Geophysical Research Abstracts,
Vol. 11, EGU2009-12093, 2009
EGU General Assembly 2009

Use of commercial soil amendments in initial soils (II) - Impact on soil respiratory and carbon isotopic characteristics

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The search for viable re-cultivation techniques for the reclamation of large scale soil disturbances induced by mining of mineral resources has increasingly received attention in recent times. These techniques should favour plant growth under dry conditions and under nutrient-poor substrates; a problem in the lignite mining district in Lusatia, Germany. Substrates with basal respiration around 0.04 μg CO2 g-1 h-1, which is relatively low compared to mature soils, were amended with two nutrient rich commercial soil additives (CSA 1 and CSA 2). The CSA 1 is a synthetic-mineral mixture and CSA 2 an organo-mineral mixture. The amendment stimulated basal respiration based on both carbon dioxide evolution and oxygen uptake by 150 and 125 % for SCA 1 and CSA 2, respectively when 1 % of each additive was thoroughly mixed with substrate in a laboratory study. The stimulating effect was evident after glucose addition to CSA 2. The CSA 1 application in the field at lower rates still showed apparent stimulation of soil respiratory activities after one year. Similarly, the organo-mineral-mixture has prominent effects on basal respiration and substrate-induced respiration when glucose was added. We concluded that the commercial additives used as long-term amelioration techniques increased both nutrient preservation and, to some extent, soil microbial activity.