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Comparing the methods for determination of carbon in soil

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The global climate change raised the question of carbon sequestration of forests. Forests are important natural carbon sequesters in the temperate zone. It can be ascertained, that a significant part of carbon (often more than half of it), can be found in the soil. The greater amount of carbon can be found in the organic substance of soil (humus).
There are several methods for determination of carbon in soil. The most popular method is determination by dry-burning, which means that the samples are exposed to high temperature and the amount of carbon content of CO_2 becomes observable with the help of thermal conductivity detector or infrared spectroscopy. The advantage of this system is that burning and carbon content determination happens in a reproducible way if the conditions are satisfactory. However, this method is limited, because e. g. in Hungary the soil contains too much lime (often above 50%) and during the burning CO_2 evolves from decomposition of minerals. The previous hydrochloric destruction of carbonate is not usable for lime content during examination. In the case of soils with high lime content the application of wet oxidation by potassium dichromate for organic matter determination is correct.
During our investigation we made a comparison between the results of dry and three different wet burning, in the same way we did with organic matter determination in parallel with the determination of 320 soil samples. Between the results of wet burning we detected a decided difference. The Tyurin-type humus (Benediktas 2006, Tóth and Szabó 2003) determination (which is widely applied in Eastern Europe and it is a gas burning destruction method) showed high dispersion. The other destruction method showed favourable results, this method is applied on water bath, and is corresponding to the Hungarian standard. The correlation coefficient was between 0,87 és 0,98 amongst three analytical methods. We made a comparison between results of wet and dry burning method. The latter method was performed with Elementar vario EL III. C/N system. The results showed that there is very close correlation (0,99) between the wet and dry analysis and when laying a regression line to the results of two analysis, the line cuts the axis almost in zero, and the steepness of line is 45 grade. The most effective method was the following: potassium dichromate destruction during 3 hours on 100°C in water bath. In case of this method, the wet analysis is fairly substituting the dry method. Therefore we propose the application of wet burning methods in case of calciferous soils, which will not destruct the carbone of soil, moreover it gives convenient data. The wet burning methods showed better carbon determination results in case of calciferous soils than the dry burning method.

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