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Carbon budget of a temperate-climate vineyard

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Agricultural crops received scarce attention in relation to the continuous monitoring of carbon fluxes and the assessment of their overall budget. A common believe is that agricultural fields cannot be net carbon sinks. Indeed, many technical inputs, heavy periodical harvests, and the repeated disturbances of upper soil layers, all contribute to a substantial loss both of the old and newly-synthesized organic matter. Perennial tree crops, however, can behave differently: they grow a permanent woody structure, stand undisturbed in the same field for decades, originate a woody pruning debris, and are often grass-covered.

We have been monitoring the Net Ecosystem Exchange (NEE) by eddy covariance and the carbon partitioning in a temperate vineyard in North Eastern Italy, at the FLUXNET station ITA-Neg. Five complete yearly budgets confirm a steady and substantial sink capacity of the system, with a yearly NEE around 800-900 g_C m^{-2}, grape harvest representing about 20-25% of it. Biometrical assessment of growth and partitioning show a good agreement with micrometeorological measurements and demonstrate a large input of organic matter into the soil.

Even if it can be objected that this sink may be only temporary and the built-up can be substantially disrupted at the end of the vineyard life cycle, these results show that there is a concrete possibility of storing carbon in agricultural systems. Temperate-climate vineyards seem to be good candidates. Proper practices can be defined to preserve this storage at best, possibly contributing to the global carbon budget.