

POSTER PRESENTATIONS

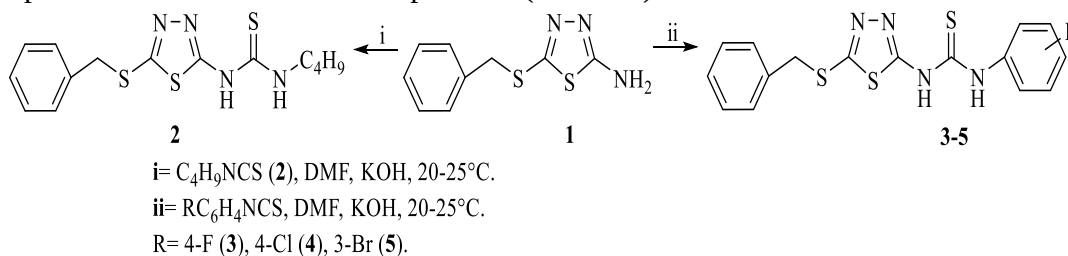
SYNTHESIS AND INSECTICIDAL ACTIVITY OF 1-(5-(BENZYLTHIO)-1,3,4-THIADIAZOL-2-YL)-3-(ALKYL, ARYL)THIOUREAS

T.T. Toshmurodov, Sh.Sh. Khasanov, S.A. Sasmakov, A.A. Ziyaev

S.Y. Yunusov *Institute of the Chemistry of Plant Substances, 77, Mirzo-Ulugbek Str.,
Tashkent, 100170, Uzbekistan, E-mail: ttt1609@mail.ru*

1,3,4-Thiadiazole derivatives exhibit a broad spectrum of biological activities. Indeed, several well-known biologically active compounds have been developed based on this scaffold, including the diuretic acetazolamide, the antibiotics sulfamethizole and cefazolin, the antidepressant atibepnone, and the broad-spectrum herbicides ethidimuron and buthidazole.

As part of our ongoing research on the chemical transformations of previously synthesized 5-amino-1,3,4-thiadiazole-2-thione derivatives [1], we investigated the reactions of 2-(benzylthio)-5-amino-1,3,4-thiadiazole (**1**) with butyl and aryl isothiocyanates (aryl = C₆H₄-3-Br, C₆H₄-4-F, and C₆H₄-4-Cl). As a result, 1-(5-(benzylthio)-1,3,4-thiadiazol-2-yl)-3-(alkyl, aryl)thioureas (**2–5**) were obtained in good yields (75–83%). The optimal reaction conditions were found to be stirring in DMF in the presence of KOH at room temperature (20–25°C) for 5 h:



The chemical structures of the synthesized compounds were confirmed by IR, ¹H NMR, and ¹³C NMR spectroscopy. The insecticidal activity of the synthesized compounds was evaluated against *Spodoptera frugiperda* and *Helicoverpa zea* cells. Compounds **2–5** exhibited significant activity against *S. frugiperda* cells, producing mortality/inhibitory effects of 62–83% and 11–81% at concentrations of 100 and 10 μM, respectively. In contrast, their activity against *H. zea* cells was lower, with mortality/inhibitory effects ranging from 58–75% and 0–70% at the same concentrations. Among the tested compounds, 1-(5-(benzylthio)-1,3,4-thiadiazol-2-yl)-3-(4-chlorophenyl)thiourea (**4**) demonstrated the highest activity against *S. frugiperda* cells, with inhibitory effects of 83% and 81% at 100 and 10 μM, respectively. Meanwhile, 1-(5-(benzylthio)-1,3,4-thiadiazol-2-yl)-3-(3-bromophenyl)thiourea (**5**) showed the highest activity against *H. zea* cells, reaching 75% and 70% at the corresponding concentrations.

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References:

1. A.A. Ziyaev, T.T. Toshmurodov, S.A. Sasmakov, U.S. Mahmudov, Sh.S. Azimova. Synthesis and antimicrobial activity of 2-substituted benzylthio-5-amino-1,3,4-thiadiazoles // *Uzbek Chemical Journal*, 2021, No. 3, pp. 54–69.