THE LEVEL OF AIR POLLUTION WITH SEDIMENT PARTICLES IN BIHOR COUNTY BETWEEN 2019 AND 2021

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Abstract

This paper studies the level of air pollution with sediment particles in the Bihor County area, between 2019 and 2021. The data used for this work were provided by the Environmental Protection Agency of Bihor Oradea. This agency deals with the monitoring of air pollution with sediment particles in Bihor County.

In Bihor County there are located 10 sampling points of sediment particles, strategically divided. Four sampling points are located in the industrial area around Aleşd, two sampling stations are located in Oradea (A.P.M. Headquarters and Meteorological Station), and the other 3 points are located in the industrial area of Oradea (Episcopia Bihor, Biharia, Sălard) and a sampling point in Băile 1 Mai.

Through these located points we can have a real image of the pollution with sediment particles in Bihor County, being able to take concrete measures in cases of pollution with sediment powders.

From the study carried out, it can be concluded that at Telechiu in 2021, the month of April was determined a concentration of 17,550 g/m2, the maximum permissible concentration being exceeded (17 g/m2/month).

Keywords: maximum permissible concentration, monitoring, sampling points, sediment particles.

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INTRODUCTION

Air pollution with sediment particles is a very important problem, they are materials in the form of particles that can be solid or liquid. The particles have different forms such as: particles, smoke, soot, nitrates, asbestos, pesticides, bioaerosols. Sediment particles have an irritating action on the airways, and their specific action is related to their chemical composition, which can be toxic, fibrosing and allergenic (Pereş, 2011). In many cases these particles are of an anthropogenic nature by burning biomass, industrial processes, as well as road traffic. But they can be natural such as volcanic eruptions, sand and dust storms, natural fires of vegetation or forest (Köteles, 2011).

MATERIAL AND METHOD

For this study we used data from the Environmental Protection Agency of Bihor Oradea. This institution supervises the level of air pollution in Bihor County, through the 10 harvesting points (www.apmbh.ro). The harvesting points are: Telechiu, Chistag, Aleşd, Ţeţchea, Băile 1 Mai, Meteorological Station, A.P.M. Bihor, Biharia, Sălard and Episcopia Bihor (Köteles & Pereş, 2021). The analysis of the level of pollution with sediment particles was carried out over a period of three years (2019, 2020, 2021) (Köteles & Pereş, 2019). The maximum permissible concentration for sediment particles is 17 g/m^2/month (monthly harvesting frequency) (STAS 12574/1987, Order 592/25.06.2002).

RESULTS AND DISCUSSIONS

1. Annual evolution of sediment particles

Following the analysis of sediment particles concentrations, for 2019 it was observed that the highest concentration was determined in Chistag with a value of 8.747 g/m^2. A close value was also recorded in Sălard of 8.114 g/m^2 and in Episcopia Bihor of 7.049 g/m^2. Cele mai mici valori sau înregistrat în Oradea la APM Bihor cu o valoare de 4.043 g/m^2 şi la Staţia Meteorologică de 4.171 g/m^2.

In 2020, the highest concentration was determined in Telechiu by 7.492 g/m^2, followed by Ţeţchea with a value of 7.261 g/m^2 and 7.172 g/m^2 measured in Episcopia Bihor. The lowest values were determined in Băile 1 Mai (3.679 g/m^2), followed by Aleşd (4.116 g/m^2). The reduced value was also determined in Oradea at APM Bihor (4.563 g/m^2)

For 2021, the highest level of pollution with sediment particles was determined in Ţeţchea with a value of 9.748 g/m^2, followed by

Episcopia Bihor with 8.334 g/m² and Chistag 7.782 g/m².

From the evolution of the average concentrations for the years 2019 – 2021 it results that the maximum permissible concentration has not been exceeded (Figure 1).

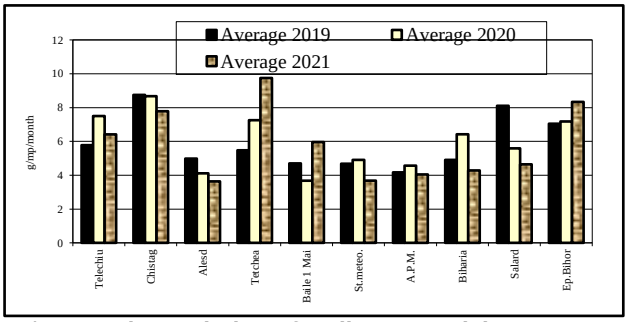

Figure 1 **The evolution of sediment particles average concentrations in Bihor county, 2019 – 2021**

Following the analysis of the average of the three years taken into account, it results that the highest concentration was determined in Chistag being 8.403 g/m², followed by the Episcopia Bihor with a value of 7.518 g/m² and Ţeţchea with 7.493 g/m². Low values were recorded at the sampling points in Aleşd (4.241 g/m²), APM Oradea (4.260 g/m²) and Oradea Meteorological Station (4.421 g/m²) (Figure 2).

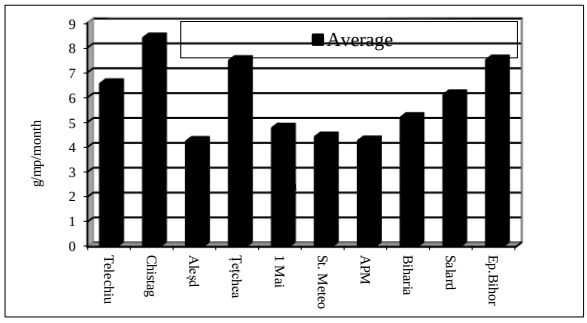

Figure 2. **Evolution of the multiannual average concentrations (2019 – 2021) of sediment particles at the 10 monitoring points in Bihor county**

2. Monthly evolution of sediment particles

Following the analysis of the 10 sampling points, the highest average concentration for 2019 is recorded in May, 7.928 g/m², followed by July with a value of 7.106 g/m² and June of 7.030 g/m². In the case of 2020, the highest values were determined in January (8.353 g/m²), July (7.707 g/m²) and June (7.604 g/m²).

For 2021 the highest concentration was determined in July of 7.991 g/m², close values were determined and in September 7.754 g/m² and may 7.573 g/m², (Figure 3).

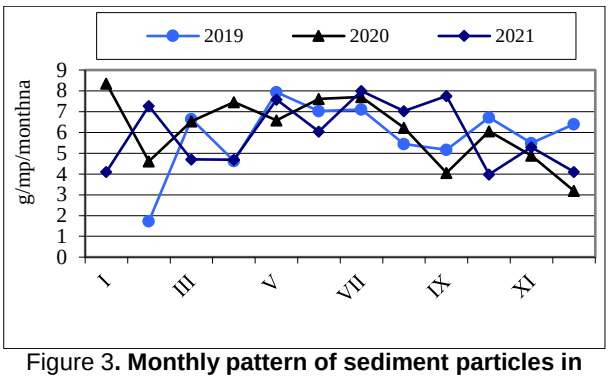

Figure 3**. Monthly pattern of sediment particles in Bihor county (the average of the 10 sampling points)**

In the analysis of the monthly evolution, for the three years studied from 2019 to 2021, the highest average was determined in July being 7.601 g/m², followed by 7.358 g/m² in May, and in June by 6.891 g/m².

The lowest concentrations following the analysis of the lunar evolution over the years studied were 4.439 g/m² in February, 4.562 g/m² in December and 4.916 g/m² in April (Figura 4).

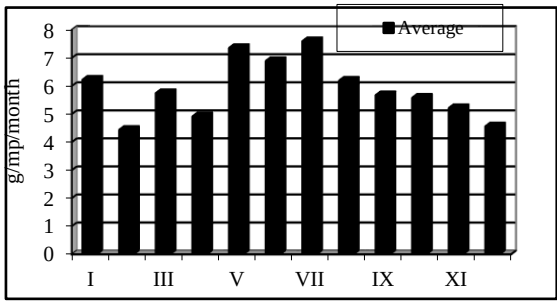

Figure 4 **The evolution of multiannual monthly average concentrations of sediment particles in Bihor (the average of the 10 sampling points)**

3. Evolution of pollution by sediment particles at sampling points

At the monitoring point in Telechiu, for 2019 the highest concentration was recorded in July of 12.120 g/m², of 11.520 g/m² in June and 10.090 g/m2 in March.

In 2020, the highest values were determined in January 16.310 g/m², in June 12.310 g/m², followed by November 11.250 g/m² (Figure 5).

The highest values for 2021 were recorded in April 17.550 g/m², when the maximum permissible concentration of sediment particles was exceeded, high values were also determined in September 16.880 g/m².

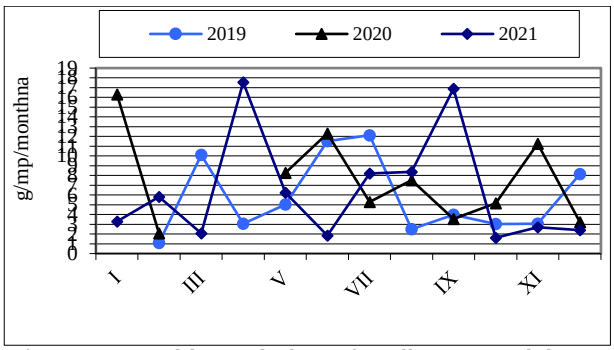

Figure 5. **Monthly evolution of sediment particles at sampling point Telechiu**

At the sampling point in Chistag for 2019, the highest measured value in July was 15.250 g/m², followed by June 13.49 g/m².

In 2020 the highest values were in January 16.120 g/m² and July 11.760 g/m². The highest value in 2021 was determined in September at 15.340 g/m²

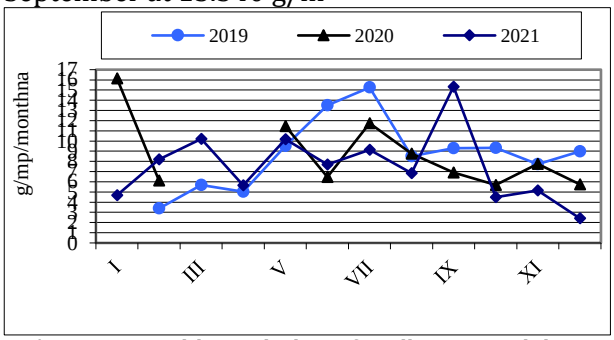

Figure 6. **Monthly evolution of sediment particles at sampling point Chistag**

At the sampling point in Țețchea the highest value for 2019 was determined in March (11.490 g/m²), and in 2020 the highest value was 15.850 g/m². In 2021, the highest value was recorded in February of 15.980 g/m² (Figure 7).

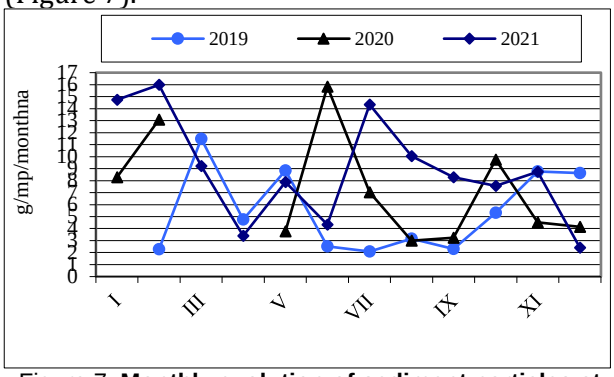

Figure 7. **Monthly evolution of sediment particles at sampling point Țețchea**

The highest value for the sampling station at The Meteorological Station Oradea was determined in January of 13.760 g/m² in 2020, followed by July in 2019 a value of 10.000 g/m² (Figure 8).

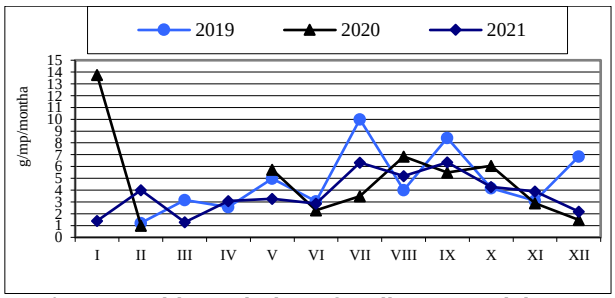

Fig.8. **Monthly evolution of sediment particles at sampling point Meteorological Station Oradea**

At the APM Bihor Oradea headquarters, the highest value of sediment particles was determined in August 2021 of 7.2700 g/m², followed by 6.790 g/m² in October 2019 (Figure 9).

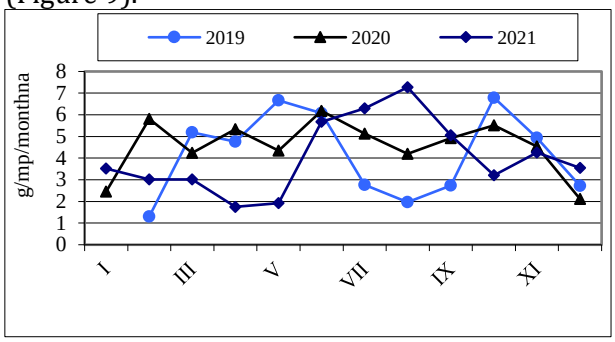

Figure 9. **Monthly evolution of sediment particles at sampling point APM Bihor Oradea**

The highest values recorded at the sampling station in Sălard, was determined in 2019, in May, a value of 16.320 g/m², followed by January 2020 of 15.820 g/m² (Figure 10).

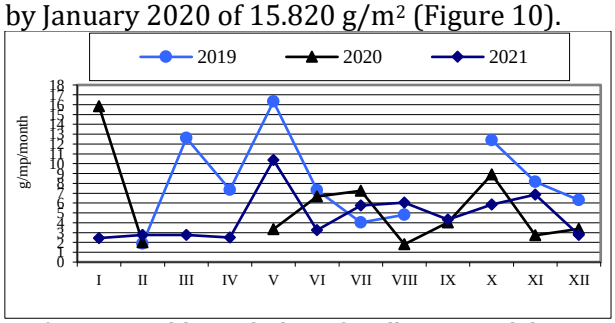

Fig.10. **Monthly evolution of sediment particles at sampling point Sălard**

CONCLUSIONS

The analysis of the average of the 10 sampling points for the years 2019 - 2021 shows that the pollution level does not reach the maximum permissible concentration which is 17 g/m²/month.

However, from the analysis of each sampling point, we can see that in Telechiu locality the threshold of 17 g/m²/month, was exceeded in 2021, the month of April being of 17,550 g/m².

In the localities of Telechiu, Chistag, Aleşd and Ţeţchea, in the Aleşd industrial area, there is a more pronounced pollution, but it does not exceed the maximum permissible concentration, only in the case of accidents or weather conditions that favor the deposition of sediment particles and the lack of precipitation.

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