接種植物促生菌Bacillus subtilis YT對不同碳氮比堆肥腐熟化過程之影響

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The Effect of Inoculation of Plant Growth-Promoting Bacillus subtilis to The Maturity of Composting Process in Different Carbon/Nitrogen Ratio

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Bacillus subtilis YT, a bacterium isolated from composts, is reported to produce iturin A at high concentrations in liquid culture. B. subtilis YT displays antibiotic activity against some plant pathogenic fungi and phosphate solubilizing activity. This study aimed to investigate the effects on temperature and C/N ratio during inoculation of B. subtilis YT during composting, and the bacterial count of the B. subtilis YT in the final compost. Two tests were performed using the raw material compositions at high initial C/N ratio (HCNR) (C/N, 17.8 ± 0.2) and low initial C/N ratio (LCNR) (C/N, 13.0 ± 0.2). Each individual composting experiment had three heaps (A, B, CK), each comprising 500 kg (dry weight) raw material. B. subtilis YT was inoculated to heap A at 1.5 × 10^7 CFU/gds (colony forming unit per gram of dry substrate), heap B at 1.5 × 10^6 CFU/gds, and non-inoculation (CK) as control. B. subtilis YT was cultured in liquid medium for one day before inoculation. There was no significant change in compost temperature during composting in the final C/N ratio of the compost irrespective of B. subtilis YT inoculation. The C/N ratio of the compost changed from 17.8 ± 0.2 to 11.8 ± 0.7 in the HCNR test and 13.0 ± 0.2 to 9.5 ± 0.1 in the LCNR test. The cell densities of B. subtilis YT in heaps A and B were 3.3 ± 2.4 × 10^8 CFU/gds and 1.9 ± 0.7 × 10^8 CFU/gds, respectively, during the HCNR test. However, during the LCNR test, there were 8.4 ± 2.5 × 10^7 CFU/gds (heap A) and 6.5 ± 5.5 × 10^7 CFU/gds (heap B). Cell density did not increase for B. subtilis YT in heap A (high cell density inoculation) during both HCNR and LCNR tests. B. subtilis YT propagated at pre-culture stage in liquid medium or in the compost when the temperature was less than 50°C. B. subtilis (selected from compost) was identified using primer sets for 16S rDNA and gyrB via polymerase chain reaction (PCR) as well as sequenced the PCR products of 16S rDNA and compared to the original lab stock. The data was shown that 99.9% identified to our lab stock, B. subtilis YT.

Key words: Bacillus subtilis, Composting, Plant growth-promoting bacteria.

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