



## **Antibiotic resistance of microorganisms in agricultural soils in Russia**

Natasha Danilova, Polina Galitskaya, and Svetlana Selivanovskaya

Institute of Environmental Sciences, Kazan (Volga region) Federal University, Kazan, Russian Federation  
(natasha-danilova91@mail.ru)

Antibiotics are medicines widely used to treat and prevent bacterial infections not only in human medicine but also in veterinary. Besides, in animal husbandry antibiotics are often used in for stimulation of animal's growth. Many antibiotics used for veterinary purposes are weakly absorbed in the animal's gut. So up to 90% of the administered antibiotics are excreted with manure and urine. Therefore use of manure as an organic fertilizer leads to formation and spreading of antibiotic resistance among soil microbes. Another reason of such spreading is the horizontal transfer of genes encoding antibiotic resistance from manure to soil microflora. The level of antibiotic resistance genes pollution of soils has not been properly studied yet.

The aim of this study was to estimate the contamination of agricultural soils by antibiotic resistant genes. 30 samples of agricultural soils were selected around of Kazan city (Tatarstan Republic) with 1.3 Mio citizens. Since tetracycline is reported to be the most wide spread veterinary antibiotic in Russia, we estimated the level of soil contamination by tet(X) gene encoding tetracycline decomposition in microbial cell. Real time PCR method with specific primers was used as a method of investigation.

Particle size type distribution of 31% of soil samples was estimated to be sandy clay, and 69% of soil samples – to silty clay. Content of dissoluble organic carbon ranged from 0,02 mg g<sup>-1</sup> (sample 20) to 0,46 mg g<sup>-1</sup> (sample 16). Respiration activity and microbial biomass of soils were estimated to be 0,80-5,28 CO<sub>2</sub> C mg g<sup>-1</sup> h<sup>-1</sup> and 263,51-935,77 μg kg<sup>-1</sup> respectively. The values presented are typical for soils of Tatarstan Republic. In terms of the antibiotic resistant gene content, 27 of 30 samples investigated contained tet(X) gene, while 52% of the samples were highly contaminated, 34% of samples were middle contaminated and 14% of samples – weakly contaminated.