

Effect of Linear Macropore Installation in Subtropical Soil to Reduce Surface Flow at Sugarcane Field

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Linear macropores were installed at subtropical red soil to reduce surface flow at sugarcane field. Examined fields were located at Ishigakijima Island. The fields were suffering from heavy rain which is increasing these days because of climate change. Surface flow causes soil erosion which declines sugarcane productivity. Also soil particles were directly delivered into sea with coral reef. Soil particles would shade the sun and also nutrient rich water damage the coral reef. Therefore, reducing surface flow with soil particles is crucial for protecting subtropical natural environment. We previously installed artificial macropores with bamboo fiber into the fields to enhance vertical infiltration and reduce surface runoff. Result showed that installation of macropore to tillage field reduced the surface flow while enhancing vertical infiltration. Therefore in this research, for easily installation of macropore, we installed another artificial macropore, namely "linear macropore" for which macropores were created by subsoiler and filled with sugarcane leaves. Fibrous materials were filled to reinforce the structure. Soil moisture, precipitation, surface flow depth and SS concentration were measured for, 1. conventional tillage, 2. linear macropores with fibrous materials, 3. linear macropores without fibrous materials and 4. Non-tillage field, respectively. Result showed that the amounts of surface runoff were lower at the field of linear macropores with fibrous materials and the amounts of sediment runoff were lower under the non-tillage management. Empty linear macropores showed higher runoff and sediment loss. This result shows that linear macropores with fibrous materials reduce surface flow while enhancing vertical infiltration and non-tillage shows some surface flow but reduces sediment flow by reducing impact of rainfall with residue mulching. Surface runoff increased for empty linear macropore management probably because of clogging.

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