

The Effect of Artificial Macropores on the Amount of Organic Matters in Soils and Plant Biomass

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Artificial macropores with fibrous material were installed in degraded red yellow soils to enhance vertical infiltration along with organic matter and nutrients. They enhanced vertical infiltration without cultivation which could cause small particle loss from the surface soils. Macropore and no macropore plots were prepared and total carbon in 10, 30, 50 cm depth were measured every half year. Infiltrated soil water was sampled through capillary force soil water sampler to measure total organic carbon and ion concentration. Results showed that soil total carbon in macropore plot increased in spring while it decreased in fall. Control plot showed few fluctuations. Total carbon concentration in soil water also showed higher trend in macropore plot, thus the TC fluctuation in soils could be caused by infiltrated soil water conducted by artificial macropores. Ion concentration was also measured to find that nitrate nitrogen was higher in summer season in macropore plot, which would be a source for biological decomposition of organic matter and also for nutrient for plant growth. Resulted plant biomass in macropore plot was two times larger than that in control plot. Additionally, plant species number observed at the macropore plot was 12, while it was 8 in control plot. This vegetation would be possible organic matter source for future soils. Finally, carbon increment in poor nutrient soils after macropore installation was calculated as 0.0036 g-C g-soil-1 yr-1 (20.4 t-C ha-1 yr-1), which was very successful. The study had successfully showed that relatively simple technique of artificial macropore with fibrous material could increase the organic matter in soils and recover the vegetation in ill-drained soils.

Keywords: macropore, infiltration, carbon sequestration