



A field study to estimate time-to-ponding in different tillage and residues management: implication for soil and water conservation in orchards.

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Infiltration, drainage and leaching are strongly influenced by the magnitude of the field-saturated soil hydraulic conductivity (KSAT). KSAT is a measure of the ability of a soil to transmit water and it is one of the most important soil parameters. It is well established that the saturated hydraulic conductivity is influenced by both soil texture and soil structure.

Time-to-ponding (TP) has received considerable attention because of its importance in hydrologic and agricultural processes. TP is defined as that moment during rainfall or sprinkler irrigation when free water first appears at the soil surface. This time marks a period beyond which both runoff and erosion may be initiated. Tillage and crop residues are known to influence infiltration and water storage depending on climatic conditions and soil properties.

The objectives of this study was to estimate the time-to-ponding curve for three different tillage system and residue management for soil and water conservation in orchard systems.

The treatments compared were conventional tillage (moldboard at 25 cm followed by scarifying at 15 cm), minimum tillage (moldboard at 15 cm) and no-tillage. Each

tillage system had a plot with crop residues removed and one with the residues retained on the surface. Water was applied with sprinkler irrigation at various rates that would never allow any surface ponding. The no tillage treatment with residues retained showed the highest infiltration. Crop residues increased infiltration for all the treatments compared to soil surface without residues. The minimum tillage treatment with the residue showed the presence of ponds after 50 minutes. The lowest infiltration was observed in the conventional tillage systems without residues. Ponding conditions were observed for this treatment after 25 minutes of irrigation with only 2 cm of water infiltrated.

The importance of measuring in-situ soil hydraulic properties as well as how such processes can be modelled will be discussed. This study shows the beneficial effects of the residue on soil surface with respect to water infiltration in orchard system. It also showed that the no-tillage system is a more appropriate system to adopt in areas characterized by high intensity rainfall.