



Response of autotrophic and heterotrophic respirations to soil temperature, humidity, roots development and laboratory measurements.

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The study of heterotrophic and autotrophic respiration behaviours is a crucial step to understand the processes underlying soil respiration and requires important efforts to separate these two components.

In this study, the soil respiration has been analysed in a potato crop at the CarboEurope-IP agricultural site of Lonzée (Belgium). Manual measurements of soil respiration were performed using a LI-6200 analyser and a home made soil chamber. They were carried out every 4 days during the vegetation period on 32 points. Measurements have been made in the crop rows (bumps) as well as between them (holes). In each case, total respiration was measured in planted areas, the heterotrophic component was measured in non-planted areas and autotrophic respiration was deduced by difference between the two first.

The response of autotrophic and heterotrophic respiration components to soil temperature, humidity and root development were analysed.

Bumps and hole are characterised by different soil properties but also by different temperatures and humidities. In addition, plant roots develop mostly in the bumps at the beginning of the vegetation season and induce a large autotrophic respiration. During the season, the autotrophic respiration increases in the holes, suggesting an extension of the root system to the hole. Total and heterotrophic respirations were found

to have similar temperature sensitivities, indicating that the autotrophic respiration is not much sensitive to temperature. Finally, soil moisture was not a significant driving factor of heterotrophic respiration above 0.15 (% Vol).

Laboratory measurements of basal and induced respiration, microbial carbon and nitrogen, organic carbon and nitrogen elements have also been performed. Basal and induced respirations were fairly well correlated with flux measurements.