New pots for trees

In recent years two different revolutionary containers for trees have been developed to improve the establishment rate of stock. **TONY KIRKHAM**, Head of the Arboretum at the Royal Botanic Gardens, Kew and **DAN LUSCOMBE**, Assistant Curator at Bedgebury National Pinetum, write about the history and advantages of the Light Pot™ and Air-Pots™.

Light Pot™ or the Barcham White Bag

Every now and again a new product comes onto the market or a new technique comes to light that revolutionises the way that we successfully plant and establish new trees. One such product is the Light Pot™ or the "Barcham white bag" as we know it in the horticultural world.

One of the first things we hope to achieve as dendrologists when we plant trees in our gardens or arboreta is to encourage newly planted nursery stock to develop a strong, healthy, well balanced root system quickly that is capable of supporting the trunk and young crown. All too often we over-stake to compensate for a mediocre root system, whether the root system be too small or badly damaged when lifted from the field or pot bound with spiralling roots if container grown. We forget to remove the stake or adjust the ties because of more pressing needs in our busy schedules and the outcome is damage to the trunk from abrasion against the stake or a trunk lacking increment and a feeble root system unable to support the crown due to the lack of movement and flexing in the wind.

Contractors often plant dead trees as the naked root systems are left exposed to the wind, root hairs drying out and dying between the lifting and planting operation. This is not only depressing and upsetting to the planter or nurseryman, but also costly in terms of the expense of the failed nursery stock and planting operation and the lost years between planting and beating up.

The white bag system of growing trees has reduced the potential for all the above to happen and contributes to the increase in tree-establishment success rates.

Light pots were originally developed in Australia for growing eucalyptus by using a white material as opposed to black as a means of reflecting the strong sunlight that scorched the root systems in black pots whilst on the standing out ground.

The method was a great success, reducing the temperatures in the pots, but when the root systems were exposed, it was noticed that all the roots were growing vertically downwards rather than circling around the circumference of the pots, which would be the norm in a conventional tree-growing container.

The white containers had allowed an amount of light to penetrate the pot, triggering a phototropic and geotropic reaction. This triggered the roots to grow downwards away from the light, aided by the pull of gravity. When

planted out from the white bag, the roots are quick to explore their new surroundings without continuing the spiralling movement experienced from a conventional containerised root system and so quickly and effectively rooting stress free.

Barcham Trees PLC developed the light pot into the white bag that is now synonymous with the Barcham name, resembling the builder's bulk bags with handles for ease of handling, overcoming health & safety manual handling regulations and with protection over the root ball allowing the delivery of a healthy tree to the planting site.

In 2003, to improve urban tree planting, the white bag was developed further by incorporating a permeable and degradable mulch mat and root barrier into the design of the pot. It was soon realised that trees require a period in their early life growing a natural root system in open ground, and the white bag is used to containerise the tree for a 12 months period prior to sale.

This new system of growing and transporting trees has helped to revolutionise tree planting and establishment in local authorities and we can attribute the new urban treescape that we are beginning to witness around our towns to the Barcham Light Pot™. TK

Air-Pots™

In the nursery at Bedgebury and like most nurseries, we used to use conventional pots for growing our trees and shrubs. In 2004 we received a *Paulownia* sp from Wakehurst Place in a large strange nobly pot covered in holes. This was my first introduction to Air-Pots™. It was only when this tree was planted and the root system could be seen that the benefits of this strange looking pot became apparent. Previously we had had to try and unravel the mass of thick twisted roots on many of our plants before planting them. Often the shock of trimming and raking roots would cause reduced growth and sometimes death. However with the Air-Pot grown *Paulownia* we just unwound the pot revealing a thick and healthy mass of roots the tips of which were all pointing out and down. We put the plant in the hole; back filled, walked away and enjoyed watching it grow. This observation was great but we knew that *Paulownia* is quick growing and this good establishment may not have been the result of the Air-Pots™. With my interest piqued we decided to order some and try them on a range of conifers and broad leave trees.

In the UK the Air-Pots™ are made and distributed by the Caledonia Tree Company based just outside Edinburgh. There was little information on how to use the pots and we had numerous questions to ask: what were the best growing media? What size of pot for which species? Watering etc came to mind so a phone call to the company was in order. I was pleased to speak to the owners Jamie and Suzie Single. They could have just pushed a sale but instead offered loads of advice and were interested in feedback on how we got

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photograph © Barcham Trees

Left Light Pot™ or the Barcham White Bag. Handles make the bags easy to handle (***top***); the roots grow vertically downwards (***below***).

Below An opened Air-Pot reveals the fibrous root system ready for transplanting.

photograph © Tony Kirkham

on with our wide range of plants; common and the rare or unusual.

To give some comparison and as a safeguard against it all going horribly wrong, in the first season we used both conventional and Air-Pots™. We planted the same species from the same accessions in each pot type. After a couple of months there wasn't any obvious difference by just looking at the plants between the two options. It was only when we started re-potting that the differences could be seen. The root systems in the normal pots were what we expected, spiralled, with few white new roots and a large swirl of roots at the bottom of the pot. To pot on involved teasing, trimming and raking before putting into a larger pot. With the Air-Pots™ the roots were copious lovely white new roots and instead of having to tamper with them they could just be gently place in their new larger pot. This made the whole process quicker, almost negating any damage to the roots (essential for fleshy or fragile rooting species like magnolias) and reduces the risk of disease. All in all, the root system of the plants in Air-Pots™ was healthier, fuller and better established with plenty of new roots. This was perfect as our aim is always to raise quality plants that establish quickly and successfully when planted. A healthy root system is vital for this.

History of Air-Pots™

In a previous life the Air-Pot was known as the Spring Ring. These were a more primitive version and were designed to wrap root-balled plants in the

photograph © Tony Kirkham

Young plants in Air-Pots™ showing the simple fixing method and holes through which roots are air-pruned.

short period of dormancy to prolong the planting season. These were mainly used in Australia by nurseries and landscapers for growing eucalyptus. These quick growing trees presented growers with major problems. Fast growing roots spiralled out of control in small containers resulting in top-heavy plants causing the trees to topple over. Air pruning of the roots provided a solution. Therefore there was an incentive to design a practical yet cost efficient air pruning pot for general nursery use. Since 2000 the Caledonian Tree Company has been designing and developing their Air-Pots™ with this in mind. Slightly different versions of the air pruning pot are available in the USA and Australia.

How they work

As with most good products the idea behind Air-Pots™ is simple. They encourage a fibrous healthy root system on containerised plants by eliminating spiralling and strangling of the roots. This is done by surrounding the root ball with air. This is where the slightly bizarre appearance of the pot comes in to play. Rather than a conventional smooth sided pot the Air-Pot is covered in closed inward pointing cones and outward pointing open ended cones. The effect is a bit like an egg box with no flat surfaces on the wall of the pots. The base of the pots is a round disk like a grill full of holes and it is slightly raised off the ground.

When potting the plant is placed in the Air-Pot so the root collar is level

with the top of the pot. As the roots start to grow they reach the sides of the pot and the inward facing cones direct the roots outwards to the open ended cones. When the roots reach the air they dehydrate and are 'air pruned'. The plants response to this is to produce more roots and the root ball becomes denser and full of new white tipped roots. This is what stops the spiralling found in conventional containers

Once the plant has filled the pot with roots all you have to do is remove the screw on the side and peel the pot wall away. The base then pops off and you are ready to plant.

Advantages

- Better root system
- Quicker establishment
- Pots can be made to any size either volume or depth
- Reduced number of times for potting on
- Seeds of tap rooting species e.g. *Quercus* or *Carya* can be direct sown into pots and planted out from the pot
- No need for any root disturbance when re-potting or planting excellent for such difficult plants as magnolias
- The greater availability of air to the roots creates a better environment for bacteria and Mycorrhiza making it easier for the plant to take up nutrients
- Made from recycled plastic

Disadvantages

- Plants dry out quicker than conventional pots, drip irrigation is strongly recommended
- Rewetting is a problem if plants dry out (a bucket of water is handy to dunk plants in)
- They are more costly to buy than conventional pots this is more of a problem for commercial growers
- The pots must be made up by hand
- It can be difficult to store the pots

Conclusion

Over the last five years we have moved over to growing almost all our plants in Air-Pots™ and they have proved a great success. We use peat based composts and this works really well with the Air-Pots™ but other media is just as successful. Knightshayes Court, Westonbirt Arboretum and Wakehurst Place have had excellent results in peat free media. The most important thing to do is visit the website and watch the instructional video on how to use Air-Pots™ as if they are not put together properly they won't work properly!

It takes a while to get used to using Air-Pots™ but when you have a system that works for your garden or nursery you will wonder how you grew plants without them. Happy growing. DL

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