Fact Sheet

Container Nursery Stock

Projects HNS 28 and 28b

41/97

Horticultural Development Council
Bradbourne House
Stable Block
East Malling
Kent ME19 6DZ
T 01732 848 383
F 01732 848 498

Alternatives to peat for growing media

by Margaret Scott, HRI Efford

Container production relies almost entirely on peat-based media which have gradually been developed over the past 35 years through extensive R&D programmes. Peat continues to offer the most cost effective, reliable material available, with the ability to tailor mixes to the requirements of a wide range of HNS species and production systems. However, the high profile 'anti-peat' lobby of the 1990s focused attention on the need to consider alternatives and HDC projects HNS 28 and 28b investigated the range of materials available and their management and performance for HNS container growing media.

The environmental lobby's campaign to protect the diminishing English lowland bogs was for a complete replacement of peat rather than gradual substitution with suitable amendments. This is despite the fact that a large proportion of HNS media used imported peat from Ireland, Finland, Russia and the Baltic States, where considerable resources remain available.

The campaign led to a large number of 'alternative peats' becoming available, but with limited information on their use in growing media. These included those derived from waste products, recycled and renewable resources with a range of nutrient contents, through to inorganic supplements.

Range of materials

The scale of the possible combinations was huge and products were categorised according to nutrient levels as potential bulking agents, or those with low, medium or high nutrients, together with their structure and potential water holding capacity. This allowed a number of combinations to be achieved within the required structure and nutrient range, though rate of fertiliser addition was complicated by lack of information on nutrient release patterns of the various materials.

Alternatives used in the trials had already been composed/reprocessed before receipt and were considered suitable for inclusion in growing media.

Year 1 (1990/91)

This initial work screened over 30 different combinations of alternatives against peat or peat-bark standards, with base dressing estimated according to individual mix analyses, and all plants grown under a standard irrigation regime. Most of the mixes included coir as the main bulking agent, with the addition of pine bark, crushed expanded slate, chicken or cow manure and composted sewage/straw sludge in varying proportions. Mixes based on rockwool or paper waste were also considered.

Results varied with species. *Chamaecyparis pisifera* 'Boulevard' proved particularly sensitive, with plants in mixes containing coir appearing to suffer from a nutrient deficiency, while those in mixes with a proportion of animal wastes suffered phytotoxicity. Growth in mixes with paper waste present was poor. The rockwool-based mix also produced relatively poor growth, and the 'white' colour was considered a disadvantage.

In contrast, *Viburnum x burkwoodii* was tolerant of most mixes.

This first year highlighted the potential of coir, the problems of using even relatively small quantities of high nutrient animal wastes in specialised growing media, and identified a number of required management changes depending on mix, especially in relation to nutrition and irrigation.

Year 2 (1992/92)

The main objective of the second year was to evaluate nutritional requirements of the various mixes.

Screening was increased to include coir, composted conifer bark, granulated pine bark, wood fibre and spent mushroom compost as the main bulking agents, in combination with composted municipal waste, cow and pig manure and paper waste. Three fertiliser regimes were compared, with the rates dependent on initial analysis of the mix.

Large differences were seen in plant growth between fertiliser rates and the best were taken for comparison with the peat and peat-based controls. Where supplementary nitrogen had been applied, results in the coir and coir-bark mixes were as good as the peat-based control for *Chamaecyparis pisifera* 'Boulevard' and *Viburnum x burkwoodii*, but the ericaceous species (*Azalea* and *Calluna*) were poorer, a relation perhaps of the higher pH of coir.

Inclusion of the nutrient rich organic wastes resulted in poor colour with *Chamaecyparis pisifera* 'Boulevard' and reduced growth of the ericaceous species, but produced reasonable results with *Viburnum*.

Spent mushroom compost proved disastrous, killing plants or reducing growth unacceptably.

Peat-bark mixes
A complementary trial looked at use of a range of matured/composted pine and mixed conifer barks as peat alternatives of for partial substitution, using *Hydrangea* and *Chamaecyparis lawsoniania* 'Ellwoods Gold'.

Peat-bark mixes produced better results than straight bark, most probably due to the difficulties of achieving adequate watering of the more open bark mixes. The mixed conifer bark gave transient foliage yellowing with *Hydrangea* in the early stages of establishment, but thereafter produced reasonable results.

Year 3 (1992/93)
In this final year, the emphasis of the work changed to include both peat-free and peat-based mixes and, according to the structure of the mix, received differential irrigation regimes. As previously, base dressing were amended according to analysis of the materials used. The main bulking agents included coir, wood fibre, wood waste, mixed conifer and pine barks, a treated domestic waste (WMC) and three grades of peat. These were used in combination with paper waste or different grades of wood chip. Comparisons were made with *Chamaecyparis pisifera* 'Boulevard', *Viburnum tinus, Azalea* 'Rose Greeley' and *Erica erigena* 'W.T Rackcliff'.

All species did well in the coir and coir-bark/wood chip mixes and the peat-bark/wood chip mixes. The finer wood fibre-based mix also produced satisfactory results, but coarser wood fibre proved difficult to water. Plants in mixes with paper-waste were poor.

Chamaecyparis pisifera 'Boulevard' grown in wood waste were a little smaller than those in peat, though *Viburnum tinus* grew equally well in both. *Viburnum tinus* also grew well in the WMC mixes in combination with peat/wood waste/wood chip, with benefits particularly noticeable in the spring following overwintering outdoors, suggesting continued release of nutrients from reserves within WMC. However, other species in WMC were generally smaller than the peat controls.

An observation trial showed the potential of composted bracken in a 50:50 mix with peat. Composted bracken was one of the few 'peat alternative' materials with a low pH, making it especially important for ericaceous species.

Summary

- From the three years screening, it is concluded that no peat alternative presently available can be used as a direct substitute for peat.
- Coir and processed wood fibre appeared the most useful bulking agents, with various barks, wood products and inorganic materials as amendments.
- In all cases there was a need to amend base fertilisers according to pH and nitrogen draw down properties of the various materials. In addition, irrigation regimes needed to be matched to mix requirements.
- There were species variations in response to the different mixes and it seems that no one peat-free mix will be equally suitable for the diverse range of HNS grown as peat. However, some species responded very well in the peat alternatives, producing equal or even better results than in peat-based controls (*Viburnum*), while other were poorer (*Chamaecyparis pisifera* 'Boulevard').
- Variability between batches of the various materials was a problem and at times made extrapolation of trial results difficult.
- Animal waste, spent mushroom compost and paper wastes in their present form proved unsuitable for container mixes and should be considered more for soil amelioration, mulching, etc. Domestic waste requires further work, but could have potential, in combination with other materials, for some species.

Conclusion
This programme of the work has identified problems associated with rapid conversion of HNS container production into peat-free growing media, while helping identify a number of materials with potential.

These, however, require further R&D to develop media capable of producing products of as good a quality as peat-based mixes, cost effectively.

Further information may be obtained from the HDC project report HNS 28 titled 'Container production: influence of production methods on plant quality, shelf life & establishment and reasons for under performance in containers (EM)' and 28b titled: 'Alternatives to peat for container HNS production'