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BIOMONITORING NO_x AND SO₂ USING URBAN TREES

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Abstract: The nitrogen oxides and sulfur dioxide air pollution in urban areas is a real problem. For this reason it is recommended the air quality monitoring. In this respect, one may note that biomonitoring is a useful tool. The aim of our study is to emphasize the NO_x and SO₂ occurrence in environmental air and the interrelationship between air N and S occurrence and their concentrations in biological tissue of pine tree needles. High NO_x and SO₂ amounts were identified in environmental air. Strong and negative correlations are emphasized between sulfur and nitrogen content of needle tissue.

• Introduction

Due to the importance of air pollution with nitrogen oxides (NO_x) and sulfur dioxide (SO₂), it is useful to monitor air quality from the point of view of the content of these components during the period, especially in urban areas. The aim of our study is to emphasize the NO_x and SO₂ occurrence in environmental air and the inter-relationship between air N and S occurrence and their concentrations in biological tissue of pine tree needles.

• Material and method

The study was performed in Cluj - Napoca area, in spring of 2023. The biological material is made of *Pinus nigra* (pine tree). The needles were collected weekly and both N and S were quantified from the biological samples. The air NO_x and SO₂ concentrations were provided by official data from the Cluj - Napoca Environmental Agency.

• Results and discussions

High NO_x (22.6 µg/m³) and SO₂ (82.80 µg/m³) concentrations are identified in environmental air.

Table 1. The mean and statistical indicators of the air SO₂ and NO_x concentrations (µg/m³) quantified in Cluj - Napoca municipality

Statistical indicator		SO ₂ µg/m ³	NO ₂ µg/m ³
n		106	106
Mean		22,60	82.80
The interval of confidence	+95%	17,04	70,55
	-95%	29,36	100.05
Variance		2,62	47,83
Standard deviation		1,62	6,92
Standard error of the mean		0,16	0,67
Coefficient of variability/Coefficient of variability		19,75	9,16

A strong multiple correlation (R = 0.752) is emphasized between the studied parameters.

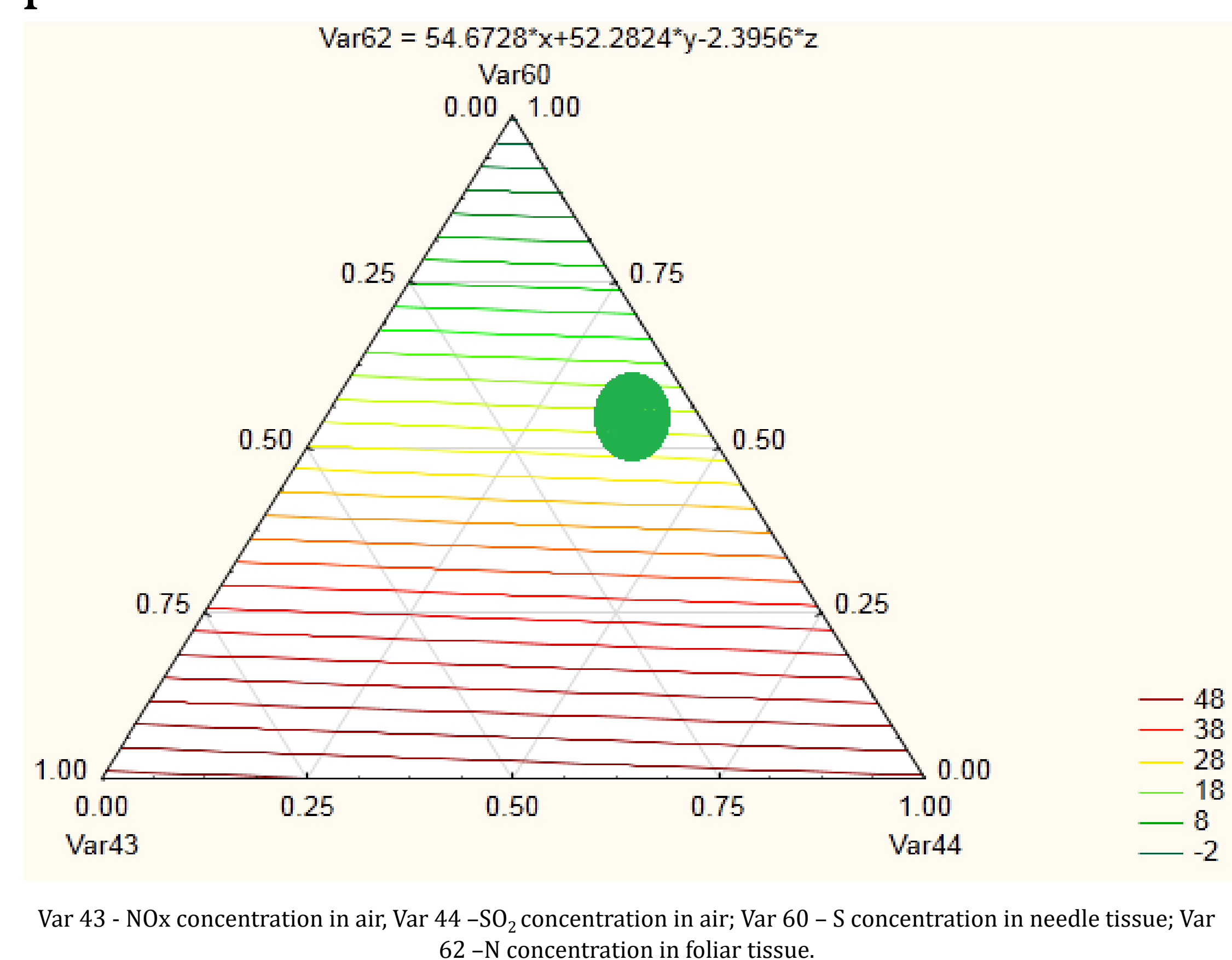


Figure 1. The interaction NO_x, SO₂ (from air), S and N (from *Pinus nigra* needle tissue) in Cluj - Napoca

• Conclusions

High NO_x and SO₂ amounts were identified in environmental air. Strong and negative correlations are emphasized between sulfur and nitrogen content of needle tissue.