



Priming effects in Haplic Luvisol induced by increasing glucose amounts

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Input of easily available C sources increases microbial activity in soil and may induce priming effects (PE) – short-term changes of soil organic matter (SOM) decomposition after substrate addition. The relationship between the level of priming effect and amounts of added substrates for growth of microbial community is still unclear. We related the intensity and duration of PEs to the amounts of added glucose. Six concentrations of glucose uniformly labeled with ^{14}C were added to Haplic Luvisol, and the released $^{14}\text{CO}_2$ and CO_2 efflux were monitored over a four weeks period. The glucose concentrations were chosen according to 1, 10, 40, 100, 160 and 200% of C in microbial biomass. The first concentration represents the average amount of sugars in soil and was sufficient only to activate microbial biomass, but not enough for its growth. The last concentration was 1.5 times higher than the glucose amounts commonly used for substrate induced respiration (SIR) method (Anderson and Domsch, 1978), allowing the intensive growth of soil microorganisms. Labeled and unlabeled CO_2 was responsible for decomposition of added glucose and SOM, respectively. Comparison of SOM decomposition in soil with and without glucose addition allowed calculation of priming effects.

After the start of incubation, maximal decomposition rate of glucose ($31\% \text{ d}^{-1}$) presented as percentage of the added amount was observed for glucose concentration of $0.5 \text{ mg glucose C g}^{-1} \text{ soil}$. Higher and lower glucose concentration decreased the maximal decomposition rates. After one day the maximal decomposition rate was typical for the highest amount of glucose added.

All amounts of added glucose induced changes in decomposition of SOM compared to the control. However, the intensity of PE was inversely related to the amount of the added glucose. Priming effects started within one day after the glucose addition and were mainly finished after one week.

Analysis of microbial growth kinetics showed changes in community structure after glucose addition. These changes were related to the induced priming effects. The microbial growth kinetics was an efficient approach for evaluating short-term changes in the response of microorganisms to substrate addition.