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Evidence for carbon losses in the short period following maize to alfalfa conversion

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The possibility that the carbon sink in agricultural soils can be enhanced has taken on great importance since the Kyoto Protocol was signed in 1997. Croplands represent about 12% of the earth's surface and can have equal or greater net ecosystem production (NEP) than natural ecosystems that were converted to crop production. Different strategies have been suggested and tested in order to reduce atmospheric CO2 by increasing SOC (i.e. no-till farming, incorporating all surplus cereal sludge into arable land, agricultural de-intensification and so on). Tillage is the most commonly mentioned route for altering C balance in row crops like corn, and could be expected to be among the most impacting strategies for carbon mitigation potential. Little quantitative information are available on the amounts of C sequestered in maize based cropping systems, which represent the dominant agricultural land use in North Italy. In this work, we present data on the effects on NEP and net biome production (NBP) of one year of land use change from a row crop (Zea mays L.) to a alfalfa (Medicago sativa L.) and of two different management strategies (tillage and no tillage) in both the agro-ecosystems. We made paired eddy flux measurements coupled with continuous soil respiration measurements on root exclusion subplots in order to estimate NEP and NBP in the land use change experiment and growth analysis and soil respiration measurements in a replicated block design for the management experiment.