THE EVALUATION OF POLLUTION OF AGRICULTURAL LAND BY Pb AND Cr, ALBANIA

VLERESIMI I NDOTJES SE TOKAVE BUJQESORE NGA PB DHE CR, SHQIPERI

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Abstract: *The eco-zone of Elbasan is located in the central part of Albania. The climate in the suburbs of Elbasan is characterized as Mediterranean field-central in which the annual average temperature is 15.4 grades, during the winter the temperature goes from -3 up to 18 grades and during the summer 25-35 grade. The average annual amount of rain is 1157-1300 mm, while the extreme annual amount of rain goes from 620 mm to 1500 mm. the earth habitats with a high potential of living creatures, are agricultural objects because the earth as ecological environment fulfils the conditions for the raise of agro ecosystem. One of the most evident conditions for the use of agricultural land is the presence of high nutritive levels for plant creatures and without pollution substances. The purpose of this study is the evaluation of pollution in agricultural land by Pb and Cr in the suburbs of Elbasan area. The provision of samples on pollution was carried out in four points, close to the object of Metallurgic Factory Paper – Pajove, Bradashesh-Vidhas,Labinot – Shushice and Vidhas –Paper. The depth of the earth sample was taken up to 30-50 cm, where is developed the main part of the root system of plants. The analysis has been carried out for the metals Pb and Cr. In each area were taken five samples in four different points. The weight of the sample was 0.3-0.5 kg. The Atomic Absorption Spectrometry (AAS) as an analytical technique was applied in order to determine the values of heavy metals Pb and Cr in different samples. The analyses were carried out in the Institute of Veterinarian Institute, Tirana. The values of Pb in the earth samples in the suburbs of metallurgic factory vary from 17 ppm in the sample no. 1 to 65 ppm in the sample no.14 such a change is because of the different distance of sample receipt. The difference between the sample with a highest value and that with the lowest value is 48 ppm Pb. The values of Cr in the earth samples vary from 418 ppm in the sample no.16 and 612 ppm in the sample no. 19. These values belong to the same area; this shows that the values of Cr are stable. The difference between the sample with the highest value and that with the lowest value is 194 ppm Cr. The study carried out in 2004 by the Department of Agro-environment & Ecology and by the Institute of veterinary research, Tirana, contributes in the qualitative evaluation of agricultural land in the agro ecosystems of Elbasan area.*

Rezumat: *Ekozona e Elbasanit ndodhet ne pjesen qendrore te Shqiperise. Klima ne rrethinat e Elbasanit karektizohet si mesdhetare fushore-qendrore ku temperature mesatare vjetore eshte 15.4 grade, gjate dimrit temperature levis nga -3 deri 18 grade e gjate veres 25-35 grade. Mesatarisht bien rreth 1157-1300 mm rreshje ne vit, kurse reshjet ekstreme vjetore jane nga 620 mm ne 1500 mm. Habitatet tokesore me mundesi te larta gjallesash, jane objekt bujqesor, sepse toka si mjedis ekologjik ploteson kushtet per ngritjen e agroekosistemit. Nga kushtet me te dallueshem per perdorimin e tokes bujqesore eshte prania ne te e niveleve te larta ushqimore per gjallesat bimore dhe pa lende ndotese. Qellimi i ketij studimi ka eshte vleresimi i ndotjes ne tokat bujqesore nga Pb dge Cr ne rrethinat e zones se Elbasanit. Sigurimi i mostrave mbi ndotjen u realizua ne kater pika, ne afersi te objektit te Kombinatit metalurgjik Paper – Pajove, Bradashesh-Vidhas,Labinot – Shushice dhe Vidhas –Paper. Thellesia e mostres se tokes eshte mare deri ne thellesine 30-50 cm, deri aty ku zhvillohe pjesa kryesore e sistemit rrenjor te bimeve. Analiza eshte kryer per metalet Pb e Cr. Ne secilen zone u morren nga pese mostra ne kater pika te ndryshme. Madhesia e mostres ishe 0.3-0.5 kg. Spektrometria me absorbim atomik (AAS) si nje teknike analitike, u zbatua per te parcaktuar vlerat e metaleve te renda Pb dhe Cr ne mostra te ndryshme Analizat u kryhen ne Institutin e Krkimeve Veterinare, Tirane. Vlerat e Pb ne*

mostrat e tokes ne rrethinat e kombinatit metalurgjik variojne nga 17 ppm ne mostren me nr. 1 dhe 65 ppm ne mostren e me nr.14 Nje ndryshim i tille eshte per shkak te distances se ndryshme te marrjes se mostrave. Diferenca midis se mostres me vlere me te larte dhe asaj me vlere me te ulet eshte 48 ppm Pb. Vlerat e Cr ne mostrat e tokes variojne nga 418 ppm ne mostren me nr.16 dhe 612 ppm ne mostren me nr. 19. Keto vlera i perkasin te njejtes zone , kjo tergon se vlerat e Cr jane te qendrueshme. Diferenca midis se mostres me vlere me te larte dhe asaj me vlere me te ulet eshte 194 ppm Cr. Studimi i realizuar ne vitin 2004 nga departamenti i agromjedisit&ekologjise dhe instituti i kerkimeve vetrrinare, Tirane, kontribon ne vleresimin cilesor te tokes bujqesore ne agroekosistemet e zones se Elbasanit.

Key words**:** *pollution, agricultural land, spectrometry, agro ecosystems*
Key words: *ndotje, toke bujqesore, sektrometri, agroekosistem*

INTRODUCTION

The problems regarding the guarantee of a stable environment in Elbasan region are many and very complex (4,6). This makes it difficult to treat them at the same time, in the conditions where big investments are necessary and the financial resources are very limited. The issue becomes more difficult by the fact that during more than 30 years the state institutions have remained silent toward the degradation of the environment in the region of Elbasan, which is reflected clearly in the liberal attitude toward industrial pollution, in the lack of studies on the environmental problems that have appeared, the inconsiderable investments for the improvement of the condition and the no-inclusion of these problems in national programs of interventions with priority in the field of environment. Thus, the selection of those problems that have the main impact in the environment and possible to be solved, could be a realist first attempt toward the improvement of the condition (1,2,8). This does not mean that other problems, collected or new are not important, but the analyzed issues are considered as the primary issues to be resolved (9,10).

The study environment. The study taken in the environmental field, in the eco**zagrotechnics**one of Elbasan has had the following objectives: The quantitative evaluation of Pb and Cr , considered as polluters in the earth environment. the Ecozone of Elbasan is located in the east part of the pine of Elbasan, in its central part is located Shkumbin river and in the west area is located the Metallurgic complex (3,5). The climate in the city of Elbasan or in the field of Elbasan is characterizes as Mediterranean central-field where the annual average temperature is 15.4 grade, during the winter the temperature varies from -3 up to 18 grades and during the summer between 25-35 grade. In special days the minimal and maximal temperature reaches its extremes. The average annual amount of rain is 1157-1300 mm shi, while the extreme amount of rain yearly varies from 620 mm to 1500 mm, and the main period of rain is October- March. Following the measurements done by the Institute of Meteorology and by other specialist the main direction of the wind results north-east and south-west. during the year 44% of the days are quite, in 23% of the days the wind blows in the direction from east and northeast and in 18% of the days from west to southwest with a speed of 0-3 m/sec. the direction of the wind has a direct impact on the distribution of polluters in the city of Elbasan and its suburbs. The average flow of the water of Shkumbin river is 52.3 m^2/sec (5,7).

MATERIAL AND METHODS

The provision of data. The provision of data on the pollution was done close to the object of zonal Metallurgic Combine. Paper – Pajove, emergent, zone 2. Bradashesh-Vidhas, zone3. Labinot – Shushice, zone 4. Vidhas –Paper. The analyses were carried out in the Institute of Veterinary Researches, Tirana. For the agricultural land the depth of the sample of

the earth has been taken up 30-50 cm, where develops the main part of the root system of plants. The analysis has been carried out mainly for the metals Pb e Cr. In each area were taken 5 samples in four different points. The size of the sample was 0.3-0.5 kg.

Preparation of samples. Many analytical procedures have been described for this purpose. The greatest part of the techniques described foresee the previous dissolution or dejection of the sample followed by the atomization programmed in a stove of graphite, instrument used in our case. (Varian AAS 200). We have preferred to apply those analytical procedures which carry out the oxidation with nitric acid with the help of the peroxide of hydrogen. We have managed to acquire the lowest values blank using the dissolution of samples in test-tubes silica-fused 16x100 mm with tap Teflon. The samples were measured repeatedly and the highest of points was compared with those of the respective standards. The standard dissolution of chrome and lead was added to different matrixes or mixtures sample +peroxide before they were incubated during the whole night 80 grade Celsius. Also alternatively we have also used the techniques with the addition of standards.

Reagents. We have used clean acid nitric (Fisher Scientific 00564) and also 30% H2O2 and $K_2Cr_20_7$ and we have only used the certified standards 1000mg/liter per AAS. The water used during the analytical procedures for the rinse of glasswork has been distilled and de- ionized. The levels of metals in the water used have been below the discovery level LOD. we have kept the dissolutions in a container of polyethylene or polystyrene.

Spectrophotometer with atomic absorption Spectroscopy with atomic absorption is the most appropriate term to characterize the absorption or release of the electromagnetic radiation (REM) by the atoms of heavy metals of the samples to be measured. All the atoms of a specific element absorb or release the electromagnetic radiation in a length of the wave which is unique for a specific element. This technique is based on the law of Beer according to which the amount of the light absorbed from a chemical element is in a direct proportion with its percentage in the sample analyzed. The spectrometer with atomic absorption (AAS) is an analytical technique which serves to pre-determine a wide spectre of the remains of heavy metals in different samples. This is a method qualified as “technique of the destruction of the sample” and the factual quantity of the sample used for measures in fact is very small (usually 10 milligram). The analytical element is composed by a photocell, a monochromatic and a system of reading, (see the photo). The sample after weighted carefully and exactly it is diluted in strong acids. In our study we have used mainly the nitric acid. The product of dilution is sprayed through a pump in the flame of acetylene produced by the instrument, in which are reached very high temperatures of the order of thousand grades Celsius. Here occurs also the atomization of the diluted material and as a result a photonic flux is produced (light) with a determined wave length. A part of this light (photons group) reaches to be absorbed by the atoms of the sample. The amount of the light that can be absorbed is in a direct proportion with the percentage of the element in the dissolution and also in the sample .in fact the measures with spectrophotometer with atomic absorption, are done separately for each element that is to be specified in the sample. This makes the technique relatively slow and consumes a lot of time for measures. However this technique is very sensitive and manages to determine traces of the elements of the order part per million and part per milliard.

Photo: Typical Spectrogram derived in Spectrometry with atomic absorption with the correction of the background

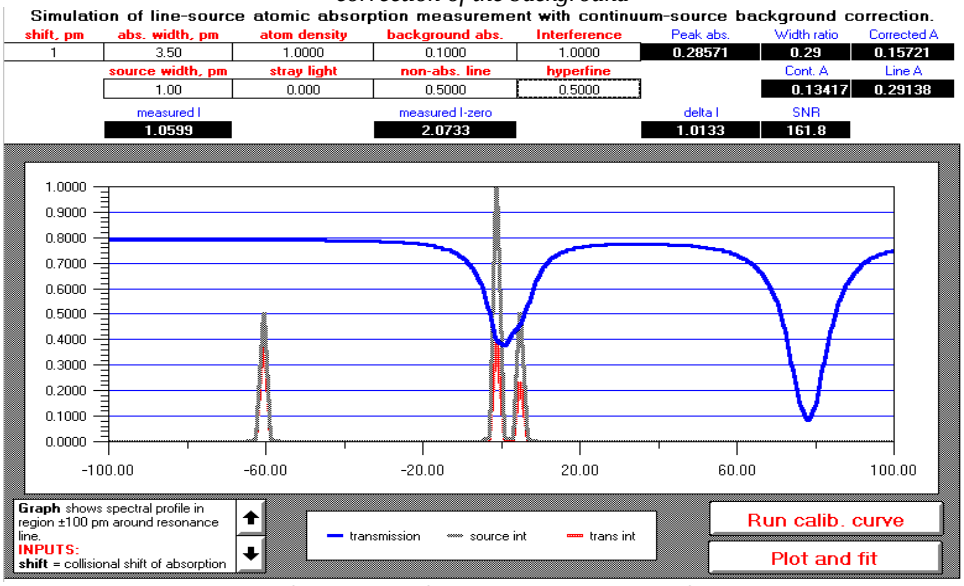

Figure 1: Analysis of the samples of agricultural land with AAS for elements Pb, Cr.

RESULTS AND DISCUSSIONS

The agricultural land is the result of the action of physical, chemical, biological factors, on the rocky formations was formed the land and the agricultural land. In the suburbs of Elbasan we can distinguish the type of alluvional land and the type of erosive land (depositing) (4). The mechanic composition is from the average to the heavy one. These lands are object of man activity, and today are cultivated by farmers. The land and agricultural land are in the ecological aspect, an indispensable factor in setting the relations of living beings. Not all type of lands can be used for agronomic or agricultural purposes but in the ecological aspect all the lands receive special values. This derives from the fact that the lands according to topographical, geological, pedological setting etc. are a habitat. Thus, there it is lived. Habitats have a limited or high possibility of keeping the human beings. The land habitats with a high possibility are an agricultural object, because the earth as ecological factor fulfils the conditions for the raise of the agro ecosystem. The most distinguishable conditions for the use of agricultural land is the presence of high levels of food for plant living creatures. In order to have a high efficiency of the land and habitat we should start from several aspects such as: any plant or animal requires a habitat to live, having food and other essential factors.

The samples of the land taken in analysis show that the elements Pb and Cr are varied values from one sample to the other. The values of Pb in the samples of the land in the suburbs of Metallurgic Combine vary from 17 ppm in the sample by no. 1 and 65 ppm in the sample by no. 14. Such a change is because of the different differences of the receipt of samples. The difference between the sample with a highest value and that with the lowest value is 48 ppm Pb. The values of Cr in the land samples vary from 418 ppm in the sample no.16 and 612 ppm in the sample no. 19. These values belong to the same zone; this shows that the values of Cr are stable. The difference between the sample with the highest value and that with the lowest value is 194 ppm Cr.

Table 1

Soil Samples Resultas Pb and Cr (ppm)

Nr. of sample	Code of sample	Pb (ppm)	Cr (ppm)
1	1a	17	578
2	1b	34	455
3	1c	29	510
4	1d	33	530
5	1e	29	544
6	2a	58	598
7	2b	61	590
8	2c	47	670
9	2d	48	660
10	2e	54	650
11	3a	23	418
12	3b	15	414
13	3c	19	332
14	3d	65	310
15	3e	12	320
16	4a	27	418
17	4b	11	443
18	4c	24	447
19	4d	26	612
20	4e	28	483

Sources: Analysis of the samples of agricultural land with AAS for elements Pb, Cr.

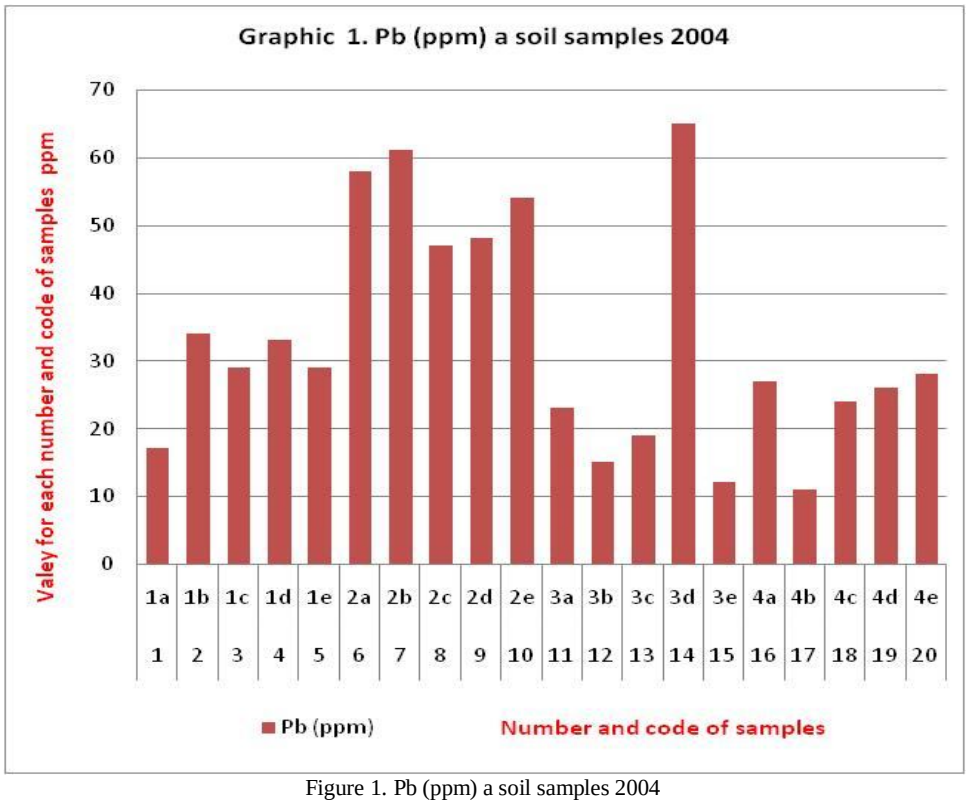

Figure 1. Pb (ppm) a soil samples 2004

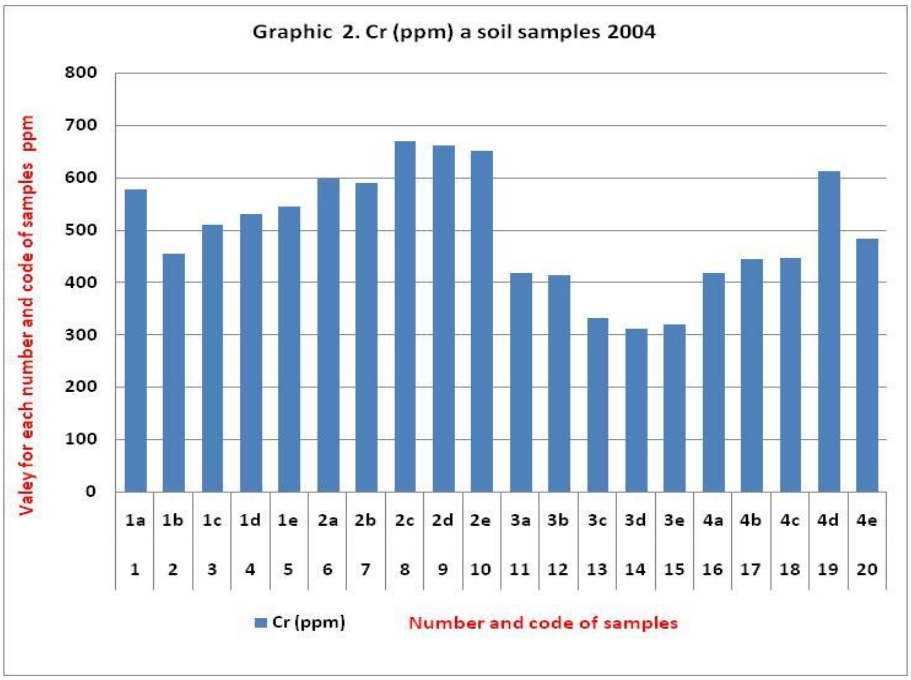

Figure 2. Cr (ppm) a soil samples 2004

CONCLUSIONS

The study carried out in the ecozone of Elbasan for the problems of ecological systems has reaches in a series of important conclusions:

- For the evaluation of pollution in the ecozone can be taken into consideration the composition of elements such as Pb, Cr.
- For the evaluation of agricultural land for the level of pollution can be taken into consideration only the composition of chrome Cr, and the element Pb is not problematic .
- The agricultural land Paper, Bradashesh, around the Metallurgic Combine has been polluted by the heavy metal of Cr.
- From the data of this study in general results that the Metallurgic Combine has caused pollution with dangerous consequences for the ecological system as a whole. Amongst the pollution of the environment in general is polluted also the agricultural land, the regeneration of which requires a long time, this is why the pollution caused by chrome Cr, shall be taken very seriously

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