

几株猪粪堆肥发酵菌对堆肥发酵的促进作用

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Effects of Strains of Zymogen on Composting of Pig Manure

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摘要

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摘要 为了筛选出能直接用于新鲜纯猪粪堆肥发酵的功能菌,从发酵猪粪中分离出8株可能对猪粪发酵有促进作用的菌株,对其进行16S rDNA分子生物学鉴定,确定其为枯草芽孢杆菌(*Bacillus subtilis*)、肠杆菌属(*Enterobacter* sp.)、地衣芽孢杆菌(*Bacillus licheniformis*)、包特氏菌属(*Bordetella* sp.)、拟诺卡氏菌属(*Nocardiopsis* sp.)、微杆菌属(*Microbacterium* sp.)。对各分离菌株应用于纯猪粪堆肥的催化腐熟效果进行研究,结果表明,枯草芽孢杆菌和肠杆菌属均可提高堆体发酵温度,加快有机质分解速度,有助于降低腐熟后堆体含水率,降低堆体发酵初期的pH值,增加全氮相对含量,加快C/N比值的下降速度,促进堆肥腐熟进程。枯草芽孢杆菌和肠杆菌属菌株可作为纯猪粪堆肥发酵的优良菌种;在使用地衣芽孢杆菌时,需在堆肥初期适当降低堆体温度以提高其堆肥功效;拟诺卡氏菌属菌株可作为纯猪粪发酵菌的辅助菌种使用;包特氏菌属菌株和微杆菌可以提高堆体发酵温度,但其余各指标未见有明显的优势,故不建议作为纯猪粪发酵菌使用。

关键词: 堆肥 16SrDNA 鉴定 猪粪 细菌

Abstract: In order to screen out functional strains of bacteria that can be applied directly to promote composting of fresh swine manure, eight strains of bacteria that may possibly promote fermentation of fresh swine manure were isolated from swine manure compost, and identified with the 16S rDNA molecular biological method as *Bacillus subtilis*, *Enterobacter* sp., *Bacillus licheniformis*, *Bordetella* sp., *Nocardiopsis* sp., and *Microbacterium* sp.. Effects of the strains promoting composting of fresh swine manure was investigated separately. Results show that *Bacillus subtilis* and *Enterobacter* sp. could raise temperature of the pile of manure under composting and extend duration of high temperature, thus accelerating decomposition of organic matter, reducing pH of the pile at the initial fermentation stage, reducing of C/N ratio and water content in the compost, and increasing relative content of total nitrogen. As a result, composting of the manure was accelerated. It is, therefore, held that *Bacillus subtilis* and *Enterobacter* sp. are the two optimal strains for use in composting fresh swine manure. When *Bacillus licheniformis* was used, the temperature of the pile should be properly lowered at the initial stage of the composting so as to improve its effect on composting. *Nocardiopsis* sp. could be used as supplementary zymogen in composting. As *Bordetella* sp. could be used to raise temperature of the pile under fermentation, but did not show any significant effects on other indices, they are not recommended as zymogens for use in composting fresh swine manure.

Keywords: composting 16S rDNA identification swine manure bacteria

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