iSQAPER
Interactive Soil Quality Assessment

Agricultural management practices proven to improve soil quality

Minimum tillage or no tillage

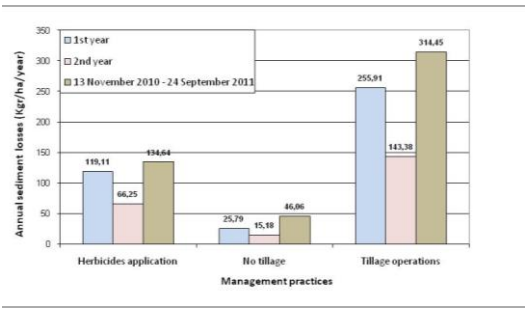
Minimum tillage or no tillage practices belong to the wider production system of conservation tillage. According to this system soil cultivation is kept to the minimum necessary for crop establishment and growth. Several publications report that conservation tillage practices can decrease soil disturbance, increase soil water conservation, improve soil aggregate stability, improve water infiltration and reduce runoff and soil loss.

Soil threats addressed: soil erosion (water and tillage erosion), loss of organic matter content

Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the removal of a field's fertile topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage. Soil erosion, as water erosion (due to surface rainwater runoff) and tillage erosion due to use cultivation machineries.

Occurrence of erosion can be proved by visual indicators or experimental measurements

One simple method to assess soil loss due to tillage is to measure the differences in the soil surface around a tree trunk and the nearby soil surface the tree. Such measurements shown that a soil displacement of 5–42 cm has occurred in Crete over a period of about 45 years depending on the slope gradient and the direction of tilling (Karamesouti et al., 2015).



Soil erosion experiment carried out in Crete, under the treatments (i) no tillage, (ii) no tillage–herbicide application and (iii) ploughing to 20 cm, have shown that no tillage gave lowest sediment loss, the lowest water runoff, and the greatest amount of rain water stored in the soil (Kairis et al., 2013).

Location of demonstration site

The demonstration event organized in collaboration with the ELGO-DIMITRA Organization, Institute of Olive Groves, sub-Tropical Plants and Vines located in Chania Crete (Address: Avenue Soudas 131, Chania, Crete), on July 4, 2019.

Further information about minimum tillage or no tillage

In hilly agricultural areas of the Mediterranean basin, soil losses are significant and of major importance to the sustainability of the environment. This is mainly attributed to the practice of leaving the soil bare, especially during the crucial rainy period, through intensive tillage or herbicide application.

Minimum tillage is a cultivation system that combines an agricultural tractor of low power, a shallow tillage depth, and the minimum number of contour ploughings per year. This technique leaves at least 30% of the soil surface covered by plant residues after planting or natural vegetation to reduce erosion and surface runoff.

No tillage cultivation system is a stricter form of conservation tillage in which no soil cultivation is done. In the olive groves of Crete, shallow ploughing or disking once every three to four years is recommended in order to incorporate plant residues and fertilizers into the soil and to eliminate perennial weeds.

Many studies have reported the important role of vegetation cover and land-use management in the control of water runoff and sediment yields. It has been estimated that the key plant cover threshold is 40-50%; below this soil erosion accelerates. The lowest rates of annual runoff and subsequent sediment loss observed in hilly areas under olive cultivation highlight the significant role of an understory of annual vegetation in limiting soil loss.

Recent efforts at quantifying this effect illustrate that soils with permanent vegetation cover suffer sediment losses at least of one order of magnitude less than sediment loss on arable land and that 88% of the observed soil erosion phenomena occurs on ploughed land.

References

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