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Effect of Input Crushed Kenaf as an Organic Material Source on the Soil Aggregate Formation in Reclaimed Land

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[Introduction]
Soil porosity play a role in supplying nutrients, oxygen, and water necessary for plant growth. Soil aggregation is a factor that has a great influence on the formation of soil porosity. Soil aggregation changes the physical structure of the soil to increase air permeability and water retention, thereby greatly affecting the growth of crop. Soil organic matter serves as a source of nutrients for crops, and as an energy source for micro-animals, bacteria, and fungi, promotes the growth of microorganisms, strengthens the secretion of mucus, and increases the formation of soil aggregates. Kenaf is an effective natural organic resource that can promote the formation of aggregates in reclaimed soil with high productivity. So, we input chopped kenaf in reclaimed land as an organic material and analyzed the degree and pattern of soil aggregate formation.

[Materials and Methods]
For the test, 3,000 kg/10a/year of chopped kenaf was added from 2020 to 2021 in the Saemangeum reclaimed land. The aggregation analysis was performed by the wet sieving method according to the NIAST methods. The diameters of the sieves used were 2.0 mm, 1.0 mm, 0.5 mm, 0.25 mm, and 0.1 mm. The distribution of the particle size was compared using the mean weight diameter, and the average particle size was directly measured with a stereo-microscope at 7 times magnification and then averaged.

[Results and Discussion]
The input organic material acted as central core in soil, and the formation of aggregates was promoted. The decomposition of by-products and the increase of microorganisms affected by crop cultivation, also increased the aggregation formation compared to the non-input. Input chopped kenaf and after controled by automated water supply system lead the highest aggregate formation rate 18.6%, with liquid fertilizer treatment 16.0%, input chopped kenaf 14.2%, standard fertilization 10.8%, which was significantly higher than 8.2% of the non-treatment. Because the decomposition period was not sufficient, the maturity of the aggregate was generally low. The distribution of small grain size<0.1mm was the highest, and the ratio decreased as the particle size increased. Showing the highest distribution ratio was 0.5～1.0mm. When organic matter was added, the aggregate diameter was generally larger than non-input, and the treatment with the largest aggregate diameter was input chopped kenaf + automated water supply system.

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