Practical Experience with Active Compost and Compost Tea in Container Production©

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INTRODUCTION

A number of European environmental laws are making it more difficult to produce nursery stock. In particular, the availability of pesticides and fertilizers is being reduced to prevent pollution of the water supplies. To counteract this trend, a number of nurseries are beginning to work with compost and compost tea, which can contribute to a more environment-friendly way of growing nursery stock.

In partnership with my wife, I run a nursery at Jabbeke. We specialise in liners propagated by grafting. Our customers are street tree growers, container nurseries, and, for some lines, garden centres.

Our propagation program has two main elements: summer grafting from August to the end of September and winter grafting from January to the end of February. In winter, bench grafting is done with the hot-pipe callusing system. In summer we work with potted rootstocks in P9s, which are grafted under polyethylene tents. All grafts are potted in P14s in March and covered with tunnels till mid-May. The cover is then removed, and the plants are caned and placed in trays. They are regularly tied to the cane as growth progresses, and weeded, during the summer. In autumn all orders are picked up and placed in a cold glasshouse to overwinter.

ORIGINS OF OUR USE OF COMPOST TEA

Early in Spring 2004 we had a major failure: 70% of the summer grafts made in 2003 died, caused by dried up roots. Tests indicated that water capacity in the substrate was not sufficient. That event, combined with a chance meeting with an organic grower of blueberries, was the start of a new development on our nursery.

The blueberry grower told me about an experiment that was done at the Belgian Institute for Agricultural and Fisheries Research (ILVO: Instituut voor Landbouw en Visserijonderzoek) with strawberries. It compared strawberries grown with chemical fertilizers on a classical substrate with strawberries grown on a substrate with controlled microbiological compost. Neither received pesticide or fungicide treatment. The result was astonishing. The "classical" strawberries had plenty of diseases and pests. The strawberries grown on compost showed none. The results convinced me to use active composts in my nursery.

The aim was a healthy, stress-resistant plant that would result in a better take of the grafts and better survival over winter. We regarded any reduction of pesticides and fertilizers as a beneficial side effect.

INTRODUCING COMPOST AND COMPOST TEA ON THE NURSERY

Our first experiments were done in the spring of 2004 with rootstocks for summer grafting in P9s. We used commercially available controlled microbiological compost fractioned at 10–20 mm. This compost was mixed in a normal substrate with peat at 10%. No chemical fertilizers were added. Every 2 weeks compost tea was made and

sprayed over the rootstocks at 20 L of tea per 100 L of water applied over 1000 m^2. Organic fertiliser was applied each week in between the compost tea applications (Black Gold, Triple Ten and Kelp, all supplied from Nu Tech). The feed was to support the microorganisms on the leaves and in the substrate, not to feed the plants directly. These treatments were repeated until we started grafting in mid-August.

The rootstocks were not as thick as previous years but the roots were very good. Fungal diseases and pests didn't cause any problem during that growing season. For example we had a major attack of black aphids on *Euonymus europaeus* but within 2 weeks they disappeared without any control measures being taken. During overwintering of the grafted plants we saw a lot of fungal fruiting bodies on the substrate, an indication of a good development of beneficial fungi in the substrate. The take of the grafts was excellent; in total there was an increase of 10% compared to previous seasons.

FURTHER TRIALS

The following spring we divided the crop in two parts. The first was potted in a peat substrate with our previous standard chemical fertilizers and the second was potted in a substrate with compost at 15% (v/v) without chemical fertilizers. In the compost organic fertilizers were mixed to feed the plants. The portion of the crop growing in the substrate containing compost received compost tea every week. Each of these treatments included organic fertilizers diluted in the tea to stimulate growth and avoid thinner plants as we had the year before.

This method was working well, in my opinion, due to the addition of organic fertilizers. Plants were growing very well, and we saw increased taxa differences in leaf colour compared with previous seasons. Dieback of twigs during winter (e.g., *Liriodendron*) was not seen, and spring re-growth was perfect. Only *Magnolia* had some nitrogen deficiency. Internodes were shorter on plants grown on the 15% compost substrate compared to the ones grown using chemical fertilizers. In general I found that plant quality was significantly better in the portion of the crop grown in the compost substrate and treated with compost tea — although the quality of the plants grown using chemical fertilizers was also very good. For example, we normally use a bamboo cane of 60 cm with a grafted *Fagus*, we had to replace it with a bamboo of 105 cm and even that was too small. Micorrhizal and beneficial fungi were very evident on the plants roots.

OUR OWN COMPOST RECIPE

However the story was not so straightforward. In 2005 I began using a tea made from a compost of my own, and the effect was not the same as the year before, when it was bought from a commercial firm in Holland. We had more troubles with fungal diseases, especially on *Quercus*. Also the take of the summer grafts was not as good as the year before. Something was wrong, but we didn't know the cause.

In the winter of 2005/6 two lectures were organised for Belgian growers with Dr. Elaine Ingham of Oregon State University. She is an authority on compost and compost tea, and she told us to use a microscope to control the tea.

Soon enough the explanation came why the tea made from our own compost was not working as well as the one made from the commercial compost. Our compost was made of pieces of bark, and it was almost impossible to extract fungi out of them into the water.

We had to look for another kind of compost to make tea.

That was found in a heap of compost made the previous year that was mixed with peat and had lain there for almost 6 months. It happened to be excellent compost from which organisms could be extracted very easily into the water.

After further research earlier this year we have perfected our recipe to make the tea, and we can see good growth of fungi during the brewing process.

Every brew is sampled and checked under the microscope to ensure we have a good population of beneficial microbes. It gives an indication of what is going on and helps us to understand what is happening and how we can manipulate the brewing process further to improve results.

We still have to research how to use compost in the substrate as well as compost tea to improve nitrogen availability to the plant. We will aim to achieve this by improving the nutrition of the microbes in the system. Nowadays, I'm more a mushroom grower than a tree grower.