

## **Dikamba control in environmental objects when used in agricultural technologies**

Dicamba (D) has IUPAC name 3,6-dichloro-2-methoxybenzoic acid. Other names 3,6-Dichloro-o-anisic acid, Dianat. It is a synthetic auxin and is used as a herbicide. According to the chemical classification, it is also referred to as chlorinated derivative of o-anisic acid. Density 1.57 g/dm<sup>3</sup>, melting point 114 to 116°C, flash point 199°C. Solubility (20°C, g/L): in water 500; in acetone 810, in ethanol 922, in hexane 2.800, methanol 500, ethyl acetate 500, cyclohexanone – 916, dioxane – 1180, toluene – 130, xylene – 78, dichloromethane – 260 [1]. Brand names for formulations of this herbicide include Dianat, Banvel, Diablo, Oracle and Vanquish etc.

The herbicidal activity of D is similar to 2,3,6-trichlorobenzoic acid, but slightly superior to it in potency. D can be classified as a herbicide with auxin-like activity. Its effect is manifested in increasing the rate of RNA synthesis and its concentration, accelerating the synthesis of lipids and protein, increasing the extensibility of membranes and cell growth in length. D is characterized by mobility in plants [2]. Penetrating through the leaves into plants, it moves quickly into the root system. Moves along the phloem and xylem, accumulating mainly in the growing tips. From the roots of a small amount of the drug can pass into the environment. When processing the roots do not accumulate in them, and moves to the upper parts of the plant. The redistribution of the herbicide from mature leaves and its concentration in the young is possible, from where its transfer is significantly slowed down. In drug-resistant cereals, the herbicide, evenly distributed throughout the plant, is destroyed fairly quickly. Most of it is released into the environment from the root system. Cereals in the tillering phase are insensitive to this compound. External signs of D damage include elongation of the stem, twisting and wilting of the leaves, and then their death.

When using D as a herbicide, only a small part of the substance gets on the plant and has an herbicides effect. Most of the drug is washed into the soil and stays there for a long time, gradually decomposing and metabolized by microorganisms. While in the soil, it has a detrimental effect on the positive microflora. Surface water and groundwater are also washed away from the soil. In addition, the amount of D that gets on the plants can be absorbed by them and then get into the fruits of plants unevenly distributed inside the plant in residual amounts of 3,6-dichloro-2-methoxybenzoic acid. Half of the D trapped in the soil is removed from one and a half weeks to one and a half months. Given the acidic nature of D, it is more retained in acidic soils, i.e. at a lower value of the acidity of the medium. Geological studies of different countries record D in groundwater

at the level of  $10^{-2}$  mg/l. Moreover, such and more concentrations are recorded not only in areas of agricultural land, but also in non-agricultural and urban areas. In addition to D esters, other compounds are highly hydrophilic and can migrate in aqueous solutions. Moving in soil and water can harm other plants.

1. *Ghanizadeh H., Harrington K.C., James T.K.* A comparison of dicamba absorption, translocation and metabolism in *Chenopodium album* populations resistant and susceptible to dicamba // *Crop Protection*. — 2018. — Vol. 110, No 8. — P.112–116. <https://doi.org/10.1016/j.cropro.2018.04.007>
2. *Syguda A., Wojcieszak M., Materna K., Woźniak-Karczewska M.* Double-Action Herbicidal Ionic Liquids Based on Dicamba Esterquats with 4-CPA, 2,4-D, MCPA, MCPP, and Clopyralid Anions. *Ecology and evolution* // *ACS Sustainable Chemistry and Engineering*. — 2020. — Vol. 38, No 8. — P.14584–14594. <https://doi.org/10.1021/acssuschemeng.0c05603>