivation was carried out at a depth of 8-10 cm in the phase of 6-8 leaves, and the second (with an occipation) at a depth of 6-8 cm. The biological and economic yields were determined from each site separately, followed by weighing and sampling, its moisture, mass 1000 grains and so on.

The research program was based on a two-factorial experiment to determine the grain yield of hybrids of Sorgo . Keiras and Fulgus, depending on the treatment of the compounds studied (foliar feeding of plants during the vegetation period at a dose of 20 g / ha). First factor (A) - hybrids of sorghum:

1. Keiras ;

2. Fulgus.

The second factor (B) is the compounds studied:

2-Hydroxyethylammonium 2-((5-(theophyllin-7'-yl)methyl)-4-phenyl-1,2,4-triazol-3-yl)thio)acetate (1).

Morpholine 2-((5-(2-fluorophenyl)-1,2,4-triazole-4-amino-3-ylthio)acetate (2).

RESULTS OF THE EXPERIMENT

The results of studies conducted in different soil and climatic conditions indicate a relatively significant impact of 1,2,4-triazole derivatives on the growth rate and development of grain sorghum plants. In our research conducted in 2018, the introduction of these compounds into the root cause of growth has led to the growth and development of grain sorghum plants. The yields of hybrids , Keiras and Fulgus, yielded the following results (Table 1).

Table 1: Effect of Foliar application of 2-hydroxyethylammonium 2-((5-(theophyllin-7'-yl)methyl)-4-phenyl-1,2,4-triazol-3-yl)thio)acetate and morpholine 2-((5-(2-fluorophenyl)-1,2,4-triazol-4-amino-3-ylthio)acetate on the grain yield of hybrids of sorghum

Hybrid	Version	Yield, t/ha	Increase to control	
			t/ha	%
Keiras	Without entering (control)	3,28	-	-
	Compound 1	3,31	0,03	1,03
	Compound 2	3,43	0,15	4,62
Fulgus	Without entering (control)	3,35	-	-
	Compound 1	3,42	0,07	2,17
	Compound 2	3,54	0,20	5,85

The yield of grain, as is known, depends on the individual productivity and number of plants per unit area. The highest yield of grain is formed at the optimal combination of individual productivity and plant density.

From the data shown, it is evident that the individual productivity of plants changed somewhat. Her indices have been influenced by the endocrine induction of the recurrent drugs. The best option was to introduce morpholines 2-((5-(2-fluorophenyl)-1,2,4-triazolo-4-amino-3-ylthio)acetate (2) morpholines when growing the Fulgus hybrid, thus increasing yield compared to control according to the research results was 0.2 t/ha.

CONCLUSIONS

1. The effect of 2-hydroxyethylammonium 2- ((5- (theophyllin-7'-yl) methyl) -4-phenyl-1,2,4-triazol-3-yl) thio) acetate and morpholine 2- (5- (2-fluorophenyl) -1,2,4-triazol-4-amino-3-ylthio) acetate on the growth, development and yield of grain sorghum in field conditions.

2. According to the results of the experiment, the positive effect of these 1,2,4-triazole derivatives on grain yield sorghum in relation to the control group was established.
3. It was found that the highest yield in field conditions was provided by the addition of morpholines of 2 - ((5- (2-fluorophenyl) -1,2,4-triazole-4-amino-3-ylthio) acetate (2).

REFERENCES

[1] Bihdan O. A. Synthesis, physical, chemical and biological properties of derivatives of 1,2,4-triazol-3-thione containing fluorophenyl substituents: Dis. Cand. pharmacy sciences - Zaporizhzhia, 2015. - 205 p.

[2] Pat. 114082 Ukraine, IPC S07D 249/08, A01P 21/00. Monoethanolamone 2-((4-methyl-5-(thiophen-2-ylmethyl)-4H-1,2,4-triazol-3-yl)thio)acetate stimulating winter wheat growth / Knysh E. G., Panasenko O.I., Safonov AA [and others]. - Declared 19.09.16; published Feb 27, 17, Bull. No. 4

[3] Pat. 110453 Ukraine, IPC C07D 249/00, A61K 31/00. Derivatives of 1,2,4-triazoles, which stimulate sunflower growth / Knysh Ye.G., Panasenko O.I., Safonov AA [and others.]. - Declared 04/05/16; published 10.10.16, Bull. No. 19

[4] Pat. 114083 Ukraine, IPC (2016.01), C07D 249/08 (2006.01), A01P 21/00. Ammonium 2-(4-amino-5-(furan-2-yl)-4H-1,2,4-triazole-3-ylthio)acetate, which stimulates the growth of winter wheat / E. G. Knysh, O. I. Panasenko, A.A. Safonov, D. M. Danilchenko; Applicant and Patent Owner. No. u2016 09620, application. 19.09.16, published Feb 27, 17, Bull. No. 4

[5] Pat. 117320 Ukraine, IPC (2017.01), C07D 249/00, C07D 295/00, A61K 31/00, A01P 21/00. Application of salts of 2-((3-R-4-R1-4H-1,2,4-triazol-5-yl)thio)acetate acids as growth stimulators of winter wheat germs / E. G. Knysh, A. I. Panasenko , V.V. Parchenko, R.O.Shcherbina, D.M. Danilchenko, N.O. Chromich, Yu.V. Likholat, V. L. Matyukha, S.S. Kravets; Applicant and Patent Owner. № u2016 13322, application. 26.12.16, published 26.06.17, Bull. No. 12

[6] Pat. 117081 Ukraine, IPC (2017.01), C07D 249/00, C07D 295/00, A01P 21/00. Salts of 2-((3-R-4-R1-4H-1,2,4-triazol-5-yl)thio)acetate acids that stimulate blackberry growth of the KIOVWA / E. G. Knysh, O. I. Panasenko , V.V. Parchenko, R.O.Shcherbyna, D.M. Danilchenko, N.O. Khromykh, Yu.V. Likholat, A.O.Didur; Applicant and Patent Owner. № u2017 00706, application. 25.01.17, pub. Jun 12, 17, Bull. No. 11

[7] Parchenko V.V. Synthesis, physico-chemical and biological properties of the 1,2,4-triazole-3-thione 5-furilderivatives: *Dis ... Dr. of Pharm. Sciences*. Zaporizhya, 2014; P. 361.

[8] Parchenko V.V. Synthesis, physico-chemical and biological properties of the 1,2,4-triazole-3-thione derivatives which contain furan core. *Dis ... candidate of Pharm. Sciences*. Kyiv, 2006: P. 207.

[9] The study of 2-((3-R-4-R1-4H-1,2,4-triazole-5-yl)thio) acetic acid salts as growth stimulators of winter wheat sprouts / R. O. Shcherbyna, D. M. Danilchenko, N. O. Khromykh, Yu. V. Lykholat. *Pharmacy Bulletin.* 2017. № 1. C. 61–65.

[10] Studing of ((5-R-4-R_1-4H-1,2,4-Triazole-3-YI)Thio)Acetic Acid Salts Influence On Growth And Progress Of Blakberries (*KIOVWA Variety*) Propagules / R. O. Shcherbyna, D. M. Danilchenko, V. V. Parchenko, O. I. Panasenko, E. H. Knysh, Yu. V. Lykholat. *Res. J. Pharm., Biol., Chem. Sci.* 2017. Vol. 8 (3). P. 975–979.

[11] Some aspects of synthesis 3-(2-florphenyl)-6-R_1-[1,2,4]triazol[3,4-b][1,3,4]thiadiazole and 3-(2-, 3-ftorphenyl)-6-R_2-7H[1,2,4]triazolo[1,3,4]tiadiazines / Bihdan O. A., Parchenko V. V. // Research Journal of Pharmaceutical, Biological and Chemical Sciences. – 2018. № 9(3). P. 463—470.

[12] Sherbyna R.O., Parchenko V.V., Pavlov S.V., Panasenko O.I., Knysh E.G., Belenichev I.F. Neuroprotective activity of the 1,2,4-triazole S-derivatives. *Zaporizkyi medychnyi zhurnal 2011*; 13(1): 94-97