

Compost Tea: Disease Suppression and Crop Stimulation in Grapes, Potatoes, and Pumpkins

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Introduction: In April 2003, a NE-SARE project was initiated by The Rodale Institute® and The Pennsylvania State University to evaluate and outreach information on the use of aerated compost tea for disease suppression and crop stimulation in grapes, potatoes, and pumpkins. Measuring the disease suppressant and crop stimulant effects of compost teas will help growers decide if this technology is to their benefit.

Aerated compost tea is a solution that is rich in beneficial microorganisms and nutrients, made by combining compost and water, typically at a ratio of 9:1, and adding other materials such as kelp, humic acid, and fish hydrolysate as microbial nutrient supports. This mixture is mechanically aerated to create aerobic conditions in the solution. Compost tea stimulation of disease suppression and crop performance are reported and highlighted.



Spraying compost tea on potatoes.



Steve Wright spraying compost tea on his grape vines.

Disease Suppression Evaluations: The compost tea treatments were applied weekly to potatoes, pumpkins, and grapes in both years of the project. Potato and pumpkin plots were located on-site at The Rodale Institute, while grape plots were located at three different vineyards in the region.

Pumpkin plots were evaluated for powdery mildew caused by *Erysiphe cichoracearum* and *Sphaerotheca fuliginea*.

Potato plots were evaluated for late blight (*Phytophthora infestans*).

Grape plots were evaluated for powdery mildew (*Uncinula necator*), downy mildew (*Plasmopara viticola*), black rot (*Guignardia bidwellii*), and gray mold (*Botrytis cinerea*).

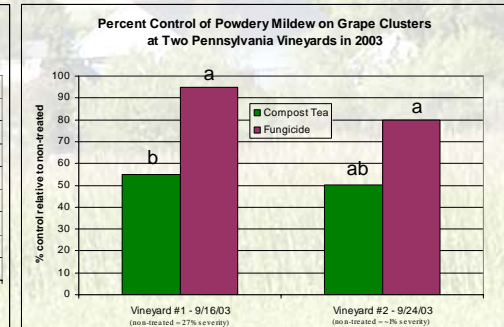
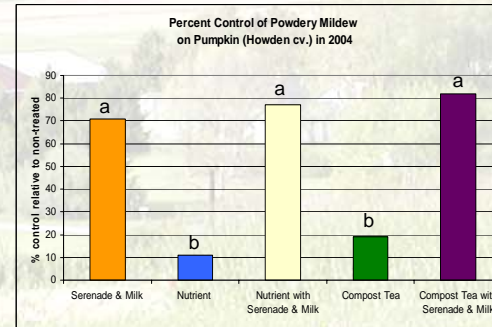
Results: Compost tea was analyzed for microbial concentrations (Soil Foodweb, Inc.), microbial diversity (BBC Labs), and nutrient content (Agri-Analysis). All analyses suggested the compost tea had adequate population, diversity, and leaf colonization to optimize disease control from laboratory experience.

During year one, approximately 50% suppression of powdery mildew was observed in the compost tea treated grape plots (Chardonnay cv. and Chambourchin cv.). A slight, but not statistically significant, reduction of gray mold, along with an increase in the level of downy mildew, was observed in the compost tea treated plot during the first year at one of the vineyards (Chardonnay cv.). Compost tea failed to suppress powdery mildew on pumpkins (Howden cv.) in year one, but reduced colony number and size in year two. Compost tea did not reduce severity of late blight on potatoes (Superior cv.) when disease was present in year two. See graphs below, lower-case letters represent significant difference, Duncan's multiple range test ($p < 0.05$).

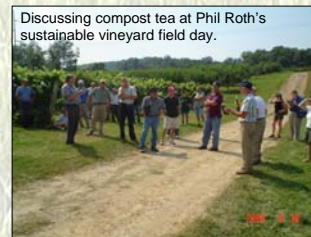
Acknowledgements: Vineyard collaborators on this project included Phil Roth of Roth Vineyard in Fairfield, PA, Steve Wright of Wright Wine Works in Barto, PA, and Barbara Shinn and David Page of Shinn Vineyard in Mattituck NY. Collaborating researchers on this project included Cornell viticulture extension agent Dr. Alice Wise, USDA microbiologist Dave Ingram, and Paul Wagner of the Soil Foodweb Inc.

Summary of Disease Suppression and Yield Stimulation with Compost Tea

	Disease		Production	
	2003	2004	2003	2004
Grapes	50% Suppression of Powdery Mildew Some Gray Mold Reduction	No Disease Suppression	Increased Growth and Yield	No Yield Difference
Potatoes	No Disease Present	No Late Blight Suppression	33% Increase in USDA Extra #1 Grade	No Yield Difference
Pumpkins	No Powdery Mildew Suppression	19% Suppression of Powdery Mildew	No Yield Difference	16% Increase in Yield



Discussion: Compost tea alone did not suppress the majority of diseases evaluated and should be used on a crop specific and pathogen specific basis. Control was not sufficiently effective against grape powdery mildew to recommend compost tea for widespread grower adoption as a sole disease control strategy. The efficacy, consistency, and practicality of using compost tea for disease management needs to evolve considerably before recommendations can be made to growers. Compost tea offered more measurable benefits in stimulating crop growth, yield, and quality than in suppressing disease. However, in year two, the combination of Serenade (*Bacillus subtilis*), milk, and compost tea showed greater effectiveness for suppression of powdery mildew on pumpkins than any practice alone.



Discussing compost tea at Phil Roth's sustainable vineyard field day.



Comparing different compost tea brewers.



Educating farmers about compost tea at a Rodale Institute field day.