# A Review of the Potential Benefits of Growing Container Nursery Stock in Peat-Free Media©

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## INTRODUCTION

In the U.K., peat has been the predominant component of growing media for almost 50 years. Technically and commercially, it is difficult to replace. However, for some 25 years its environmental status has been controversial and U.K. mainland reserves are almost exhausted. The U.K. government has set voluntary targets for to phase out use of peat in horticulture in England and Wales: by 2015, all public authority contracts are expected to specify only peat-free plants while by 2020, all retailers in England and Wales are being asked to sell only peat-free plants. In 2011 the government set up a Task Force (composed of growers and other industry stakeholders, including the author) to identify the barriers likely to prevent the targets being achieved, and the actions needed to overcome those barriers.

For historic reasons, many growers regard peat-free growing with suspicion. Yet, over the last decade, progress in identifying and using peat alternatives for U.K. horticulture has been very significant, especially in container nursery stock production. Indeed, trials and grower experience have identified benefits to the crop from use of some ingredients, mirroring the experience of those growers overseas who lack access to cheap peat.

Green compost (composted green waste) is now commonly included in peat-free and peat-reduced growing media because it is very plentiful and, if processed to a suitable standard, is particularly cost-effective. Its nutrient content is valuable but necessitates the use of low-nutrient diluents. Well-processed conifer bark is commonly used in both peat-free and peat-based growing media in the U.K. being cost-effective and locally plentiful.

In this paper the author draws on more than 10 years experience to review the benefits of growing media based on green compost and conifer bark in container nursery stock production. Observations are drawn mainly from experience obtained as co-director of the Peatering Out Project, a not-for-profit company set up to help growers gain experience in using peat-free and reduced peat media; and as research and development manager of Vital Earth, a composter of 100,000 tonne/year green waste and manufacturer of peat-free growing media.

## CHEMICAL AND PHYSICAL PROPERTIES OF GREEN COMPOST

Before undertaking any growing trials, the author undertook a literature review and laboratory studies which identified the following key properties of green compost as a growing media ingredient:

- High lignin content giving good stability in storage and use.
- Good air-filled porosity which can be maintained during long-term storage and use, resistant to slumping.
- High levels of humates leading to good wettablity, cation exchange capacity, and physical integrity of the rootball.
- Significant clay mineral content leading to good cation exchange capacity and water holding capacity, with a water holding capacity 10-20% lower than sphagnum peat.
- Relatively high bulk density compared with sphagnum peat.
- Free-flowing texture, more particulate and less “spongy” than fibrous materials such as sphagnum peat, coir, and wood fibre.
- High total levels of nutrients but mainly in “bound” form, requiring biodegradation and cation exchange to render them soluble – so they are released slowly to the plant. A special extraction method (CAT extraction) was identified to determine the levels of nutrients that seemed to be available to plants and is now a European standard method.
- Significant lime content (both calcium and magnesium carbonates), replacing the need

for addition of lime.
- High pH which can be reduced to a level similar to that of loam by dilution with bark (but still higher than sphagnum peat).
- Low levels of potentially toxic heavy metals and other phytotoxins.
- Likelihood of beneficial microbial activity, including nitrification.
- Low incidence of viable weed seeds.
- Low incidence of human pathogens.
- Acceptable appearance, feel, and odour.

**OBSERVATIONS MADE DURING GROWING TRIALS**

At potting (both by hand or using potting machines) less firming-in was needed than when using peat-based media which rendered the potting operation as a whole up to 9% faster. In one trial it was possible to reduce the number of firming-in operatives on the potting machine from 3 to 2. The material flowed into pots well and drilled cleanly. There was up to 9% extra out-turn in terms of pots filled in some trials (and the number was never less than when using peat-based media).

In practice the higher bulk density turned out not to be a major issue on the nursery as most of the differences between peat and peat-free materials were negated by watering-up. The media made good capillary contact with subirrigation systems.

Trials have been undertaken with plugs, liners, and larger transplants. Media containing green compost and bark have performed well with a very wide range of subjects, in spring/summer and autumn potting and in a wide range of crop management systems – including good results with ericaceous subjects.

Initial growth of plants after potting was sometimes slightly slower than in peat-based media and for most species a slight dwarfing, by shortening of internodes, has been noted.

Inhibition of algal growth and liverwort was noticed in many trials on the surface of media containing green compost, especially on overhead-irrigated beds. This is because the surface of these media tends to stay drier than peat between waterings. There is also some reduction in leafy weeds such as bittercress; reduced incidence of foliar diseases such as leaf spots and reduced incidences of some foliar pests such as snails and two spotted mite.

Most trials have revealed a need for lighter but more frequent irrigations. Over-wintered stock has tended to show less visible starvation (paling of foliage).

In propagation, speed of rooting of herbaceous perennials cuttings was about 10% slower in media containing composted green waste but the material lent exceptional physical integrity to plug rootballs. There was less root girdling in containerised bare-root transplants.

At despatch container plants growing in media containing composted green waste were 7-11% heavier than peat-grown stock but needed less cleaning and bark-topping, leading to reduced lead time to despatch and significant cost savings. The slightly dwarfer growth habit meant less trimming and tying in and plants travelled well, were easy to handle and established well after planting.