COMPOSTING

INACTIVATION OF PATHOGENS IN COMPOST MIXTURES AS INFLUENCED BY TYPE OF MANURE

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During aerobic composting, heat is generated from the metabolic activity of thermophilic microorganisms and may contribute to inactivation of contaminant pathogens at internal sites of static piles. At the surface of compost piles, however, heat dissipation contributes to reduced temperatures and in turn reduced pathogen inactivation. It was the objective of this study to investigate whether pathogen inactivation at the surface would be affected by the compost composition and in particular the type of manure.

Chicken, cow, and hog manures served as the source of nitrogen in compost mixtures while straw and cottonseed meal were used as carbon amendments. Mixtures varied in the C:N ratio, having initial values of 20:1, 30:1, or 40:1 and were inoculated with both gfp-labeled *Salmonella* spp. and gfp-labeled *Listeria monocytogenes*. Mixtures were placed in trays (simulating surface sites of static compost piles) and held in environmental controlled chambers at 20° or 30°C and under different levels of light exposure. On a weekly basis, moisture levels in samples were adjusted to initial values (30% or 60%). Samples were periodically taken for enumeration of pathogens and measurement of moisture and pH.

At both 20° and 30°C, pathogen survival was greatest in compost mixtures formulated with cow manure followed by mixtures formulated with chicken manure and then hog manure. Regardless of the manure used in the compost mixture formulation, however, *L. monocytogenes* populations decreased faster than *Salmonella* spp. populations. Exposure to conditions simulating bright sunlight accelerated pathogen inactivation.

COMPETITIVE INHIBITION MICROORGANISMS FOR THE CONTROL OF ZOONOTIC PATHOGENS IN COMPOST

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Indigenous microflora may play a significant role in suppression of zoonotic pathogens during static composting. The objective of this project was to isolate competitive inhibition (CI) microorganisms from static compost piles for the control of zoonotic pathogens. Compost samples from the surface of static compost piles were collected during the study of the fate of zoonotic pathogens (*E. coli* O157:H7, *Listeria innocua*, and *Salmonella* Typhimurium) in static composting of chicken litter and peanut hulls. Only samples that exhibited a large decline in inoculated pathogen populations in two consecutive sampling times were used for the isolation of CI microorganisms. Two methods were used to screen for potential CI bacteria against target pathogens (*E. coli* O157:H7, *Listeria monocytogenes*, and *Salmonella*): a deferred antagonism test and a co-culture test. A total of 20 potential CI isolates against either one or all of three target pathogens were selected from 16 compost samples. Cross inhibitory activity among these isolates revealed that nine of the isolates were compatible. Characterization of these isolates by DNA sequencing of the 16S rRNA gene is currently in progress. Future studies will incorporate these isolates into cured compost materials and evaluate their potential to inhibit the growth of *Salmonella*.