Furrowing soil for planting sugarcane increases CO_2 emission more than N fertilizer application

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The CO_2 fluxes from soil were evaluated during the plant cane cycle as a function of urea N fertilization and inoculation with diazotrophs (IN) in two locations: Jaú (sandy loam soil) and Piracicaba (clay soil). The gas flow was measured in static chambers installed in the rows and midrows in treatments with the following N rates, in kg ha^{-1}: 0 (control), 0 + IN, 60, 60 + IN, and 90. In the first four days after planting, samples were collected daily, then every four days until the first month and monthly thereafter. There was a strong temporal pattern in CO_2 emissions, probably reflecting changes in environmental conditions. Nitrogen fertilization did not influence the flow of CO_2 in the two sampling sites in all evaluations undertaken between April 2010 and May 2011. However, increased emissions of CO_2 were associated with planting line of sugarcane. In all evaluations in Jaú CO_2 fluxes were higher (p<0.01) when measured on the planting line. The CO_2 fluxes ranged from 0.30 (±0.12) to 0.99 (± 0.17) g CO_2-C m^{-2} day^{-1} in the planting lines and 0.15 (± 0.07) to 0.57 (± 0.18) g CO_2-C m^{-2} day^{-1} in the midrows. In Piracicaba, CO_2 emission had slightly different behavior, probably due to soil moisture. With increased water filled pore space in the line flows were higher (r_{line}~0.20; p<0.01). The CO_2 fluxes ranged from 0.22 (± 0.07) to 0.85 (± 0.08) g CO_2-C m^{-2} day^{-1} in lines and 0.24 (± 0.06) to 0.65 (± 0.08) g CO_2-C m^{-2} day^{-1} between the lines. The emission in the plant row was 2 and 1.5 times higher than that of the midrow, in Jaú and Piracicaba, respectively, probably because of soil disturbance due to furrowing for planting sugarcane. Root activity also have contributed to higher fluxes in the line. These differences should be considered in emission inventories of CO_2.

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