

Aerated compost tea (ACT) to improve soil biology and to act as a biofertiliser/biofungicide

Problem

Soil organisms are essential for healthy crop production, but arable farming tends to destroy them and cause an imbalance between different microorganism groups. This imbalance is bad for the soil food web and bad for the crop and may encourage soil borne pathogens and increase the level of plant disease, with little in the way of plant protection products to help control this disease.

Solution

There is an increasing body of experimental evidence indicating that compost teas can improve the health of both soil and crop. Making and applying compost tea to an arable crop can help increase levels of beneficial fungi and bacteria and improve the overall balance of the soil food web, and therefore the health of the crop. Healthy soils full of beneficial microorganisms make nutrients more plant available and also help reduce the risk from soil-borne pathogens. Additionally compost tea applied as a foliar spray can act as a biofungicide to reduce levels of disease on the leaf by offering pathogens competition from beneficial microorganisms. Preliminary tests have been performed in the field with more rigorous examination taking place in the lab.

Outcome

There is a growing body of evidence supporting the benefits of aerated compost tea (ACT) application, but not all studies have shown this conclusively. Compost tea application helps build healthy soils which can lead to benefits for the crop including improved crop health and nutrition, improved crop quality, as well as growth promotion and plant protection through pathogen suppression. Additionally ACT may also help crops cope better with abiotic stress factors such as drought.

Practical recommendation

- Exact methods of composting and compost tea making (aerobic vs anaerobic) are open to debate, but this practice abstract will focus on the method for producing aerobic compost tea.
- The most important step is to produce mature, well aerated compost full of the beneficial microorganisms needed in the soil and by the plant. Compost should be regularly turned to maintain levels of Oxygen while avoiding the build-up of CO₂ (to avoid anaerobic conditions) and keeping the temperature below 65 degrees C.
- Production of quality compost is the most important step in making high quality, beneficial compost tea.
- Compost feedstocks can be adapted to give the right balance (50:50 by weight fungal/bacterial ratio) of microorganisms. See Figure 1 on page 2.
- The composition of any compost tea will be affected by the ingredients used to make it, e.g. woodchip has been shown necessary to increase the proportion of fungi in composts. Using only farm manure and green waste will tend to produce composts which are relatively low in fungi.

Applicability box

Theme

Soil quality and fertility, Pest and disease control.

Geographical coverage

Global

Application time

Compost teas applied in spring to the soil and crop at various growth stages. Tea applied using commercial sprayer.

Required time

Weeks to make compost. 1-2 days to brew tea. Hours to spray crops.

Period of impact

Direct benefit to current crop but also to soil over the whole rotation.

Equipment

Brewer and sprayer (or contractor)

Best in

All cropping with a focus on spring cereal crops (oats/barley/wheat), OSR and linseed. Has been tested on soya, lettuce and sweetcorn in the lab for its growth promoter effects. Potatoes for potential blight control and several other crops for plant disease suppression (particularly horticultural crops).

	Composition of composts	Organisms in compost				
		Total Fungi (µg/g)	Total Bacteria (µg/g)	Protozoa (Numbers/g)	Total Nematodes/g	Fungal/Bacterial Ratio
Compost 1	40 % farm manure, 10 % wood, 50 % green waste	60.1	1736	1351	0.1	0.03
Compost 2	40 % zoo manure, 20 % wood, 40 % green waste	442	835	12002	0.1	0.53
Compost 3	35 % wood, 65 % green waste	984	1188	7948	0.3	0.83
Compost 4	50 % wood, 50 % green waste	422	393	17206	14.4	1.07

Figure 1. The effect of different organic compost inputs on microbial biomass after an 8 week production cycle (adapted from Joel Williams' Compost and compost tea)

- Cereal crops benefit from a fungal dominant brew which can be created using certain feedstocks in the compost and by brewing the compost tea for a longer period of time (48 hrs).
- Oxygenate the compost in a brewer for 24 to 48 hrs. If using tap water, remove chlorine by aerating the water in the brewer for a few hours prior to adding compost. To stimulate microbial growth, molasses can be used or more complex additions can be bought that may contain among other things seaweed extract.
- Prior to spraying the compost tea must be filtered to remove any compost as this will cause blockages in the sprayer. Spray pressure should not exceed 2.5 bar (1-2 bar is preferable) and nozzle size should not be too fine as this will damage the delicate fungi in the brew. Spray volume should be around 250-300 l per ha.
- Soil drench post drilling application followed by 2 or 3 more applications, while the crop is still young (around 2-3 leaves), and at the highest disease pressure point (typically GS37 to 65 for cereals) is a good approach. On-farm demonstrations have involved a 3-spray-strategy in April, May and June after a March drilling of a spring cereal.

Practical testing and sharing of the results

If this method seems to be suitable for your farm, we recommend that you test it under your own farm conditions.

Use the comment section on the [Farmknowledge platform](#) to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the author of the practice abstract by e-mail.



Further Information

Video

- Growing Solutions [Compost Tea System](#) from [Martin Lishman](#) (UK supplier of ACT Growing Solutions).

Further readings

- Elaine Ingham; [The Compost Tea Brewing Manual - NOFA-NJ](#)
- Martin Lishman, Growing Solutions Incorporated; [Compost Tea manual](#).

Weblinks

- Check the [Farmknowledge Tool Database](#) for more practical recommendations.

About this practice abstract and OK-Net Arable

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