Contribution of soil to CO_2 balance in industrial oilcrop productions

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IPCC (1996) stated that one of the best way to reduce CO_2 emissions in the atmosphere is the production of bio-fuels from dedicated energy crops. In Europe, among different options, the most promising fuel is biodiesel. In many EU countries a developed market exists for such a fuel being partially detaxed.

The introduction of a energy crop in crop rotations typical of Northern Italy is very helpful for mitigating greenhouse effect; CO_2 balance for oilseed crops being always positive as stated by Bona et al. (1999) but very little is known on CO_2 evolution from cultivated soils. This incertitude is related to the fact that for producing more energy is necessary to increase input levels (tillage, chemicals ..) which very often induce an increase in soil organic matter degradation. On the contrary, an extensive management can slowdown soil organic carbon degradation but the quantity of crop residues produced in this case are lesser. In this framework it is necessary to find out the most suitable level of intensification for maximizing the CO_2 balance.

In the present work the results of some simulations carried out with a model of CO_2 evolution from soils applied to sunflower and rapeseed for biodiesel production as a function of soil tillage level are reported. The model was used to simulate the soil organic carbon evolution from 400 cultivations of rapeseed and sunflower which came from a survey made in the Veneto Region (Po valley – northern Italy).

The CO_2 balance showed the relative weight of soil tillage and the amount of crop residues in determining soil carbon budget. The main factor influencing this budget was the amount of crop residues; thus underlining the relevance of reaching high yields. The tillage inputs resulted less relevant in this context.