

NITROGEN CONTENT IN SOME REPRESENTATIVE ALBANIAN SOILS ESTIMATED BY EUF METHOD

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Introduction

The electroultrafiltration (EUF)-method is one tool in determining of nutrient quantity and the nutrient intensity of different soils. Soil extraction by the EUF technique has practical importance for the prediction of mineralizable soil N. In addition to NO₃ and NH₄ the EUF method extracts an organic N fraction which is used to assess plant-available N.

Considering the popularity of this method some soil samples were analyzed by EUF and routine methods with objectives: (i) determine the status of N in Albanian soils, estimated by EUF method and (ii) determine the kinetics of N release measure by EUF.

This study was carry out with soil samples from nine sites located at different locations of Albania.

Methods

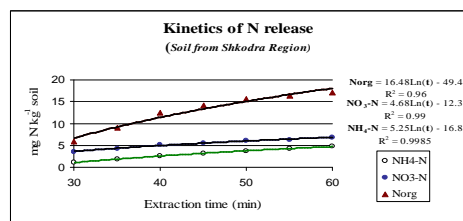
Soils from nine different sites in Albania are used. The soil samples were sieves to pass a 4 mm sieve, were air-dried and were used for analyzing of soil texture and the mineralogy of clay fraction. For further physico-chemical analyzes the air-dried soils was ground to pass a 1mm sieve. Mineral and organic N was extracted with 0.01M CaCl₂ and was determined in autoanalyser. On the other side content of N in soil samples was extracted by EUF method. The EUF technique as a routine analysis method normally extracts two fractions: the first fraction is extracted from 0 to 30min at 20^o C and 200V and the second fraction is extracted from 30 to 35min at 80^o C and 400V (Nemeth, 1985). For analyzing the kinetics of N release, the nine topsoil were extracted by a modified EUF extraction. After two fractions that were extracted with the EUF routine-program, five other fractions were extracted every five minutes at 80^o C and 400V. So, seven fractions were employed to analyze the kinetics of N release. The EUF extracts from anode and cathode were mixed together. Total N, NH₄-N, and NO₃-N in the EUF extracts were measured with a three-channel- autoanalyser. Organic N in the extracts was calculated from the difference between total N and (NH₄-N + NO₃-N).

Results.

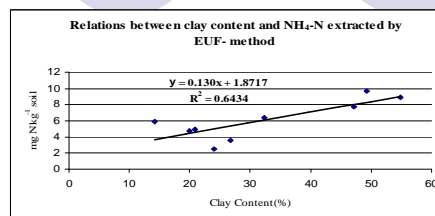
The average dates about Extractable N content and its compounds (NH₄ -N, NO₃ -N and Organic N) extracted with CaCl₂ and EUF are given in Table 1. N extracted by EUF is higher than N extracted by CaCl₂. This is true for all the nitrogen forms that we have determined. But the difference between N extracted with EUF and CaCl₂ are more apparent for organic N and NH₄-N. So, we can see that by EUF is extracted about seven time more organic N and NH₄-N than with CaCl₂, while for NO₃-N this ratio is only 1.3.

	mg N kg ⁻¹ soil extracted by:			
	CaCl ₂	EUF _{0-30 min}	EUF _{30-60 min}	EUF _{60 min}
Extractable N	12.86	18.65	21.21	39.86
NH ₄ -N	0.93	1.94	4.12	6.06
NO ₃ -N	8.89	9.09	2.29	11.38
Organic N	3.04	7.62	14.80	22.42

The kinetics of cumulative EUF extractable N, NH₄-N, NO₃-N and Organic N extraction were well described by Elovich function [$y = a + b \ln(t)$] and the determination coefficient, and term a and the b values for this regression are calculate and will present.



In all the cases the data matched the curve very well, r^2 being highly significant. The calculated b values represent the slope of each line and indicate EUF-N release rates (mg N kg⁻¹ and time unit⁻¹). A soil important factor that influence in variability of N desorption from selected soils is the clay content. The dates indicate strong relationship between clay content in one side and EUF- NH₄, EUF-Norg and steepness of slope b on the other side.



Conclusions

In all the samples analyzed in this study, EUF method extracted more extractable N than CaCl₂ method. For organic N and NH₄-N differences between methods are more apparent than for NO₃-N. EUF in 20^oC and 200V extracted nitrogen compounds that are easy available for plant nutrition and NO₃-N is main compounds of extractable N. Fractions of EUF in 80^oC and 400V give information for N reserves in the soil and organic N is main compounds of extractable N.

The kinetics of EUF-N release is well described from Elovich function. The steepness of slope (b value), NH₄-N and organic N extracted by EUF are well correlated with clay content. Using EUF in determination of extractable N give the good information to know the potential of analyzed soils for available nitrogen.

References

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