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Soil management practice in Croatian vineyard affect CO_2 fluxes and soil degradation in trafficking zones. First results

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Vineyards represent one of the most degradation prone types of intensively managed land on Earth. Steep slopes encourage grape producers to adopt environmental friendly soil management like mulching or continuous no-tillage. In this context, producers have concerns about efficient fertilisation practices and water competitions between vine and grasses in continuous no-tillage inter rows. Vineyards in semi-humid areas like Continental Croatia mostly not suffer from water deficit during growth. Nevertheless, lack of research of different soil management practices open dilemma about soil compaction concerns in intensively trafficked soils in vineyard of semi-humid areas. Soil compaction, determined by bulk density (BD), soil water content (SWC) and CO_2 fluxes from trafficked inter row positions were recorded in 2016 in an experiment in which four different soil management systems were compared in a vineyard raised on a silty clay loam soil, near Zagreb, Croatia: No-tillage (NT) system, continuous tillage (CT) and yearly inversed grass covered (INV-GC) and tillage managed (INV-T) inter rows are subjected to intensive traffic. Grape yield and must quality of grape variety Chardonnay was also monitored. Tractor traffic increased the soil BD at 0-10 and 10-20 cm, but especially at the 0-10 cm depth. CT treatment record lowest compaction at 0-10 cm because of tillage. Soil water content showed better conservation possibilities of INV-GC in drier period. In wet period SWC possibilities are similar between treatments. The results of soil compaction under different management indicate that vineyard soil differently response to traffic intensity and impact on microfauna activity and CO_2 emissions. INV-GC and NT managed soils record lower CO_2 fluxes from vineyard soil compared to CT and INV-T treatments. Management treatments did not statistically influenced on grape yields. Several years of investigation is needed to confirm the overall impact of different management treatments on the proportion of degradation process and their response to proportion of tractor circulation impacts.