Poster Title: Development of a method to evaluate mortality of black mustard (Brassica nigra) seeds exposed to volatile compounds from composted greenwaste.

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Abstract:

Disposal of municipal greenwaste is an increasingly important issue in California. Composting of plant residues could be manipulated to provide enhanced weed control when incorporated into soil. Compost can increase the efficacy of soil solarization, and one possible mechanism is the evolution and enhanced retention of biotoxic volatile constituents during decomposition. The goal of this study was to develop a method to evaluate the effect of volatile compounds from greenwaste compost on mortality of seeds of black mustard (*Brassica nigra* (L.) W. D. J. Koch) during heat treatment. We conducted three preliminary experiments to modify existing methods used in laboratory studies of weed seed thermal death. In all experiments, seed samples were placed in organdy bags and loaded into replicated jars half-filled with the material being tested (sand, field soil, field soil amended with wheat bran, or field soil amended with compost and wheat bran). Jars were heated at a constant temperature of 42˚C in a water bath. Each jar contained one bag of seeds suspended in the headspace of the jar above the material to estimate the effect of volatile compounds, and one bag of seeds filled with the same material as the jar and buried within the material to provide direct contact. After removal from jars, seeds were incubated for 14 days in a growth chamber to determine germination percentages. Experiment 1 evaluated the effect of compost maturity on seed mortality by comparing compost-amended soil incubated at two different temperatures. Field soil was amended with greenwaste compost and wheat bran and incubated for two days at either room temperature or in a refrigerator at 4˚C. Seed mortality was significantly higher in compost-amended soil that matured at room temperature (60% in headspace seeds, 83% in buried seeds), compared to refrigerated compost-amended soil (20% in headspace seeds, 27% in buried seeds). There was no significant difference in mortality between seeds suspended in the headspace and buried seeds, indicating that volatiles contributed to mortality. Experiment 2 compared two materials for comparing seed mortality in compost-amended soil to a control material without compost. Jars were filled with field soil, field soil amended with wheat bran, or field soil amended with greenwaste compost and wheat bran. There were no significant differences in seed mortality between soil and soil amended with bran, indicating that non-amended field soil was an appropriate control. Experiment 3 obtained a preliminary estimate of the effect of volatiles from compost on seed mortality, using compost-amended soil incubated at room temperature (Experiment 1), versus non-amended field soil (Experiment 2) and sand as controls. Jars were filled with sand, field soil, or compost-amended soil. Seed mortality was highest in seeds buried in the compost-amended soil (47%) and lowest in seeds in the headspace of soil (14%) and sand (15%).