function and structure of soil microbiome in agroecosystems was evaluated. In soils with different concentrations of enrofloxacin were planted: *Lactuca sativa var. crispa, Anethum graveolens, Thymus serpillum, Mentha piperita, Calendula officinalis.* The soil of agroecosystem with a high concentration of antibiotic was characterized by a low content of nitrogen-fixing microorganisms and a high number of oligotrophic and spore-forming microbiota. In Vitro experiment were isolated bacteria absolutely resistant to all tested antibiotics. Among AR microorganisms were anaerobic bacteria: *Clostridium difficile, Clostridium perfringens* and aerobic bacteria*: Enterococcus faecalis, Yersinia enterocolitica, Enterobacter cloacae.* In experiments In Vivo from the soil, were isolated: *Bacillus licheniformis, Serratia fonticola, Hafnia alvei, Bacillus cereus, Pantoea agglomerans, Bacillus megaterium* and anaerobic bacteria - *Clostridium difficile.* resistant to all tested antibiotics. In natural conditions, from the soil of agroecosystems were isolated mostly bacteria of the genus *Bacillus.* Majority of them are the foodborne pathogens and cause risk for human health.

Keywords: agroecosystem, antibiotic resistance, bacteria, biosecurity, pathogens, soil.

Tarariko O., Dr.sc.agr., professor,
academician of NAAS
Ilienko T., PhD in Agrarian sciences
Kuchma T., PhD in Agrarian sciences,
senior researcher
Institute of agroecology and natural management of NAAS
Kyiv, Ukraine

SOIL EROSION ASSESSMENT USING REMOTE SENSING

Soil erosion is a major problem of land degradation, which significantly affects the agricultural productivity. Uncontrolled and intensive development of erosion process increases the risk of soil surface degradation and desertification in the agricultural landscapes. Climate change amplifies the frequency of extreme rainfalls, which reduce the erosion resistance. There are 15 million hectares of erosive lands in Ukraine, and the erosion rate is estimated as 100,000 hectares per year, causing 15-20 tons of soil loss yearly.

The availability and open access of satellite images with high spatial resolution, such as Sentinel and Landsat open up fundamentally new possibilities for controlling, forecasting and interpreting the erosion degradation and desertification processes.

Scientific rationale for the methods of soil remote surveys is described in the works of many scientists since 1970s [1-5]. The main factors influencing the change in the spectral parameters of soils were determined, which allowed to identify not only the type of erosion (plane and lineal water or wind, etc.), but also the level of its development [6-8].

Soil susceptibility to erosion is determined by such properties as: agrophysical parameters, humidity, moisture penetration, density, roughness and content of organic matter. It was taken into account that the spectral characteristic depends on the content of humus, moisture, iron oxides and soil minerals. Loss of humus and iron compounds from the soil upper layer leads to changes in the spectral indices. The ratio of humic and fulvic acids in the soil humus, which is determined by the depth of humification, ie, the degree of conversion of organic residues to humic substances, affects the nature of the spectral brightness coefficient of the soil. For quantitative determination of these changes, according to the remote sensing multispectral data, a spatial assessment of the soil erosion degree was performed and thus the intensity of erosion processes was determined. As a result, prerequisites for the application of automated classification of eroded lands were created. Problem remains with the erosion identification of the soil, covered with vegetation.

A logical model of erosion detection in agricultural landscapes using multispectral remote sensing data of high spatial resolution was based on the multiply regression modeling using a set of spectral features, obtained from training samples. RapidEye images were used to identify plane water erosion processes, along with cartographic materials and field sampling on test sites. Test sites were located in different climatic zones of Ukraine with different types of soils.

The rules for classification decisions to determine the manifestations of water erosion based on satellite images were developed. In field conditions, the determination of soil erosion gradations is carried out according to their morphological characteristics, which is the soil truncation degree of the genetic horizons. Taking into account that there are no reference models for the erosion indicating of different soil subtypes due to the spectral features, the general approach of these features determination (training sets) is to obtain data directly on the test sites and soil profiles within the study area.

To determine the erosion by the state of vegetation cover, the vegetation indexes obtained from the high spatial resolution images are used. In particular, the proposed by Mathieu [8] brightness index (BI) and the NDVIRE index are used. NDVIRE index includes the red edge spectral band, which can be effectively used as indirect indicator of soil degradation.

For the RapidEye image, applied in the research, the following equations were used:

BI =sqrt(($R2^2$ + $R3^2$)/2)

(2) NDVIRE =(R4-R3)/(R4+R3)

where R(i) is a corresponding spectral band of RapidEye image.

Humus content were calculated based on the equation of multiple linear regression of the values of vegetation indexes BI and NDVIRE. As a result, the map of erosive degradation within the fields were designed. The developed logical model of automated identification and classification of soil water erosion using remote sensing data of high spatial resolution is presented in Fig. 1.

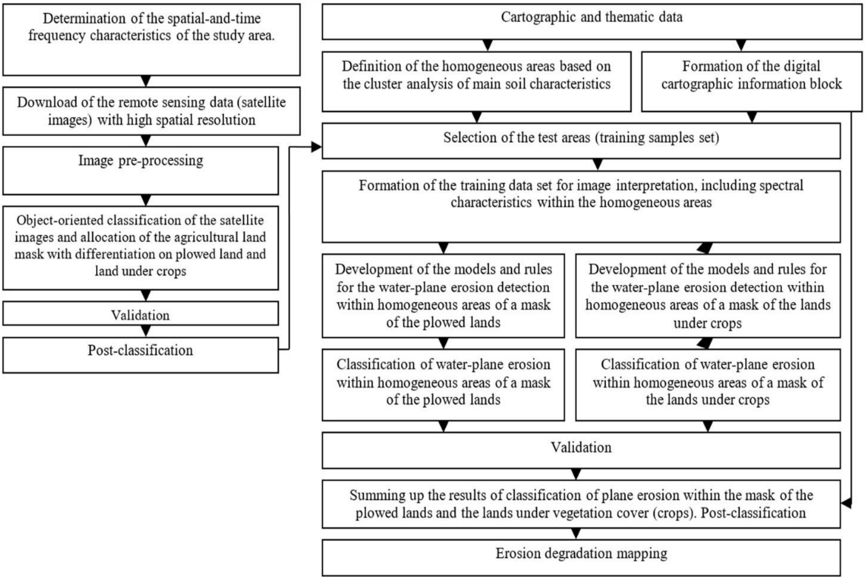
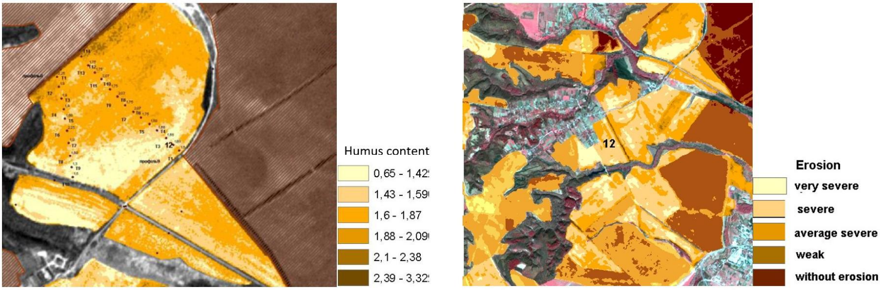


Figure 1: Logic model of the soil water erosion classification based on the remote sensing data of high spatial resolution

Within the test agrarian site located in the Myronivsky district of the Kyiv region the homogeneous soil region was identified as black soils with low humus content. BI and NDVIRE indexes were calculated based on RapidEye image and index values at each sample point were used as independent variable in multiply regressing modeling. According to the matrix of correlations, the equation of multiple regression for the soil covered with winter crops was developed as:

(3) H(humus) = 5.5626 + 2.0184*NDVIRE - 0.0187*BI.

As a result, the maps of humus contamination and erosion distribution within test site were developed (Fig.3).



a b

Fig. 3. Humus contents modeling based on the multiple regression within the mask on winter wheat crops using RapidEye image; a) test field, b) test agrarian site.

The logical models for soil water erosion detection, assessment and automated classification using remote sensing data of high spatial resolution based on multiply regression are proposed. The approach is based on the soil erosion classification within the homogeneous areas in term of soil type. Thus for each soil type the corresponding regression equation model needs to be formed. It is proposed to use the BI and NDVIRE indexes as input values in the regression model for the soils covered with vegetation. Combination of the different remote sensing data and regression models of erosion detection and its intensity by values of spectral reflection in samples points, makes it possible to determine the soil erosion distribution within a particular field.

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Tertychna O.V., Doc. Biol. Sci.
Senior Research Officer
Svaliavchuk L.I., Cand. Biol. Sci. (Ph. D.)
Research Officer
Institute of Agroecology and Environmental Management of NAAS
Kyiv, Ukraine

ECOLOGICAL FEATURES OF THE COMPONENTS OF THE ARTIFICIAL SYSTEM «POULTRY – ARTHROPODA – SURROUNDINGS»

Fast growth of production poultry products, which manifests itself in increasing demand for meat and poultry eggs leads to an increase in the concentration of poultry per unit area of livestock farms. Creation of optimum conditions of microclimate in premises, a mechanism for removing bedding materials and litter, fodder residues create favorable conditions for the year-round development and existence of synanthropic insect species and ectoparasites, that are carriers of pathogens of various etiologies [1, 2].

Poultry farms are powerful agricultural facilities, built by a person for the cultivation and maintenance of industrial poultry. Large poultry complexes are characterized by a closed type of poultry production and consists of the following major sections: feed mill, poultry enterprise for growing parent poultry (for the production of hatching eggs), incubator department, poultry farming for broiler chickens and slaughter department. Amount bred poultry broilers for one production cycle is the definition of production capacity [3].

Poultry farming with broiler production appertain to artificial systems, because they are based on such interrelated principles: growing and keeping birds on a limited territory (in poultry houses), which are equipped energy- and resource-saving systems, which provide the creation and maintenance of an opti-