ELS2014 –The Earth Living Skin: Soil, Life and Climate Changes
EGU – SSS Conference
Bari | Italy | 22 – 25 September 2014
ELS2014-41-1

Carbon sequestration and allocation in grapevine of an Italian vineyard

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Previsional models at large scale indicate that increasing the potential of soils and vegetation to sequester carbon in the organic matter will be strategic in the next decades to mitigate global warming. On this topic, agriculture plays a key role in atmospheric CO_2 effluxes.
The grapevine (Vitis vinifera L.) is one of the most common and economically important species of the Mediterranean basin, where it finds the best climatic conditions for its growth. The knowledge of dynamic biomass partitioning of vine is an important topic. In this study, results of net carbon storage in vineyard under sustainable (innovative) training systems are reported.
Vines (Vitis vinifera L. cv. Aglianico on 1103 Paulsen) were planted in 2005 and trained to a spur cordon (4444 plants ha-1). The soil texture was identified in an Chromi-Luvic Kastanozems.
From 2008, the vineyard was managed with innovative criteria using no tillage, spontaneous cover crops, compost application along the grapevine row, pruning material were left on the ground as mulch. Pest and disease control was performed according to the regional service.
The total biomass produced in the three years (average) for each plant was 1363 g. Singles organs reached 14.0, 9.3, 12.7, 7.8, 7.1 and 49.0 % of dry matter respectively for wood, roots, stems, leaves, lateral shoots and berries. NPP for our vineyard, calculated as mean of three growing seasons, was 22.6 tons CO_2eq ha-1 y-1.
Finally, the carbon balance in our vineyard resulted positive: 4.8 tons Carbon ha-1 y-1 corresponding to 480 g C m-2 y-1.
We suggest that the correct utilization of appropriate agricultural techniques and land management, which are important for fruit production and soil preservation, could also contribute to the removal of considerable quantities of atmospheric CO_2, and simultaneously, the improvement of air quality. The study collected a regional dataset to study seasonal carbon balance of the vineyard.