UDC 631.1:615.894

# CURRENT RADIATION SITUATION ON THE TERRITORY OF SEPARATE SUBDIVISION NULES OF UKRAINE TEACHING AND RESEARCH FARM "VORZEL"

***I. Gudkov, V. Illienko, A. Rusavska, O. Pareniuk, M.P. Zhuravel***

*It is presented the results of the radioecological investigation of teaching and research farm NULES of Ukraine "Vorzel", which were conducted during 2009-2012, namely gamma survey areas of agricultural land, the specific activity $^{137}Cs$ and $^{90}Sr$ in soil, crop production, feed, milk; the data about vertical and horizontal migration of radionuclides, representation and quantitative composition of the soil microflora.*

***Teaching and research farm "Vorzel" gamma survey, $^{137}Cs$ and $^{90}Sr$ in soil, plants, feed, milk, migration of radionuclides, soil microflora.***

The accident at Chernobyl in Ukraine only been contaminated by radioactive substances in the 53,454 km2 area, where there are 2293 settlements in which the population of 2.6 million people [5, 9]. Agricultural land contaminated to such an extent that pose a risk in agricultural production, reaching 1.3 million hectares. [2]. Today the population living in the contaminated areas, up to 95% of the dose exposure to ionizing radiation gets through the innershnoho exposure of incorporated radionuclides entering the body with food. Among them are the main dozoutvoryuvachamy milk, meat, potatoes and vegetables [4]. By the 4th of radioactive contamination zone - the zone of enhanced radiation monitoring after the accident was attributed NDH "vorzel."

Research radiological state of the economy was conducted only in the first years after the accident under state programs to assess the extent of radioactive contamination of the country in 1986 (Figure 1). Certainly, for 27 years the situation has changed in the direction of improvement due to physical decay of radionuclides, their migration into the thick of soil flushing precipitation [11]. Thus, the study of modern radiation

situation in the economy, where living and working at the university are academic and practical training, students are sufficiently pressing issue.

General characteristics of the NDH "vorzel." The farm is located near the village. Vorzel Kyiv Svyatoshynski district, is one of the central zone of the right-bank Ukrainian Polesie. The total area of land is 785 hectares of arable land which covers 523 hectares, the remaining 262 ha - grasslands and pastures, 10 000 m2 occupied greenhouse. The main activities are the manufacturing sector and the scientific practice of university students, research work on the effects of various factors on the formation of meat productivity of cattle, beef and dairy farming, growing vegetables under glass.

For all Kiev Sviatoshynsky area shyrokohvylyastyy typical valley-type girder vodoeroziynyy relief. Relief economy is slightly undulating plain with a small slope to the south and south-west towards the Dnieper and Desna.

The largest area of the farm occupied by sod-podzol light and medium soils ohleyennya different levels; humus horizon with low humus content (1%) does not exceed 16-20 cm basics saturation is 50-75%, hydrolytic acidity 2.5 mEq / 100 g soil phosphorus and potassium are less than 100 mg / kg soil .

**The purpose of research.** Evaluation of current radiological situation areas of the economy that suffered the contamination due to the Chernobyl accident.

**Materials and methods research.** To assess the radiation situation in the NDH was held gamma-defined shooting l37Cs and 90Sr content in samples of soil and plant vegetables and fodder crop rotations, some feed and milk, analyzed the impact of radioactive contamination on soil microflora diversity.

Samples were selected in several selections: winter in February, summer in June 2009, the spring in May, the fall in October 2010, in the summer, in August, the fall in October 2011 sampling points (T1-T10) is shown in Figure 2. When sampling soil and products guided accepted method of sampling for radiometry [8] and in the analysis of the structure and quantitative composition mikrobotsenoziv - methods of conventional microbiology methods [7].

Power background radiation was assessed using the dosimeter "Terra". Determination of radioactivity of samples was performed on 137Cs radiometer Rub

01-P6 and 90Sr - radiochemical method [3]. Statistical analysis of data was performed using the software package Microsoft Office Ehsel 2007.

Coefficient of radionuclide accumulation PhD defined as the ratio between the number of radionuclide per unit mass of the plant and its contents in the same amount of soil and conversion factor KP - as the ratio of the radionuclide per unit mass of productive to its number 1 m2 topsoil in which plants are grown .

## Conclusions

1. The environmental radiation survey area NUBiP of Ukraine NDH "vorzel", conducted in 2009-2012., Showed that around power sector background radiation is at 0,09-0,11 mSv / h, which is virtually the pre-accident value of its .

2. The level of soil contamination of agricultural land for 137Cs - basic radionuclide dozoutvoryuyuchym chasyny for this country is mostly below the limit that separates relatively clean and contaminated areas (37 kBq / m2).

3. The specific activity of green mass of vegetables this radionuclide ranged from 28.6 to 199.0 Bq / kg and forage crops - from 57.9 to 109.9 Bq / kg, which is below the acceptable level.

4. The specific activity of milk - a product that is considered a major component of the human diet dozoutvoryuyuchym is 6,3-8,0 Bq / kg, which is much lower than the permissible level (100 Bq / l). The largest contribution to the contamination of milk belongs hay and green mass of plants.

5. Contamination of soil and agricultural products 90Sr relatively small.

6. The number and diversity of microorganisms is higher for meadow ecological community compared to forest biological community. Radionuclide contamination in this case is not the main factor of influence.

7. Current radiation situation in the territory of NDH "vorzel" that after the Chernobyl accident was attributed to the zone of increased radiation monitoring, is not dangerous for crop production and animal husbandry.

## Список літератури

1. Атлас. Україна. Радіоактивне забруднення. / [за ред. Холоші В.І.] – К.: ТОВ „Інтелектуальні системи ГЕО”, 2002, 2008, 2011. – 52 с.

2. Гудков І.М. Актуальні завдання і проблеми сільськогосподарської радіоекології через чверть століття після аварії на Чорнобильській АЕС/ І.М. Гудков, В.О. Кашпаров // Вісник Житомирського нац. агроекологічного ун-ту. – 2012. – № 1(30). – Т. 1. – С. 27–36.

3. Гудков И.Н. Практикум по сельскохозяйсвенной радиобиологии / Гудков И.Н., Ткаченко Г.М., Кицно В.Е. – К.: УСХА, 1992. – 207 с.

4. Гудков І.М. Сільськогосподарська радіобіологія. / І.М. Гудков, М.М. Віннічук, – Житомир: ДАУ, 2003. – 472 с.

5. Двадцять п’ять років Чорнобильської катастрофи. Безпека майбутнього. – К.: КІМ, 2011. – 356 с.

6. Допустимі рівні вмісту радіонуклідів $^{137}Cs$ і $^{90}Sr$ у продуктах харчування та питній воді: ДР-2006. Держ. гігієнічні нормативи. – К., 2007. – 10 с.

7. Звягинцев Д.Г. Почва и микроорганизмы. / Д.Г. Звягинцев. – М.: Изд-во МГУ, 1986. – 256 с.

8. Практикум з радіобіології та радіоекології. / [Гайченко В.А., Гудков І.М., Кашпаров В.О., та ін.]. – К.: Кондор, 2010. 286 с.

9. Радіоекологія / [Гудков І.М., Гайченко В.А., Кашпаров В.О. та ін.]. – Херсон: Олді Плюс, 2013. – 468 с.

10. Соціальний, медичний та протирадіаційний захист постраждалих в Україні внаслідок Чорнобильської катастрофи. Збірник законодавчих актів і нормативних документів. – К.: Чорнобильінтерінформ, 1998. – 616 с.

11. Gudkov I. Modern radiation situation in Europe and problems of agricultural radioecolo1gy / Radiological and Agroecological Researches (Tbilisi). – 2012. – V. 8. – P. 14–17.