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The Effect of Artificial Macropores on the Amount of Organic Matters in soils

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I. Introduction

Reclamation of impervious soils is desirable, because soil erosion by surface runoff may have unfavorable effects on environments (e.g. nutrient loss from soils, eutrophication of downstream lakes). In this study, we scrutinized the effect of an artificial macropore system, i.e., a technique for permeability control, on the amount of organic matters in soils.

II. Experimental method

We installed the artificial macropores at an inclined site with red-yellow soil in Matsue Experimental Station of Shimane University, Japan. The adjacent plot without the artificial macropores was also monitored as a control plot. Total carbon (TC) and water content of soil samples, and ion concentration of infiltrated water samples were measured for both plots.

III. Results and discussion

Temporal variation in TC of the soil showed a trend of slight reduction at the treated plot. Cumulative amount of NO_3^- in the infiltrated water was greater in the treated plot than the control, while that of NH_4^+ was high in the control. The scatter diagram of Cl^- concentration of the infiltrated water versus cumulative rainfall during the interval of sampling suggested three categories of chloride dynamics (A, B, and C). At high cumulative rainfall, data from both the plots were laid in the same area (A) of the diagram. In contrast, when there was little rainfall, data from the treated and the control plot were classified into B and C, respectively. The gradient in the scatter diagram for B is similar to that of A, which indicates high efficiency of infiltration by the artificial macropores. Based on the results, we concluded that the artificial macropore system had promoted digestion of soil organic matter and leaching of NO_3^- through nitrification.

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