

Influence of Tillage Management on Soil Moisture and Temperature in the Pataha Creek Watershed

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Soil moisture and temperature are directly related to soil properties and weather conditions. Different agricultural tillage managements and weather conditions have been observed to affect soil water movement and heat transport; therefore, agricultural land use practices may have a direct impact on water availability. The Pataha Creek Watershed was selected as the study area for this research. The watershed which includes areas of Garfield County and Columbia County in Washington State has an area of about 478 km². Two tillage managements, conventional tillage (CT) and no-till (NT), are implemented in this watershed. Generally, CT leaves less than 30% of the surface covered with crop residue and consists of plowing to a certain soil depth, whereas NT means no longer any turning and loosening of the soil material.

Another important factor, precipitation, is also considered, i.e., the low and high precipitation zones located in the northern and southern areas of the watershed, respectively. Two replicated field sites are randomly selected for each combination: thus, 8 field sites are monitored in the experiment. Soil moisture content and temperature at 3 depths (25, 50, and 120 cm) are simultaneously monitored by an EC-TM sensor at a time interval of 10 minutes. The data are recorded and stored in an EM-50R data-logger. Weather data from 2 weather stations located in the 2 precipitation zones are collected at 30-minute time intervals. Except for the field experiment, an application-oriented model will also be developed on the GeoWEPP platform. This research is expected to reveal the impact of tillage management on soil water movement and heat transfer and further to test the hypothesis that no-till management can enhance summer instream flow by increasing subsurface water storage during the wet season in the Pacific Northwest.

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