Designing compost to suppress soil pathogens

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Background/Questions/Methods:

Compost has potential for use in suppressing soilborne plant disease, but existing studies show inconsistent efficacy due to different production processes and varying feedstock materials (recipes). Disease suppression is facilitated by antagonistic effects of biocontrol organisms that colonize the compost pile. Biocontrol proliferation during composting has been linked to compost maturity level and feedstock chemistry. In particular, hardwood bark compost increases populations of the biocontrol fungi *Trichoderma* and *Gliocladium.*

Our initial studies focused on whether feedstock chemistry could improve suppression of early blight on Brassica crops caused by the fungal pathogen *Alternaria brassicae*. Compost treatments applied at two organic farms included (1) a control of no compost, (2) a control of typical Vermont dairy farm compost (100% manure/silage), (3) hay (1:3 manure/silage to hay), and (4) hardwood bark (5:5:3 manure/silage to hardwood bark to softwood shavings). Hay and hardwood bark recipes were adjusted to optimum C:N and moisture ratios. Disease severity was quantified as the sum of lesions per leaf, on a scale of 0 to 4 and summed across eight plants per experimental unit. Disease severity was assessed over 8 weeks following compost application. A repeated measures Kruskal-Wallis test was performed on disease severity data separately for each farm.

Results/Discussion:

Disease severity was less in plots without than with compost on both farms ($P<0.0001$). In addition, there was less disease in plots treated with hay or hardwood bark manure compost ($P<0.0001$) at farm two.

Composted organic wastes can serve as a biological inoculant for field soils to reduce the severity of root diseases caused by plant pathogens in natural and field systems. To enhance the effectiveness and reproducibility of these results, further studies, particularly on maturity indicators, are needed to understand the ecological mechanisms behind disease suppression.