

ECOLOGICAL MONITORING OF AGRICULTURAL PRODUCTS AND SAFETY RECOMMENDATIONS IN BOLNISI-KAZRETI REGION

Z.SVANIDZE. B.GOGICHAISHVILI. Z. BERIASHVILI

Soil polluted by heavy toxic metals significantly effects agricultural products. It has disastrous impact on living organisms. Given the above, the paper is dedicated to the determination of quantitative content of such heavy toxic metals in the vegetables grown in Kvemo Kartli of Georgia, particularly in Bolnisi and Kazreti, as bullet, cadmium, copper, zinc. Monitoring was run within 2009-2010. Nuclear-absorption spectrometer - Analyst-200 was used for the analysis. Based on actual data it was determined, that from agricultural vegetables, aubergine, union (less actively) actively absorb heavy metals.

Key words: Ecological monitoring, toxic metal, nuclear-absorptive spectrometer, natural sorbents.

Tourism development in Georgia is significantly associated with the degree of ecological cleanness of local food stuff as well as to its safety. One of the main fields from this point of view needing significant focus is agricultural products.

Toxic substance content in agricultural products depends on their concentrations in the arable land, since from soil they move to the plants and hence to the breathers.

Today [1-7] toxic element content of soil, water, air basins of Georgian ore-dressing and metallurgical regions are studied and there are less data about the content of the mentioned elements in agricultural products.

Given the above, the aim of this paper is to determine the pollution of agricultural products (aborigine, tomato, potato, etc.) with some toxic metals and provision of ecological recommendations.

Bolnisi-Kazreti region has been taken as a research object since Tbilisi and Kvemo Kartli residents are supplied by agricultural products from there.

Such toxic elements as bullet, cadmium, zinc, copper were selected as the elements to be researched. The choice here was not accidental, the above elements have high toxicology, cause many irreversible diseases and the diseases that are nowadays already undefined for the medicine, have carcinogenic character and destroy the breathers.

Over the years of 2009-2010 the arable lands of the villages of Bolnisi-Kazreti regions within the 25 km radius were monitored. 10 kg material for analysis has been taken from each arable land. Quantitative content of toxic elements in agricultural products of the above regions has been determined under applicable method of nuclear-absorption spectrometer [8] the optimal conditions of which are provided in table 1.

Optimal Conditions for Nuclear-Absorption Identification of Bullet, Cadmium, Zinc and Copper

Table 1

Parameter	Pb	Cd	Zn	Cu
flame	acetylene - air			
wave length, nm	283,3	228,8	213,9	324,8
hole width, nm	0,5	2	1	0,7
movable tape velocity, mm/min	240	240	240.	240

Experiment results are given in tables 2 and 3.

Average Element Content in Agricultural Products Taken From Arable Lands of the Village of Kazreti Region 2009/2010

Table 2

Culture	Average Element Content, mg/kg			
	Pb	Cd	Cu	Zn
aubergine	1,825	0,095	23,250	24,520
	1,878	0,088	24,107	23,154
tomato	1,785	0,0810	22,954	24,815
	1,901	0,0715	23,011	24,953
potato	2,158	0,071	24,154	24,875
	2,314	0,078	24,971	24,905
cabbage	1,978	0,074	23,158	19,275
	1,985	0,080	23,975	19,987
union	0,451	0,048	14,071	12,810
	0,458	0,032	14,180	12,973
millet	1,170	0,065	15,251	15,272
	1,208	0,078	15,778	15,714

Average Element Content in Agricultural Products Taken from Arable Lands of the Village of Bolnisi Region 2009/2010

Table 3

Culture	Average Element Content, mg/kg			
	Pb	Cd	Cu	Zn
aubergine	1,092	0,085	13,711	15,871
	1,075	0,089	13,811	16,101
tomato	1,011	0,026	13,978	15,728
	0,912	0,021	14,012	15,991
potato	1,777	0,019	14,072	16,070
	1,721	0,027	14,108	16,017
cabbage	1,707	0,015	13,701	15,111
	1,271	0,018	13,820	15,472
union	0,978	0,016	12,075	11,898
	0,721	0,018	11,872	11,901
millet	1,107	0,018	12,011	11,671
	0,971	0,017	11,172	11,071

Admissible (boundary) concentrations (ABC) of the research elements in agricultural products are provided in table 4.

Admissible (boundary) concentrations (ABC) of the research elements in agricultural products [9]

Table 4

Culture	Elements, mg/kg			
	Pb	Cd	Cu	Zn
Vegetables	0,5	0,03	10	10
Millet	0,3	0,03	10	10

**Relative Value of the Pollution Degree of Agricultural Products Against Admissible Concentration For Average Two Year Figures
Kazreti Region/Bolnisi Region**

Table 5

Culture	Elements, mg/kg			
	Pb	Cd	Cu	Zn
aubergine	3,7	6,1	2,3	8,85
	2,17	2,90	1,38	1,45
tomato	3,69	2,60	2,30	4,98
	1,99	0,783	0,98	1,59
potato	4,47	2,48	2,46	2,49
	3,25	0,77	1,41	1,60
cabbage	3,96	2,57	2,36	1,96
	2,98	0,55	1,38	1,53
union	0,92	1,33	1,41	1,23
	1,71	0,57	1,20	1,90
millet	2,38	2,38	1,5	1,55
	1,078	0,58	1,15	1,14

Factual data indicate that the concentrations of the toxic elements in the agricultural products are several times (several ten times) exceed the admissible (boundary) concentrations resulting in the pollution of the arable lands themselves. The fact that the research element content is high in aubergine and low in union, we assume is caused by individual product character.

For the improvement of the situation and for ecological healthiness of agricultural products, it is required to:

- identify the sources of soil pollution;
- run soil deintoxication;
- use safe fertilization;
- timely run agrotechnical activities;
- strictly maintain agroeconomical terms during running agricultural works.

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