STUDIES REGARDING POLLUTING AGENTS IMPACT ON MARINE ALGAE BIOMASS FROM BLACK SEA

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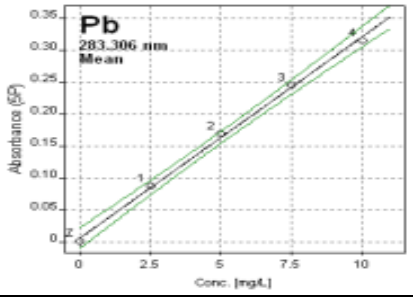
Abstract
The capitalization of Black Sea marine resources is conditioned by the impact of pollution with polluting agents. Polluting agents taken into study are heavy metals like: Cd, Cu, Zn and Pb. The accumulation of heavy metals into marine algae show the existence of polluting agents and the pollution factors of marine resources. Marine algae are the best biomarkers of pollution [1].The constant climate change and the growth of eutrophication in the last years made for a massive growth on marine biomass from the Black Sea. The capitalization of marine algae biomass can be made either for therapeutic purposes based on the active compounds from the marine algae or by the capitalization of marine algae residue with obtaining fertilizers used in agriculture [2]. The high interest for marine algae capitalization has taken into consideration only the marine resources with a low pollution value [3].

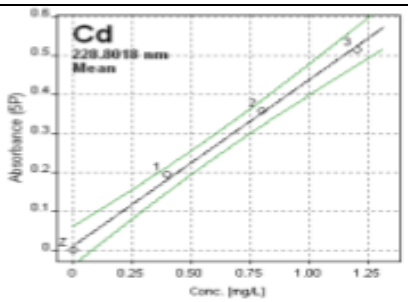
Materials and methods
The studied algae included *Cystoseira barbata*, *Ceramium rubrum*, *Ulva lactuca*, *Enteromorpha intestinalis*, and *Cladophora vagabunda*, harvested from the Black Sea during June-August in two different years: 2016 and 2017. Comparisons in what regards the heavy metal content between the two years were made. The method for heavy metal content determination was atomic absorption spectrometry. Atomic absorption spectrometry (AAS) which is a part of the UV-VIS optic methods and is based on measuring the radiant powers absorbed by free atoms. The AAS control methods are: analyzing a concentrated acid probe which reacts with analyzed solid probes. The acid samples consist of the following mixture: 2 mL H_2SO_4 96 %, 2 mL H_3PO_4 85 % 2 mL HF 40 % and 1 mL HNO_3 65 %. The solid samples have been dried up to 105°C, in order to obtain a constant mass. After the decantation process in order to reach mineralization, the samples have been filtered through Whatman filter paper. After drying, the marine algae samples have been mineralized with concentrated acids in order to determine the concentration of metallic elements at controlled pressure and temperature.

Equipment used: The Atomic absorption spectrometer ContrAA-700, Analytik Jena AG, Germany, with autosampler for dilution samples on acetylene flame method, sequential analysis at specific wavelengths Pb (283.306 nm), Cd (228.8018 nm), Cu (324,754 nm) and Zn (213,857 nm), analytical scale Mettler Toledo; electric water bath with temperature domain of 100^0C; thermal adjusted steamer.

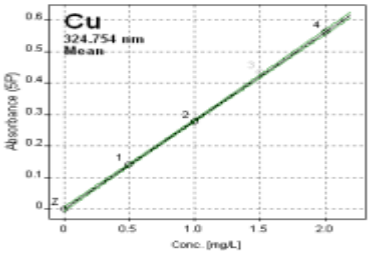
Results and discussion
The results regarding the heavy metal content is presented through medium values for the analyzed period. This paper describes the marine algae used to determine the heavy metal content. The time used for this study was only 3 moths/year being conditioned by the marine algae growth periods, heavily influenced by temperature and various other factors. In Fig. 1 a, b, c, d the calibration curves registered for Pb, Cd, Cu and Z are presented together with the detection limits of the AAS spectrometer for the 4 metals taken into study.



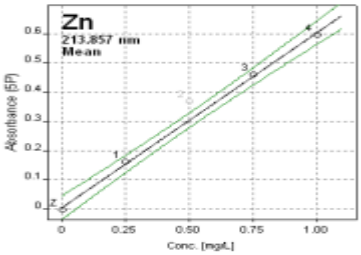
a) Calibration curve for Pb(λ = 283,306 nm)



b) Calibration curve for Cd(λ = 228,8018 nm)



c) Calibration curve for Cu (λ = 324,754 nm)



d) Calibration curve for (λ = 231,857 nm)

Fig. 1 Calibration curve for Pb. Cd, Cu and Zn

For each polluting agent studied there are also presented aspects on the possible toxicity levels on human organisms. The determination of the heavy metal contents from marine algae was compared with the one from marine waters.

Conclusions. The results obtained outline the low level of pollution of the algae biomass studied, in what regards heavy metal content. Through this study I managed to monitor and highlight the heavy metal contents from marine algae biomass.

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