



# Soil Transformation of European Catchments (SoilTrEC)- Project Fact Sheet ([www.soiltec.eu](http://www.soiltec.eu))

## IMPROVING SOIL FERTILITY AND SOIL STRUCTURE

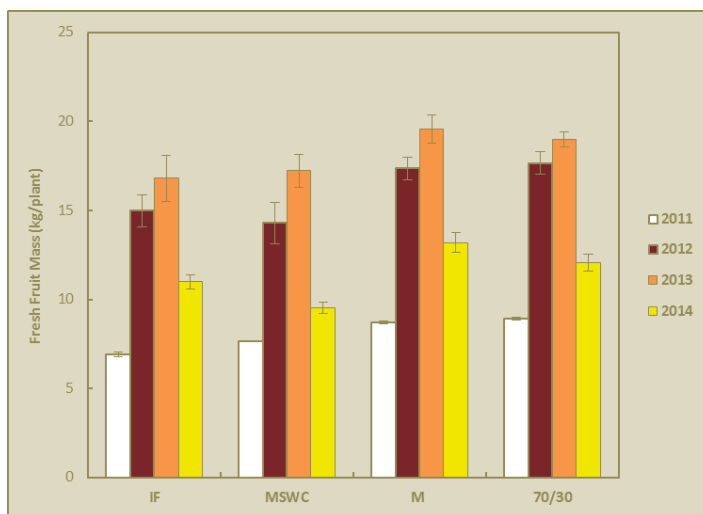
During the SoilTrEC project, a field experiment was conducted in order to evaluate the impact of carbon amendments on soil structure, tomato plant production and soil functions. The experiment started in August 2011 and lasted for 4 growing seasons at the plain of Koiliaris River Basin (KRB) Critical Zone Observatory (CZO), which is located 14 km south-east from Chania, Greece. The soil of the experimental site has a silty loam texture, a pH of 7.8 and an average initial organic carbon content of 31 g C kg<sup>-1</sup>. The experimental design is shown in Figure 1 where four treatments were studied:



**Figure 1.** Tomato plot experimental design showing the four treatments: i) control, non-amended, fertilized conventionally plots (C) with 200 kgN/ha, ii) plots amended with municipal solid waste compost (MSWC) at 50 t/ha, iii) plots amended with manure (M) at 50 t/ha derived from sheep/goats, and iv) plots amended with a 30/70 mixture of manure and compost (MSWC+M) at 50 t/ha.

## Improving productivity and minimizing the yield gap

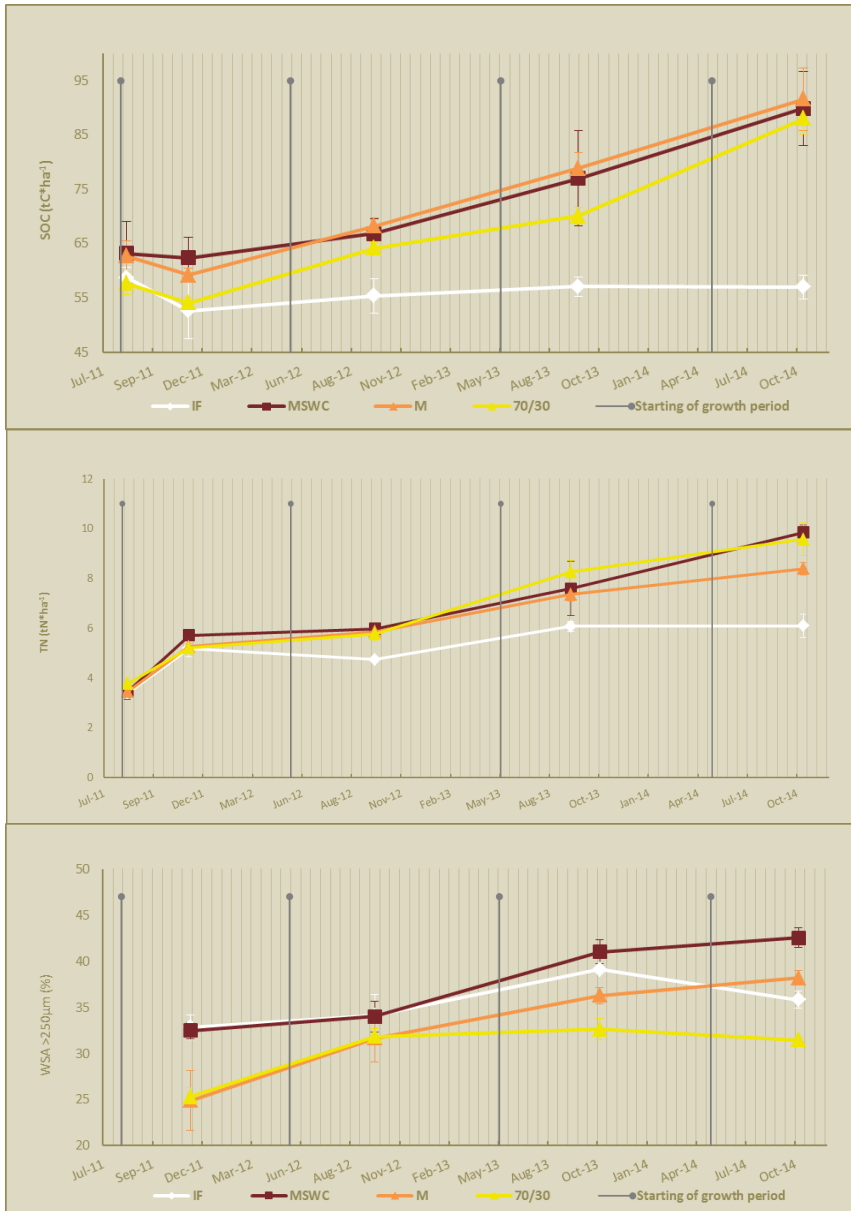
The yields in the four treatments reached 160-180 t/ha which is 60-80% higher than conventional tomato production in open fields and greenhouses.



**Figure 2.** Productivity yields from the tomato plot experiment. Tomato plants were planted for four continuous seasons. Plots amended with municipal solid waste compost achieved the same yields as those using inorganic fertilization. On the other hand, plots amended with manure or with a 30/70 mixture of manure and compost had consistently higher yields than the inorganic fertilization. Good agro-ecological practices and carbon amendments to the soil improved substantially plant productivity and minimized the yield gap.

## Improving nutrient sequestration and soil structure

Agro-ecological practices can substantially improve carbon and nutrient sequestration in the soil while improving soil hydraulic properties and soil structure. Restoration of soil properties and soil fertility can be achieved in a few years.



**Figure 2.** Soil carbon content evolution of the top-soil for the different treatments. Plots with carbon amendments increased their soil carbon content by 30% over a period of four years, suggesting that soil fertility restoration can be achieved in a relatively short period of time.

**Figure 3.** Soil nitrogen content evolution of the top-soil for the different treatments. Compost amendments can double the nitrogen content of the soil within four year. Substantial increases in nitrogen content can be achieved also by manure addition, while the inorganic fertilization increases are significantly less.

**Figure 4.** Water stable aggregate evolution of the top-soil for the different treatments. Manure amendments had the highest increase in WSA content, followed by compost and the 70/30 mixture. WSA content increases have been related to improvement of soil fertility.

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