What Material Best Enhances Soil Microbial Carbon Use Efficiency to Reduce Soil CO2 Emissions?

Kwiecinski, Jarek

This experiment was conducted to determine how the addition of kenaf fiber, granular activated carbon (GAC), and humate affected soil microbial carbon use efficiency (CUE). Upper Sonoran Life Zone soil was collected, homogenized, and a control sample was created. Three samples with 20% one amendment, three samples with 10% each of two amendments, and one sample with 6.7% of each amendment were created. Samples were placed in an environment with minimal temperature and humidity changes. Samples were watered regularly with 500 mL adjusted with environmental variables. CO2 flux data was collected with an LI-6200 CO2 analyzer. Biomass was assayed via ATP luminescence detections and enzyme analyses were performed with fluorescence detection. Based on respiration data, a decline in CO2 flux throughout the test period was observed. For some amendments such as humate, a greater decline in CO2 flux was observed. Biomass data indicated that samples had significantly different effects on biomass. The GAC sample had much lower biomass, accompanied by higher ß-Glucosidase activity. Kenaf and GAC and kenaf samples had higher biomass and lower respiration values and were calculated to have marginally higher CUE. Humate and kenaf samples also had steadily higher biomass values. To conclude, for each amendment, a significant decline in soil CO2 flux occurred over the course of the test period. CUE increased for samples containing GAC and kenaf.

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