



Compost making and compost tea – all muck and magic?

*Innovative Farmers, a not-for-profit network funded by Prince Charles’s Charitable Foundation and supported by Waitrose through sales of Duchy Organic, has been supporting a field lab on the use of compost tea. Interest in compost teas as growth promoters and soil biology improvers is increasing but are they the panacea they are claimed to be? Although relatively commonly used in amenity grassland, can they be used to good effect in arable cropping systems and more importantly, can consistent quality compost be made on farm as a feedstock? ORC crops researcher **Dominic Amos** outlines work being done in both areas through Innovative Farmers.*

Compost tea

Compost teas have been the subject of a lot of attention recently and many bold claims have been made about the benefits for crops and soils but there is very little academic research proving their efficacy.

Compost tea is made by ‘brewing’ compost in water and consists of a dilute solution of microbes and some nutrients that can be applied as a spray to the soil or to the crop. The theory is that beneficial bacteria and fungi present in mature compost are multiplied by the brewing process and can then be applied as a tea to help improve and correct any microbiological deficiencies in the soil and balance out the ratios of microbes to provide a healthier ecosystem. This in turn is supposed to improve plant health by creating microbiological associations and increasing nutrient availability. The beneficial microorganisms are also supposed to compete with pathogens in the soil and on the crop to help suppress both soil-borne and foliar diseases.



Spraying compost tea at Hemsworth Farm



Inspecting the compost tea brewer at Hemsworth Farm, during Innovative Farmers’ field lab.

Field labs

An Innovative Farmers’ field lab group was set up to look into some of the possible effects on arable cropping. After the first year, testing on three farms, attention was focused on one farm in Dorset where the farmer Sophie Alexander has invested in her own brewer and is now regularly applying homemade compost tea to her spring cereal crops, and plans to continue doing so.

In the first year she applied compost tea three times in spring to a crop of spring barley and this year used the same approach on a spring oat crop. Sophie makes her own tea on farm using a brewer designed by Growing Solutions incorporated in the USA and distributed by Martin Lishman in the UK. The brewers provide oxygen that acts as a catalyst for microbes.

The field lab, as well as looking into the compost tea making process and soil testing, has sought to investigate effects on the crop and most importantly on grain yield. Experimental design has been very simple in order to allow testing to take place within the farming system and to fit with commercial scale equipment and with a contractor, who takes care of all the spraying. This year two fields were included in the trial, with a central strip left untreated and compost tea applied to the rest of the field. While this sort of trial design doesn’t really allow for advanced statistical testing of treatment effects it can provide an element of pseudo replication to help with preliminary, introductory observation.

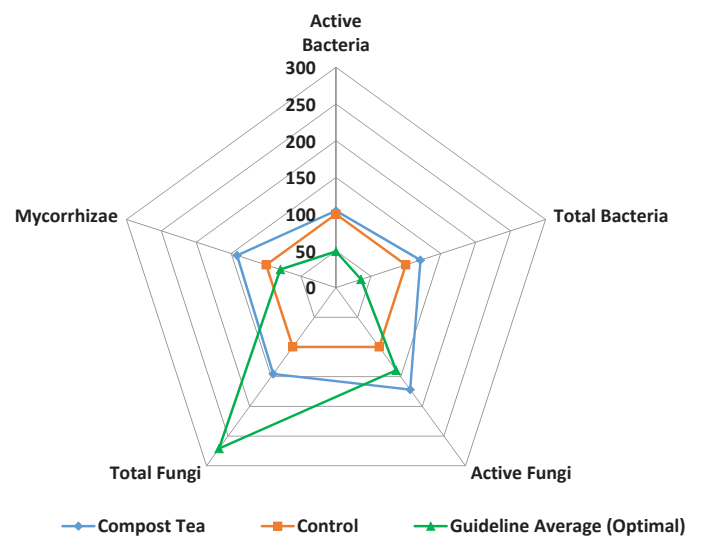


Figure 1: Soil microbiology analysis from Hemsworth Farm from June 2016 showing effects of compost tea on soil microbes and the guideline amounts.

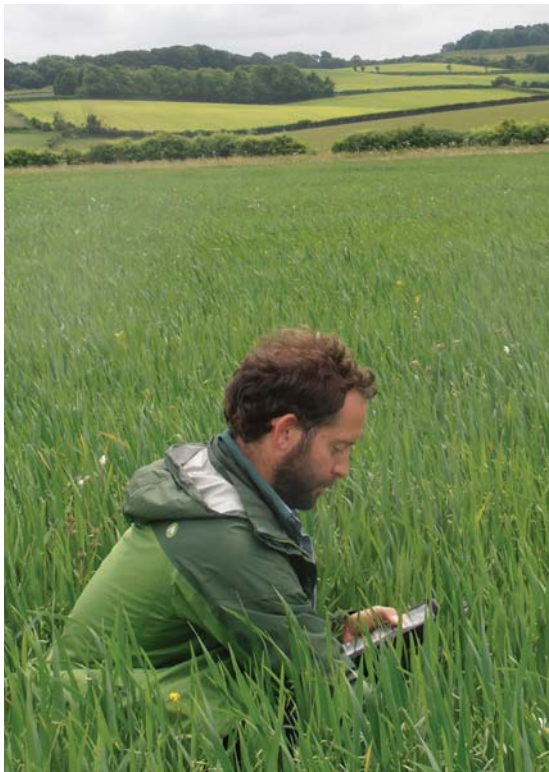


In early summer, assessments of root length and mass, crop height and canopy (LAI) were measured. Later on in the season, close to harvest, destructive sampling was performed to look into yield traits such as spikelets and grains per panicle as well as grain and straw dry weights to determine harvest index. At harvest, combine strips were cut and weighed to compare 0.5ha areas of treated and untreated crop in both fields. Thousand grain weight and specific weight were also measured post-harvest.

Results

Crop effects have been limited so far with only one significant trend observed, although the trial is of a very basic design which would be unlikely to tease out any significant treatment differences. One result that was encouraging from this year's trial on the spring oats was an apparent improvement in specific weight that may have implications for achieving the milling premium, though this effect needs investigating much more thoroughly.

The soil biology results are starting to look compelling, with improvements in active fungi (Figure 1) from compost tea application that have been observed in both years. It's often fungi that arable soils are most deficient in given that tillage practices tend to destroy them so potentially being able to manipulate soil fungi populations could have implications for arable soil health.



Dominic Amos assessing leaf area index of oats as part of the compost tea field lab at Hemsworth Farm

Controlled Aerobic Composting

ORC are working as researchers with the Land Gardeners' controlled aerobic compost (CAC) field lab, looking into whether CAC can be used to fully digest and humify organic matter in 6-8 weeks, under varying conditions, and whether the end product contains a proper diversity of humifying aerobic microbial life.



If the mature compost used is not of sufficient quality and doesn't contain the right populations and balance of microbiology then any tea made from it will also be of poor quality and is unlikely to have any beneficial effects.

While compost can be bought in it is far better to use farm produced material to act as a feedstock for the tea and so the method used to make the compost becomes very important. Austrian scientists have pioneered an approach known as Controlled Aerobic Composting which relies on accurately monitoring temperatures and carbon dioxide levels in the pile in order to turn it whenever certain thresholds are reached to keep the process as aerobic as possible. The Luebke-Hildebrandt method of composting should, they claim, ensure compost of the highest quality with a rich and diverse microbiology that will lead to the best possible compost tea.

The method can be used at all scales, either in a small hand turned pile in a back garden or at a more commercial scale with a mechanical turner, but where the true scalability comes from is by using the aerobic compost to make a tea which can cover and treat much larger areas than the compost alone.

The scientists who have developed the method are convinced that all soil health is underpinned by biology and everything else follows from that. The compost produced by their method will, they say, transfer humifying abilities to the soil to help in the natural conversion of raw organic matter into highest quality humus. The end product, it is hoped, will help create a balanced healthy soil ecosystem providing for healthy crop growth.

The field lab has now started, with the Land Gardeners, cut flower producers and garden designers in North Oxfordshire, having made their initial test piles and microbial analysis having been performed by SoilBiolab using methods and guides based on Elaine Ingham's soil food web. The trials will consist of a static 'control' pile with which to compare the CAC pile. The piles will be made to the same 'recipe' with the CAC method providing detailed instructions on the content of piles, with a target C:N ratio of 30:1 and the need to include 10% by volume of clay/loam soil.

A two day workshop was held at the end of September 2016 introducing all aspects of the CAC process and participants will begin making and monitoring their own compost piles in early spring 2017.