

AGRICULTURAL CROPS IN THE PROXIMITY AREA OF THE FORMER URANIUM EXPLOITATION BĂIȚA, BIHOR COUNTY

Dumuța Corneliu*, Brejea Radu Petru*, Martin (Boros) Anca Mădălina**

*SC Water Company Oradea SA, 3 Duiliu Zamfirescu St., corneliudumuta@gmail.com

**University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St.,
410048 Oradea, Romania, E-mail: rbrejea@yahoo.com

***Environmental Protection Agency of Bihor County, 25 A, Dacia Street, Oradea,
Romania, E-mail: madalinaboros@yahoo.com, madalina.boros@apmbh.anpm.ro

Abstract

The Beiuș intracoline basin is the result of the action of Crișul Negru and its numerous tributaries that had created a system of valleys with terraces and meadows.

Another representative category of the relief is the meadow. We notice, first of all, the Crișul Negru Meadow, intensely cultivated and humanized, as well as the meadows of the affluent rivers of: Băița, Pietros, Nimăeștilor, Roșia, etc. The meadows are inhabited and people practise the agriculture, despite the risk of floods .

Although there are no associative forms in the agricultural field in the Beiuș Basin, there are crops of corn, wheat, triticale, potato, etc., these crops being cultivated on relatively small plots of land, the surface of agricultural lands being strongly fragmented.

Agricultural lands in the Beiuș Basin, but especially in the Băița - Ștei area, during the exploitation of uranium ore, carried out for several decades, as well as after the extraction had ceased, primary processing, sorting and crushing and so far they have been exposed and they continue to be, to a greater or lesser extent, to the risk of radioactive pollution.

The protection for radiation represents an objective necessity determined by the fact that radioactivity and ionizing radiation have, on one hand, harmful effects on health and the environment and, on the other hand, they can be used for the benefit of people and the environment. Thus radioactivity and ionizing radiation are "hostile" phenomena ubiquitous in our natural environment.

Key words: uranium exploitation, mining mouths, radioactive waste, radiations, production, agricultural lands.

INTRODUCTION

The surface of the objective located in the South-East of Bihor county includes some elements that are specific to the mountain area (Bihor Mountains and Vlădeasa Mountains), the piedmont of these mountainous areas, as well as The Crișurilor Plain, is a component part of the Western Plain . The Bihor Mountains represent the highest and most massive unit in the Apuseni Mountains. The peaks of these mountains gently descend towards the Beiuș Basin. (Măhăra, 1977)

According to Figure 1., the studied surface of agricultural lands in the Beiuș Basin is about 38000ha.



Figure 1. Beiuș Basin (Google maps – processed, 2019)

Pedogenesis takes place in the western part of the country in a specific way in which the presence of relief, meteo-climatic and anthropogenic elements equally influences and strongly affects the solification process. In this sense, the high relief elements specific to the mountain area that are present in balance with the foothills, the basin and the high plain features, the anthropogenic component, the air movements, the rich hydrographic network act simultaneously in the soil formation process. (Brejea, 2011)

Crișurilor Plain has its easternmost branch developed on the Crișul Negru and presents notable complementary influences of mountain areas (Bihor-Vlădeasa-Codru-Moma Mountains), which have the specific presence of the anthropic element, inhabited areas, villages or hamlets with permanent character, some of them being identified even in the alpine area (Gârda, Arieșeni, Bihor Mountains, Țara Moților).

Crișurilor Plain has a narrow alluvial area less developed in the area we are referring to, the profile of the V-shaped riverbed with more or less wide arms that allow alluvium only in the floodplain area of watercourses (Crișul Negru and its tributaries). (Brejea, 2010)

The research works had been started in an organized way in the Apuseni Mountains in 1949 by the Soviets who, through aerogamma and ground prospecting, identified in the 1950s the Băita uranium deposit at 2.5 km from the Molybdenum mine, a deposit that was the object of the largest mining operation (up to date) in the country between the 1950s and the 1960s.

The extremely rich deposit in active substance from Băița, Bihor county, determined the opening and super intensive exploitation of the Bihor Mountains in the space between the sub-basin of Crișului Negru – Băița and the sub-basin Arieș - Leuca valley. (Dalea, 2004)

The negative effects on the environment are generated by previous activities, from 1952 to the present, as follows:

- soil pollution was caused by deposits of radioactive dust from undeveloped dumps and platforms and from the uncontrolled runoff;
- the pollution of waters and sediments from waters is due to the discharge into the emissary of untreated mine waters.(Dalea, 2000)

MATERIAL AND METHOD

The research methods consisted of: measurements and observations in the field, discussions with landowners and owners, consultation of documents which had been locally archived in the area Băița - Beiuș, measurements on the level of gamma dose flow were performed in the field using the gamma radiation detector Gamma Scout Online.



Figure 1. The gamma radiation detector Gamma Scout Online

RESULTS AND DISCUSSION

The gamma dose rate exceeds the reference threshold only in the Băița Plai area and in the other locations, where measurements on the gamma dose rate were performed on the agricultural lands in the Băița - Beiuș area, there are higher values than at national level, but they do not exceed. (Table 1)

Table 1

The gamma dose rate from the Băița - Beiuș area between 2018 and 2019

Crt. no	Year	2018		2019	
		Place of measurements	Gamma dose rate nSv/h		Gamma dose rate nSv/h
		La sol	La 1 m	La sol	La 1 m
1	Băița Plai Barieră	246	175	238	171
2	Băița village	88	73	80	64
3	Nucet	84	70	77	62
4	Fânațe	80	67	74	63
5	Câmpani	72	60	68	57
6	Hârsești	70	62	71	62
8	Ștei next to Moara 4	87	76	88	79
9	Beiuș	60	51	62	54

In the Băița-Ștei area, due to the higher natural background of radiation, the Turda 201 hybrid corn harvest registers an increase of 3-5%, higher than in areas where the risk of irradiation is excluded, the productions were similar, quantitatively, with the production obtained in Beiuș (control area). (Table 2)

Table 2

Productions obtained in the areas studied for the Turda201 corn hybrid

Location	Year 2018 kg/ha	Year 2019 kg/ha
Băița sat	4950	4980
Nucet	4970	5010
Fânațe	4970	5020
Câmpani	4980	5040
Hârsești	4990	5035
Ștei	5050	5090
Beiuș (witness area)	5080	5125

In the Băița-Ștei area, due to the higher natural background of radiation, the Arieșan wheat harvest registers an increase of 3-5% higher than in areas where the risk of irradiation is excluded, the productions were similar, quantitatively, with the production obtained in Beiuș (control area).

Due to recent reductions in livestock in the area, manure fertilization is declining, which changes the chemical mineralogical composition or the mineral dowry of the soil. (Table 3)

Table 3

Crops obtained in the studied areas at the Arieșan wheat

Place	Year 2018 kg/ha	Year 2019 kg/ha
Băița village	4560	4585
Nucet	4580	4620
Fânațe	4590	4630
Câmpani	4590	4650
Hârsești	4600	4645
Ștei	4610	4640
Beiuș (witness area)	4685	4730

CONCLUSIONS

The measurements performed with the Gamma Scout Online Radiation Detector from Băița - Beiuș area indicated a higher level in the area proposed by the study, but there are no values that exceed the reference level, exceeding the reference threshold is registered only in Băița Plai area.

Due to recent reductions in the livestock in the area, manure fertilization is declining, which changes the chemical mineralogical composition, or the mineral dowry of the soil.

Within the existing communes in the Băița - Ștei area, there are no associative forms regarding the agricultural areas.

In the Băița-Ștei area due to the higher natural background of radiation, the harvest registers an increase of 3-5% higher than in areas where the risk of irradiation is excluded, the productions were similar, quantitatively, with the production obtained in Beiuș (area control), both for the Turda201 corn hybrid and for the Arieșan wheat.

It is confirmed the possibility of cultivating different agricultural crops without risk, so the recovery of land areas in the places that are considered exposed to the radioactive risk factor in the vicinity of former uranium holdings.

Global and local meteorological-climatic phenomena influence the soil quality indicators and the wetter years favour the migration of radionuclides to the deeper layers of the soil.

Radiation protection is an objective necessity determined by the fact that radioactivity and ionizing radiation have, on one hand, harmful effects on

health and the environment and, on the other hand, they can be used for the benefit of people and the environment.

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