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## Titel
Organic carbon content determination in soils: challenges and opportunities of elemental analysis versus thermogravimetry

## Abstract
Sustainable soil management needs reliable and accurate monitoring of soil organic carbon (SOC) content. However, despite of the development of analytical techniques during last decades, the detection opportunities for short term and rather small changes in SOC induced by organic fertilization, organic amendments or land use changes are still limited with the available methods. This study aims to quantify the theoretical detection opportunities for changes in SOC content with elemental analysis (EA) as the standard method in comparing with thermogravimetry (TG) as an enhanced traditional approach derived from soil organic matter determination via mass losses on ignition. The carried out experiments consist of mixing soil samples from non-fertilized plots of three long-term agricultural experiments in Bad Lauchstaedt, Großbeeren and Muencheberg (silty loam, loamy sand and silty sand) with straw, farmyard manure, sheep faeces and charcoal in four quantities (3 t×ha$^{-1}$, 20 t×ha$^{-1}$, 60 t×ha$^{-1}$ and 180 t×ha$^{?1}$fresh matter) under laboratory conditions.The quantities were based on fresh matter application in agricultural practice accepting different amounts of added organic carbon. The results confirm EA as a method of higher reliability and accuracy for carbon content determination. TG allows to distinguish the different types of added amendments with high sensitivity. This was achieved by using newly developed evaluation algorithms for the thermal decay dynamics. We conclude from these results that TG cannot substitute EA to determine organic carbon on a routine base. However, TG could be a supplementary fingerprinting technique for the detection of added organic carbon to soils from organic fertilizers and to distinguish sources of geological or anthropogenic origin enabling a future assessment of soil organic carbon quality.