Field Trials of Bio Additives for Nursery Stock©

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INTRODUCTION

In 2009 the Danish government introduced its long-term Grøn Vækst (Green Growth) plan which defines environmental, nature, and agricultural development policies up to 2020. It aims to ensure that a high level of environmental, nature, and climate protection goes hand in hand with modern and competitive agriculture, horticulture, and food industries.

Among its targets are the minimisation of the environmental and health impacts of crop protection products and wider adoption of more sustainable agricultural and horticultural production practices such as integrated pest management (IPM).

In order to help growers achieve a reduction in the use of chemical crop-protection products, the Danish Nurseries Association has started to look for alternative products and methods to ensure ornamental crops can continue to be grown economically. To help with this programme the association has been conducting trials on the application of biostimulants, biopesticides, and compost since 2012.

BIOSTIMULANTS

Biostimulants have no direct effect on pests – they are not pesticides. Plant biostimulants are products containing compounds or microorganisms which stimulate the plants' own defence system and enhance the nutrient uptake and tolerance to stress.

Trials undertaken in 2012 and 2013 tested: potassium bicarbonate, silicon, and the biopesticides Vacciplant®, AQ-10, Serenade®, and Prestop® against several leaf spot and mildew diseases.

Potassium bicarbonate, Vacciplant, and Serenade all showed positive effects against leaf spots. Potassium bicarbonate caused some leaf spotting when tested on *Ligustrum* (Fig. 1).

Fig. 1. Spraying with potassium bicarbonate caused leaf damage on *Ligustrum.*

None of the materials tested gave any clear effect against mildew in these trials. In the first year the treatments were started too late in relation to mildew attack and were not

able to reduce the disease or keep it under control. The dry, warm summer of 2013 was conducive to high levels and rapid spread of mildew which none of the biopesticides nor biostimulants could control (Fig. 2).

Most growers who use biostimulants are using them as a supplement to chemical fungicides. Biostimulants alone are not usually enough to control an outbreak. The Danish Nurseries Association recommends that biostimulants are used in combination with crop protection products, and because biostimulants tend not to have a very long persistence weekly spraying is recommended. In combination, the biostimulants provide a trigger to the plants natural defence system making it more resistant to attacks while the crop protection product prevents or cures infection.

Fig. 2. Mildew on rose leaves in 2013.

COMPOST

Growing media used in Denmark typically consist of peat, fertiliser, and lime. In 2014 the nursery association began testing growing media containing a proportion of green compost. The aim is to see if including compost could improve root development, growth, and the ability of the plants to resist diseases.

Compost can also stimulate soil-life and suppress soil-borne diseases. Its high cation exchange capacity helps buffer most plant nutrients and so minimises the likelihood of stress due to nutrient deficiencies or toxicity. Composts also release nutrients slowly into the growing medium as they decompose.

Composts based on green waste and on horse manure were tested in three nurseries by mixing into the grower's standard medium at each site. The tests were carried out in roses (*Rosa*), *Potentilla*, *Philadelphus*, and *Picea glauca*.

Analysis of the composts showed a high pH and high levels of potassium and chloride. The compost based on horse manure was very high in pH (pH 9.2) and salinity (EC of a 1:1.5 extract was 4.25 $mS \cdot cm^{-1}$).To avoid plant damage the admixture rate was restricted to 15% v/v. Liquid feed was added to the irrigation to maintain optimum nutrient levels in

the growing media.

Yellow leaves and poor root development were observed soon after potting but after 2 months there were no differences in growth and root development in roses or *P. glauca* between the media containing either type of compost or the nursery's standard mix.

The *Potentilla* and *Philadelphus* did poorly from the start in media containing both types of compost and many of the plants turned yellow and remained so for 3 months (Fig. 3). Analysis of the different growing media showed that pH was a little high, and the level of nitrate, magnesium, and manganese was low despite the liquid feeding.

Fig. 3. Potentilla growing in media containing compost, August 2014.

Trials on the use of compost are being continued during 2015. A range of different rates of peat, compost, fertiliser, and lime will be compared in order to optimise nutrient levels, plant growth, and disease suppressive effects.