ISSUES CONCERNING THE DETERMINATION OF ORGANIC CARBON IN SOILS THROUGH COMBUSTION

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Abstract: *In agrochemical methodology for the determination of the determination of the organic-C content, an implicitly the humus content, several procedures have been acknowledged. These procedures involve dry or wet combustion, followed by a titrimetrical, or rather a gravimetrical dosage of the humified organic matter. Based on the capacity for dry or wet combustion (employing acid oxidizing mixtures) it is thus obvious to come to differentiated results in methods (procedures) related to the humus (organic-C) quantity and quality, to the level of evolution-humification and destruction of the organic matter. These differences may be caused by the fertilizing organic resources (wich are to be found in the soil and prove active during the process of the humification). The paper and determinations conducted on different soils, in terms of humus supply and agrochemical treatments, regularly show that differences appear in favor of the results obtained through dry combustion, with a more energetic oxidizing-destruction in soils that are well-supplied with organic-C. In these cases, the mentioned fraction is more stable as a consequence of superficial nitrogen bioaccumulation. In soil samples containing humus in a predominantly pozitive evolution and also humic fractions (of the organic-C) in stabilization (destruction and synthesis), the determined values are variable and are not always subject to clear differention rules.Therefore, out of the organic-C values determined throgh dry, respectively wet combustion, the establishment of certain correlations appears necessary for the interpretation of the global carbon cycle. The purpose of this research resides in setting an interpretation methid that would certify the comparison of methods obtained in determining organic carbon (dry and wet combustion). In this respect, the interpretation at hand shows varied and comparable possibilities in assessing average and long-term evolution of organic-C soil reserves.*

Key words**:** *carbon, humus, dry combustion*

INTRODUCTION

There has been a through study within the field of agrochemical laboratory methodology, leading to the recognition of the organic soil component (as complex as its cxomposition can be), to plant fertility and nutrition. Thus, several methodologies, procedures and pertinent interpretations have been developed, in the field of pedology, as well as agrochemistry (BLACK, 1993; BORLAN and HERA 1984; RUSU et al. 2005).

Therefore, soils are characterrized and classified into taxonomic units and subunits. At the same time, their productivity is assessed thruogh the organic-C and humus content which is a referential indicator expressed percentually. These indicators are agrochemically relevant for the characterization of the carbon cycle and the assessment of the nutrient condition (especially that of the nitrogen) and for determining the soil buffering capacity in relation to technological and antropic effects.

MATERIAL AND METHODS

The total and organic C analyses were conducted according to two soil categories, initially differentiated according to this indicator – a vertic argic chernozem in Turda and an albic luvosoil in Livada. The first benefited from a pedoevolution of good representation of the

organic component through bioaccumulation (with the specific aspect of this process) as compared to the second soil, wich is strongly acidic and unsaturated. However, this last soil was administered (in the last 45 years -30 t manure/ha) in the 16,17 variants on an unlimed fund; 26.27 on a limed background with 5 t $CaCO_3$ /ha and 35.37 on a limed background with 10 tons $CaCO_3$ /ha.

RESULTS AND DISCUSSIONS

The results obtained certify in the greatest majority of situation that the largest values registered for the organic-C and respectively humus are obtained through wet digestion (fig.1).

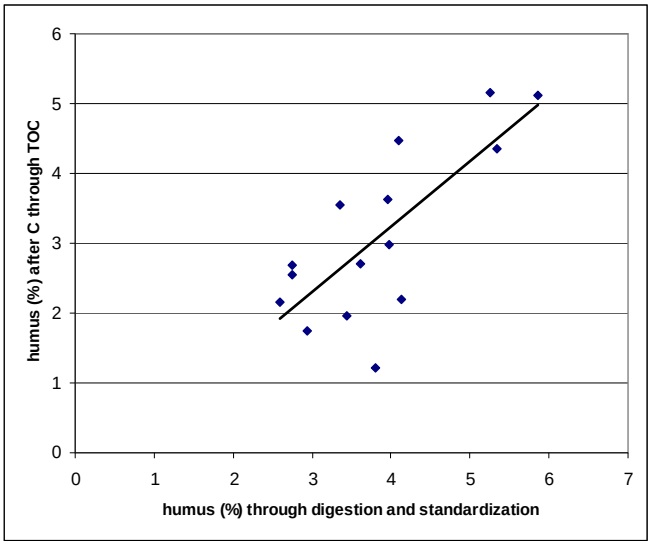

Fig. 1. The occurrence and dependence of humus values according to C Through TOC and C-through wet digestion

Acording to the above –mentioned observation, the values obtained in the unlimed albic iluvosoil make an exception and present reverse deviations, as the acidic and unsaturated environment therein doesn't favor the humifying of organic resources introduced in the soil as fertilizers –their decomposition, respectively humic synthesis manifest sources and states of value differentiation.

The predominance of differentiation values and further of determined contents through dry combustion can be motivated through the more advanced character of the oxidizing of organic components at a temperature of 900^0 C as compared to their more diminished degradation through wet digestion, where we can also add the errors intervened in the titrimetric dosing.

Preliminary results obtained are even more relevant for dry combustion as the soil holds a more stable and a more saturated humus and organic carbon, which were accumulated through the specific processes of bioaccumulation and they advance in „aged" humic components submitted to degradation less often. Soils which are more or less degraded as far as the organic component is concerned and which improve this component through fertilizing organic inputs over several decades can prove certain instability, before reaching a unique balance wich is specific to the class and/or pedologic type or the quantity accumulated and humified.

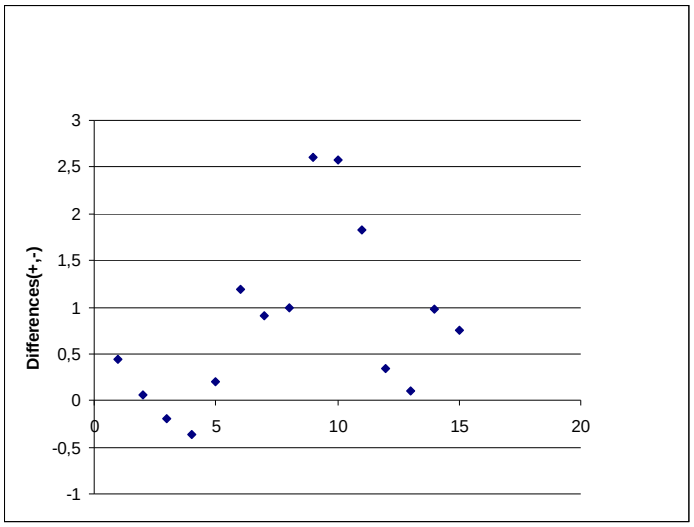

Fig . 2. Determined differences between % Humus obtained through dry combustion and wet digestion

CONCLUSIONS

Between the values of organic C and humus determined through dry combustion and acid humic digestion we can establish a direct proportionality relationship.

The contents resulted through dry combustion are predominantly higher as opposed to the ones obtained through wet digestion.

The regularity of the above observations is a function of the initial supply with total C (and humus) of the soils with the environment created for humification with nature and the variant of organic fertilizer application.

In order to extend the employment of methods and procedures for the determination of the humic component in the practice of agrochemical laboratories, we recommend thorough studies in the field.

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