Linear Macro pore Installation to Reduce Surface Flow

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Linear-Macropore Installation to Reduce Surface Flow at Subtropical Farmland.

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Key words: Soil erosion, Macro pore, Surface flow

Fields in Okinawa is suffering from surface flow which causes soil erosion. Soil erosion affects not only farming but also marine resources such as coral reef. The mechanism of the surface flow is as follows. First, rain drops hit the ground, and soil particles are separated from surface. Second, small soil particles filled the soil pores and crust layer is formed. Finally, surface flow increases. Farmland is the main sources of the soil erosion. Therefore, it’ s important to reduce surface flow with soil particles in farmland. Linear-macropore is one of the countermeasures for soil runoff. Linear-macropore is artificial ditch filling with plant residue which keep its structure. It can be installed easily by using agricultural machine. Furthermore, we can obtain plant residue easily in farmland. The objective of this study was to examine whether surface flow can be reduced by installation of linear macro pore by laboratory experiment.

We setup the lysimeter with soil which taken from sugarcane field in Ishigaki island, Okinawa and we examined 4 treatments (i.e., control, mulching, subsoiler (empty linear macro pore) and linear macro pore (subsoiling with filling gap by sugarcane residue). The soil was sieved through a 2 mm screen, and packed with the bulk density of 1.2 gcm^{-3}. Infiltration experiments with artificial rainfall were conducted in the laboratory at 25℃. Simulated rainfall with intensity of 20 mmh^{-1} was applied 4 hours to the surface, and 24 hours later after the first rainfall, the next rainfall was applied. In each experiment, we measured surface flow, soil moisture, and soil runoff.

As a result, crust layer was formed in all sections, and the ditch was collapsed in the subsoiler treatment. There was more surface flow in control section than mulching section, and no surface flow was confirmed in linear-macropore plot. Soil moisture increased the most in linear macropore. This is because linear-macropore can enhance infiltration and decrease surface flow. As we mentioned above, our research suggest that linear macro pore can increase infiltration and it can reduce soil erosion. It can be one of the countermeasures for surface flow and soil runoff.

Keywords: Soil erosion, Macro pore, Surface flow

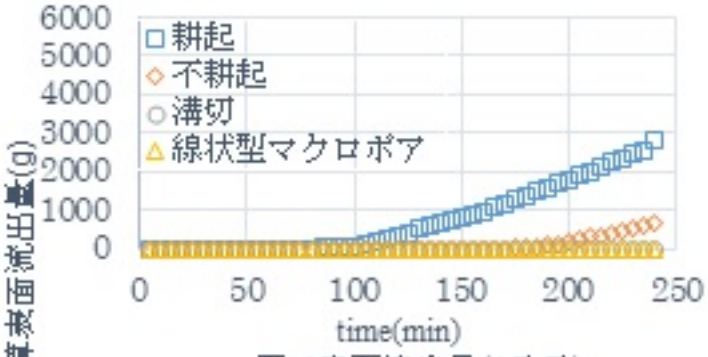

図-1表面流出量(1日目)

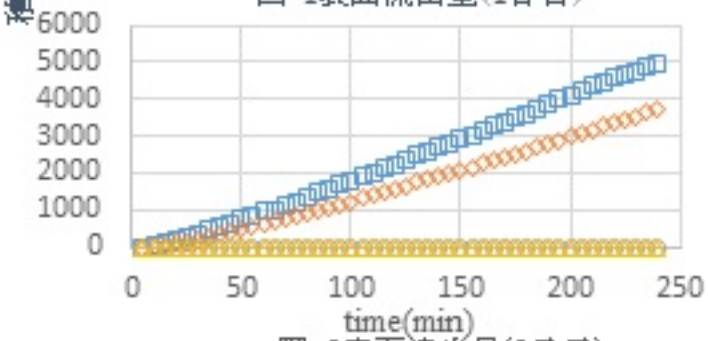

図-2表面流出量(2日目)

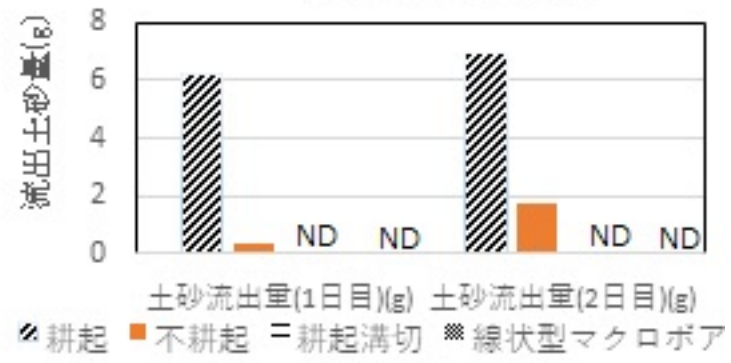

図-3流出土砂量(g)

