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An Advisor's Experience of the Use of Compost Teas in Nursery Stock Production©

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INTRODUCTION

The author's interest in alternative natural crop protection resources to replace chemical pesticides was sparked by a 1996 visit to Tree of Life Nursery in California to meet former IPPS International President Mike Evans and his business partner Geoff Bohn. This was followed-up by working with Dr. Tim Pettitt at the Efford Experimental Station in the U.K. on slow sand filters (SSFs) (1997 to 2004) and visits to Holland and Belgium to look into additives for SSFs; and a 2001 visit to compost tea ingredient supplier Van Iersel in Holland to see the first compost tea 'brewing machine' (Compost Tea X-Tractor).

Since 2001 the use of compost tea to treat nursery stock and other crops has risen in Belgium, Holland, and the U.K. as a result of decreasing availability of chemical plant protection products and legislation on the amount of run-off containing chemicals that can be allowed to enter ground water and watercourses.

By the middle of the current decade some innovative growers were already considering ways to grow crops to reduce their reliance on pesticides and to reduce input costs.

Among the techniques these growers have been using are:

- Collecting and recycling roof and nursery runoff water
- Water treatment using self-cleaning micro and sand filters
- Irrigation using aerated water over lava beds
- More aerated growing media with graded peat and bark or coir
- Adding humic and green compost to growing media
- Routinely applying compost teas to growing crops

COMPOST TEA

The compost contains a diversity of beneficial bacteria, fungi, protozoa, and nematodes that contribute to the "soil food web" — it is this rich diversity of microbes that creates high quality compost. Producing compost for making compost tea must be a carefully controlled process, from selection of the best original plant material to maintenance of critical temperature and CO_2 to develop the humus content which supplies the nutrients for the micro-organisms. Compost tea is brewed from a blend of humic and green composts.

Humic compost consists of dark brown colloidal /clay-sized particles and is high in humic acid. It is important in maintaining microbial diversity which in turn is important in the ability of the resulting brew to suppress root and soil-borne disease.

Green compost is based on fresh green plant material such as prunings and trimmings from urban parks or gardens.

Although some growers produce their own compost for brewing compost tea, many obtain ingredients from specialists such as Van Iersel bv (Netherlands). An

advantage of the latter approach is that reputable specialists have well-researched recipes based on reliable sources of ingredients. Van Iersel produces two basic composts — fungal rich or bacteria rich.

Compost Tea Brewing. Air, more specifically oxygen, is the driver and compost tea brewing machines have been developed to ensure the mixture is properly aerated during the brewing process.

Tea should be made using clean, preferably chlorine-free water. Water collected from a greenhouse roof and treated through a slow sand filter is ideal — but chlorine in mains water can be removed by aerating for 2 h.

A microbial food source such as molasses is added to the water, along with an appropriate amount of the compost mixture. Brewing time is 24 to 48 h during which time the process extracts and multiplies the micro-organisms from the compost and into the liquid.

The resulting brown watery liquid is decanted and passed through a 400 mesh sieve to give an extract containing soluble nutrients and a rich diversity of microbes.

Compost Tea Application. Once brewed the tea should be used as soon as possible — it loses half its microbial activity within 12 h.

Apply tea at 50 $L \cdot ha^{-1}$ (5 $ml \cdot m^{-1}$) aiming to cover 70% of the crop foliage. Newly emerging growth needs compost tea at 14-day intervals but apply every 7 days in propagation. Continue to treat protected crops through the winter. Rates can be increased in dense foliage stock plants.

Tea is usually applied through overhead irrigation lines — use a dilutor at 1 : 200 in summer but when crop water requirements are very low in winter use 1 : 10. Alternatively it can be applied through conventional boom sprayers or air-assisted knapsacks.

Care is needed in winter if you introduce untreated stock to a treated crop area and especially so if no provision is made to conventionally treat the crop. The introduced plants will not carry any suppression of overwintering diseases such as botrytis, rhizoctonia, or septoria.

Foliar applications suppress disease pathogens that invade infection sites and provide nutrients to stimulate plant growth just as a foliar feed does.

Applications as a growing media drench maximise disease suppression; provide nutrients for the roots to take up and stimulate growth; establish a biological "barrier" around the roots to help prevent root infections; improve the microbial diversity of the soil or growing medium and improve the recycling, availability, and retention of nutrients within the soil or growing medium.

Disease Suppression. Based on the author's experience of working with growers in the U.K. over a number of years, compost tea has activity in suppressing the following:

- *Alternaria* sp. (e.g., on evergreen azalea)
- *Botrytis* in protected crops, and in propagation
- *Phoma* sp. in lavender and azalea
- *Rhizoctonia* in *Calluna* and *Erica* cultivars
- *Fusarium* sp. (e.g., in *Cordyline australis)*
- *Pythium* sp. (e.g., in *Choisya ternata* and cultivars)
- *Venturia* sp. in *Malus, Pyrus*, and *Pyracantha*

For propagation it is important to target stock plants and apply weekly as all plants move on.

Costs. Based on 2008 prices and exchange rates each application costs approximately £25.00 per ha in ingredients. A 100-L (treats 2.0 ha) compost-tea machine costs £925; a 200-L machine £1100.

Grower Comments. Here are some of the benefits of using compost tea that growers have commented on during the past few years:

- No longer need to rely on the use of chemicals and pesticides to grow quality crops.
- Inputs can be reduced with confidence.
- Compatible with well managed IPM programmes.
- Reduces considerably the need to apply routine fungicide treatments.
- Staff like the idea of micro-feeding as they do not have to handle chemicals.
- Fertiliser rates can be reduced so there is less leaching and pollution of ground water (growers the author has worked with have looked at reducing controlled release fertiliser rates by 15%).
- Less down grading due to foliage and root pathogens.
- Compost tea can reduce costs by 95% when compared with conventional fungicide treatments.

CONCLUSION

Compost tea is not a pesticide — it only stimulates growth and suppresses pathogens. Neither is it "just a product": it provides sustenance for the "food web" as part of a dynamic system.

It does provide micronutrients for growth and a rich diversity of microorganisms to compete with and displace pathogens.