

Interest “brewing” about compost teas

Combating crop diseases is often a seemingly endless battle for some organic producers. Unfortunately, late blight, grey mould, downy and powdery mildew, fusarium wilt, and scab are terms all too common to most farmers. However, recent interest in the disease suppressive characteristics of compost has renewed use of a crop protection tool suitable for both organic and conventional producers. Liquid extracts from composted material, commonly referred to as compost teas, are being used to suppress plant disease and stimulate plant growth and are having positive and exciting results.

Unlike chemical fungicides that indiscriminately kill both the pathogenic and beneficial microorganisms, compost teas function on an entirely different principle. Compost teas applied as a foliar spray exert an influence in the phyllosphere (plant leaf surface) by coating the leaf with live microbes. The beneficial microorganisms including bacteria (primarily from the genera *Bacillus*, *Pseudomonas*, *Penicillium*) along with some yeasts and fungi form a physical barrier against the disease causing agents and provide a competitive environment in which the pathogenic species lose out. In addition, compost teas also stimulate healthy plant growth as a foliar nutritional source, translating into a healthier plant, more resistant to attack from disease. The benefits of compost teas are not restricted to the leaf surface. Compost teas used as a pre-plant drench (applied to the soil) can be viewed as inoculating the soil with plant-available nutrients and beneficial soil organisms.

The compost used for brewing will determine, to a large extent, the quality and efficacy of the compost tea. Making fine compost is an art, with a lot of science backing it up (to learn more about composting, check out our website, www.organicagcentre.ca, and register for a web-based course entitled, Composting Skills). Integral to making compost for brewing purposes is to ensure that disease-causing pathogenic microorganisms are killed or at least out-competed by beneficial species. Temperature and oxygen, which are invariably linked in composting, are two critical factors to monitor during the composting process. Compost depleted of oxygen becomes anaerobic, favouring pathogenic and otherwise non-beneficial organisms. Compost can be adequately aerated by simply turning the pile regularly which will not only keep the oxygen level high and uniform throughout the pile, but will also moderate temperature. Ideally, compost temperature should range between 55 and 70 °C (no higher than 80 °C – possibility of fire) for one or two weeks to optimize an environment for beneficial organisms.

The actual methodology of brewing compost tea ranges from the “burlap sack in a barrel” (passive) to sophisticated micro-brewing systems like SoilSoup Machine™ and the Micro Brewer™ (both active). These high-tech “tea pots” optimize aeration by swirling the water around the compost in a continuous vortex, creating a larger quantity of compost tea in a reduced time. The terms active and passive are used synonymously with aerated and non-aerated, respectively. Elaine Ingham (Soil Foodweb, Inc.) strongly advocates for the use of aerated systems in the brewing of compost teas because anaerobic by-products are often toxic to plant cells. In contrast to her views, other research has shown anaerobic teas have the strongest disease suppressive abilities,

potentially a result of the biocidal properties of the by-products. Will Brinton (Woods End Laboratory, Mt. Vernon, ME) believes that the aerated/non-aerated issue may be a moot point, in that, facultative anaerobes have been shown to be responsible for the disease suppressing abilities of compost teas, and by definition these bacteria can survive in both aerobic and anaerobic environments.

Regardless of brewing method, the steeped compost should take on a dark brown colour. Then the compost tea should be strained to remove any sediment that may plug the sprayer nozzles. Ideally, the tea should be applied within five hours of being brewed, however aeration of the tea can marginally increase its shelf life. The application rate of compost tea does vary somewhat depending on crop, however a general recommendation is approximately 20 L per acre per 1 to 5 feet of plant canopy. The tea should be applied every two weeks during the growing season and should coincide with times of moderate UV indices because UV light can kill beneficial microorganisms. Using a compost tea as a soil drench, an approximate rate would be 1 L per plant.

There are many other factors that affect compost tea quality and include; water source (water containing high levels of salts, heavy metals, nitrates, chlorine should not be used; mesh size of the tea bag; brewing time; weather conditions; parent material of compost (animal based manures retain activity longer than composts solely of plant origin); and use of added materials. The use of added materials refers to different recipes for different purposes. By adding materials such as molasses, humic acid, kelp, yucca extract, rock dust the microbial populations may be altered, perhaps favouring bacteria over fungi or vice versa.

The literature on compost teas is expanding and is often difficult to understand because of the apparent contradictions. As such, organic farmers are often on the cutting edge of the research. At present, the OACC in collaboration with the PEI Department of Agriculture, (Integrated Pest Management Specialist, Rachael Cheverie) are coordinating two farmer-directed on-farm compost tea trials. Soil drench and foliar sprays of compost teas are being evaluated for suppression of late blight in several varieties of potatoes, and are being compared to conventional fungicide programs.

Av Singh, Ph.D, is the Extension Coordinator at the Organic Agriculture Centre of Canada and may be reached for comment or questions at 902.893.6275 or via email at asingh@nsac.ns.ca