A New Rockwool Based Growing Medium for Container Plant Production

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Grodania A/S, in conjunction with progressive nursery stock growers in the UK, has developed a complete peat-free production system based on Grodan rockwool for container nursery stock. Grodan-media plants can be grown side by side with peat-media plants to similar quality standards. This means no modification of existing production systems.

Trials carried out under full commercial conditions have given comparable results to peat-based compost from propagation to liner pot and in the final 3 litre container. Indications are that fine tuning on the nursery will give improved results over peat. Assessed visually by nurserymen all plants were considered to be of marketable quality. From data recordings, there were little or no significant differences between the treatments. All plants received the standard peat treatments.

BACKGROUND

Work started on a Grodan compost in 1986 as a direct result of Danish pot plant growers' concerns about poor structural quality and uniformity in peat. Trials proved that pot plants would grow well in 100% Grodan rockwool but it was not free flowing, which caused handling problems and the project was abandoned. As part of routine re-evaluation the project was looked at again in early 1989. By 1990 a flowable rockwool medium, code named "Derek", had been developed. Derek has been designed to improve on some of the strengths of peat and avoid some of its weaknesses. It is a designed substrate from naturally occurring materials, produced in a precise and controlled way. This ensures continuity and uniformity and the ability to tailor-make substrates.

CHARACTERISTICS

In Denmark, research showed that pot plant growers wanted a weed-free, structurally stable medium, which would not shrink in the pot, and had the high air-holding capacity of a medium-light peat. In addition they wanted improved water-holding capacity and some buffering capacity. Derek was designed to fill all these needs (see Table 1). The benefits which the Danish growers identified could also be applied to UK nursery stock production.

AFP and Water-Holding Capacity. The starting point for any compost design is the water : air balance. The Grodan rockwool component of Derek is a specific mixture of special types of water repellent and water absorbent rockwool which, at field capacity, will give an air-filled porosity (AFP) of around 20% in the pot.

At this AFP level, Derek is able to hold 60 to 70% water. A peat with a similar water-holding capacity would be expected to have an AFP of about 10%. Water held in Derek is only loosely held, so the roots do not have to apply high suction pressure to get at it.

Table 1. Physical and chemical data.

Property	Units
Water-holding capacity	60 - 70% by volume
Air-filled porosity	20% by volume
pH	6.0 -6.2
Conductivity	0.1 - 0.2 mS/cm
Cation exchange capacity	25 - 30 meq/100 g
Weight	0.75 - 2.2 kg/ 3-litre pot
Colour	Develops to dark grey/black
Pest/disease/weed seeds	Guaranteed free

Observations indicate that the evaporation rate of water from Derek is exactly the same as from a wet peat surface. Even in the liner pot, the top surface will dry off in much the same way as a peat compost. Rewetting is easier than peat.

Weight. At field capacity Derek will weigh about 10 to 15% more than a peat compost. Generally, Derek will be used below field capacity. Transport time could easily be extended by topping up the water level.

Buffering Capacity, pH, and Conductivity. The buffering capacity is low enough to allow good nutritional control during crop production and high enough to enable feed to be held for normal shelf life requirements. Controlled-release fertilisers used at standard peat rates gave normal plant growth. Derek's pH is around 6.0 to 6.2 and does not need lime incorporation. Like peat its pH will be affected by the water supply used. Trials on nurseries with water pH levels of 7.4 and 7.6 have not adversely affected crop growth rates.

The conductivity of Derek is very low which allows for optimum use of fertilisers. This means salt-sensitive plants will not be adversely affected by the growing medium.

Colour. Derek is a light brown/grey mottled colour which matures to a more even dark grey/black after successive irrigations. Most other non-peat products tend to be "peat brown" in colour. This can cause confusion to the general public.

Although Derek is distinctive in colour, it can be overlooked. The first overwintering (3-litre pot) observation trial on one nursery was concluded abruptly when nursery staff selecting for an order shipped off a good number of Derek-grown plants to a customer. They did not notice the difference and neither did the customer!

Efficacy. All trial work was carried out under commercial conditions. A no change policy was used—that is: no changes to the fertiliser regime, the irrigation, the standing down area, the potting machines, the pot size, planting material, or crop husbandry. The only change was the switch from nursery compost mix to Derek.

A trial was set up to compare peat, coir, and Derek performance in 2-litre pots from a spring potting. The nursery experience showed that coir required an extra kilo of OsmocotePlus 12 - 14 month spring formulation per cubic metre compared with the peat compost (Bulrush medium). Derek received the same OsmocotePlus rate as the peat compost—4 kg/m^3. Both the coir and peat compost mix also included 1.5 kg/m^3 dolomitic lime.

One hundred 9-cm peat liner plants of ×*Cupressocyparis leylandii*, *Mahonia japonica*, *Buxus sempervirens* 'Aureo-variegata', *Spiraea japonica* 'Snowmond' and *Ilex aquifolium* 'Alaska' were potted into each substrate.

Plants were potted by machine on April 1, 1992, and stood down on Mypex with overhead irrigation. The *M. japonica* was placed on Mypex in a shade house. All plants received the standard peat treatment. The standard herbicide programme of Ronstar 2G was applied after two weeks from potting followed by Flexidor in May/June. A final Ronstar 2G treatment was applied in September.

Height and width growth rates were analyses from April to late June (see Table 2 and 3). Derek gave significantly taller plants than coir in *Spiraea*, *Ilex,* and *Buxus*. In the width growth rates, Derek was significantly better than peat for *Mahonia*. *Ilex* in Derek was significantly better than in coir.

Table 2. Mean height growth rates (mm) from April to June in three pot substrates.

Species	Peat	Derek	Coir	LSD%
Spiraea	287 +	310 +	240 -	50.3
Ilex	108	125 +	75 -	36.2
Buxus	49	66 +	43 -	17.5
Mahonia	92	94	113	N.S.
×*Cupressocyparis*	192	206	199	N.S.

Values marked (+) are significantly better than values marked (-).

Table 3. Mean width growth rates (mm) from April to June in three pot substrates

Species	Peat	Derek	Coir	LSD5%
Spiraea	230	262	176	N.S.
Ilex	35	68 +	17 -	33.9
Buxus	44	61	57	N.S.
Mahonia	124 -	211 +	229 +	77.3
×*Cupressocyparis*	not recorded			

Values marked (+) are significantly better than values marked (-).

Across all species, neither coir or peat had a significant advantage over Derek in height or width. In general terms, Derek outperformed coir substrate with extra fertiliser and was as good as peat grown plants.

Trials of spring- or summer-potted rooted cuttings into liners, stood down on Efford sand beds or on normal sand beds with overhead irrigation, and 3-litre-pot trials have shown that Derek can produce plants of equal quality to peat without changing any aspects of husbandry. It should be remembered that today's peat production systems have been developed over the last 25 years. In just one year Derek has matched its performance. With fine tuning, superior plants to peat-raised plants may be produced in the future.