

## Assay of optimal sample size of soil respiration in semi-arid sandy grassland

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### Abstract

Sample size, and, for practical reasons, optimal sample size ( $N_{opt}$ ) is critical in plant ecological works, including CO<sub>2</sub> gas-exchange studies. The commonly used sample size seems to be smaller than the optimum. Extensive literature survey revealed that from 109 studies 60% used less than 10, and another 22% used 10 to 20 samples in one sample patch, while the optimum was determined around 30 by several authors. Therefore, under-sampling can occur very often, which can lead to bias when upscaling to larger extent.  $N_{opt}$  of soil respiration ( $R_s$ ) chamber-based measurements had been determined along different measuring conditions in a Hungarian semi-arid sandy grassland. Measurements followed identical sampling scheme along transects of 15 m length by 20 cm-s, on 75 measuring positions.  $R_s$  required 7 to 41 samples to estimate the mean value within 10% confidence intervals with 95% probability.  $N_{opt}$  was mostly determined by soil water content ( $r^2=0.26$   $p<0.05$ ) and partly by broadband NDVI ( $r^2=0.17$ ,  $p<0.1$ ). Multiple linear regression with these two variables simultaneously improved correlation by 20 or 29% ( $r^2=0.47$ ,  $p<0.05$ ), respectively. Consideration of the actual level of the drivers of  $R_s$  could be necessary at every certain measuring situation.

Support: TAMOP-4.2.2.B-10/1-2010-0011 „Development of a complex educational assistance/support system for talented students and prospective researchers at the Szent István University” project.

*Keywords: sample size, soil respiration, spatial sampling*