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Rebuilding Soil Health with Forest Industry Residuals

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Intensive vegetable production can degrade soil quality and make crops more susceptible to soil-borne pathogens. Many soil-borne pathogens, particularly *Phytophthora capsici*, are becoming increasingly problematic because they have wide host ranges, can survive in soil for years, and are now resistant to many commonly used fungicides. Indiana has a significant forest industry with residual products that could be used to rebuild soil quality and help suppress soil-borne pathogens. Amending soil with complex organic substrates has previously been demonstrated to reduce disease severity in some trials, though the mechanisms are not well understood. The chemical composition of the amendments and stimulation of resident soil microbial communities are likely to play a role in pathogen suppression. We collected soil from a farm with a recent outbreak of *P. capsici* and amended it with one of four forest industry residues alongside a control (no amendment) treatment. The treatments were saturated with water and left to incubate for one month. Soil samples were collected after 0, 1, 3, 7, 14, 21, and 28 days and subjected to various assays to quantify changes in the abundance and activity of key microbial groups. After 28 days, susceptible pepper seedlings (cv. Red Knight), were transplanted into soil from each treatment. After one month, plants were collected from each plot and roots rated for disease severity, and plant root and shoot biomass determined. Results-to-date indicate that these treatments have dramatic effects on the composition of soil microbial groups. Future experiments will be conducted using soil enriched with ^{13}C so that we can track how much of the carbon in the amendments are utilized by soil microbes, and sequestered in soil. Results of these studies will have important implications for helping vegetable growers build soil organic matter, and help manage soil-borne pathogens.

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