Latest developments on compost tea

Compost tea – what is it?

Compost tea (CT) is produced from brewing compost in water. The compost acts as food for the microorganisms to develop whilst brewing. CT comes in both aerated (ACT) and non-aerated compost tea (NCT). Aeration in modern systems is produced by bubbling air into the compost brew in order prevent harmful microorganisms from developing. These in turn my harm the soil and crops once applied (Ingham, E., 2005; Litterick et al., 2004; Scheuerell and Mahaffee, 2002). NCT is not anaerobic, but may have lower active microorganisms. However, research in recent years has not been conclusive of which CT is more effective (Litterick et al., 2004).

Latest developments and research

CT is often seen as a way of preventing crop disease and pathogens via beneficial microorganisms. For example, a study on fungus germination showed how CT can inhibit infection by up to 79 and 84% (Siddiqui et al., 2009). However, more recently with the degradation of soils on both a UK and global scale, it is being seen from the perspective of aiding soil health by providing soils with active microorganisms that may have been lost through intensive agriculture systems, fertiliser and pesticide use.

This provision of soil microbial populations from CT can improve soil structure, water holding capacity, organic matter, and the flow of nutrients between crops and the soil. This means that the health of the crop can be improved through better nutrient balance as well as the ability of microorganisms such as fungi to create a protective shield around crop roots. This acts to fend off pest and disease attacks (Iersel, 2001; Ingham, E., 2005). In horticultural systems, applications on to crop leaves can also have a protective effect on the crop, although more evidence is needed on this (Al-Mughrabi, I. 2007; Frost and Clarke, 2004).

There is a need for longer term thinking in both using CT and looking at its effects through research. It is also important as a farmer to consider the climate, weather and soil situation when applying CT. For example, in a dry year such as 2017, microorganisms may not survive in soils once applied due to lack of moisture. This may be why there was no increase in active fungi this year for the Compost Tea field lab.

Greater understanding of how microbial communities interact together and with pathogens is currently progressing. A recent trial has suggested that high diversity of beneficial microorganisms in CT applied to agricultural soils aids competition for food with pathogens. They therefore protect the crop from potential pathogen attack, instead of antagonising pathogens (as in pesticide use). This method of encouraging high microbial diversity acts to naturally out-compete them (Wei et al., 2015).

CT can have beneficial effects for both soils and plants; however this is not always conclusive. A recent trial in South Korea indicated that aerated compost tea could be used as an organic liquid fertiliser with active microorganisms for red leaf lettuce, soy bean and sweetcorn (Kim et al., 2015). Some recent trials also compare a variety of different composts (agricultural waste, vermicompost, solid municipal waste etc.) to evaluating the differences on crops (Mengesha, W.K. et al., 2014; Erhart, E. et al., 1998).

Further work needs to be undertaken across a wide range of soils and agricultural sites in order to further verify and understand how CT operates in soil and plants. This is especially needed in the UK, as previous research has tended to be focused in America, Australia and countries with more tropical climates.

Despite the need for more research, the benefits of CT for soil health have been presented and promoted at recent conferences in the UK, such as Groundswell.

Application considerations

Testing the quality of the compost via CO_2 levels, temperature and the type of microbial populations (beneficial or potentially harmful) before brewing as well as testing the brew to ensure it is aerated and that beneficial microorganisms exist is vital for ensuring that the brew applied to the field will provide it with beneficial effects. Despite being unpublished, experiments such as the Territorial Seed Experiment, 2000, show that this is necessary (Ingham, E., 2005).

It is useful and important to understand what the current soil microbial populations are, and if they are active. It is also important to consider the history of the fields on which compost tea is being applied, are there likely to already be high active populations of microorganisms? In this case, it may be that CT applications are not useful.

Making good quality compost is key - considering where the materials come from, and therefore microbial populations they may also bring, is relevant to understanding how the microorganisms then behave / the effect of the CT in the soil once sprayed. It is also essential to keep the equipment clean – including the brewer and the hose nozzle that it is applied to the field with. Biofilms may otherwise form and reduce the quality of the CT (Ingham, E., 2005).

Compost tea brewers are a significant cost (although have been known to be made on-farm using available resources), and therefore need careful consideration before purchasing. These considerations should include soil type, testing for soil biology and microbiology to understand what your fields already have and the type of crop you produce.

Future questions for CT in UK agriculture

More research needs to be done to understand how new microbial populations from CT affect any existing populations in the soil, and whether this brings a benefit or if it may kill indigenous populations.

The complex interactions between microorganisms are still not fully understood, and more research and on-farm trialling is needed to improve the CT making process. Longer term studies over several years are also needed, as microbial communities change as crops are removed and planted (Wei et al., 2015).

With research expanding in the area of soil microbiology, there is recognition that microorganisms both existing within soil and introduced via CT needs organic matter to feed off to maintain a healthy soil population. However, further research is needed to understand how much organic matter needs to be in agricultural soil for this. It may be that you need to increase your soil organic matter as well as the microorganisms to support them.

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