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Studies have shown that 25% of newly planted trees fail and die. Trees are more likely to succeed if well grown in the nursery and planted with appropriate knowledge and care. The main causes of failure in newly planted trees is from: being planted too deep, planted into consolidated/airless soils and lack of water/irrigation aftercare.

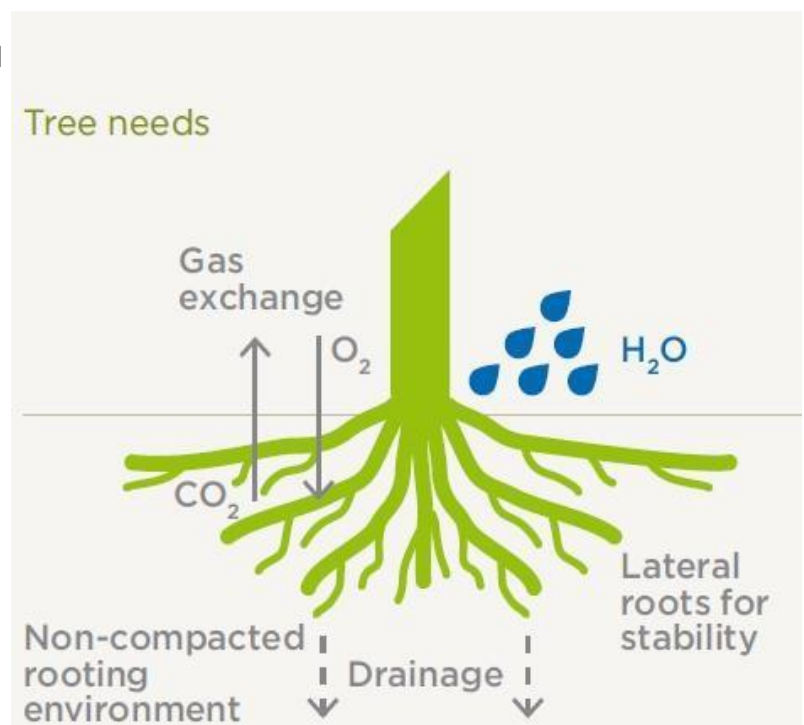
Site Selection

Select a site with sufficient space for the tree. Avoid planting too close to utilities: e.g. underground pipes (sewers, water, gas) and cables—secure service plants prior to excavation. Don't forget overhead cables, power and phone. The utility companies will demand about 5+ metres distance from their equipment, though 3+ metres is more reasonable for smaller trees. Distance from buildings would be similar and try to visualise the mature size. Do consider the soil type and its suitability to support your tree/plant of choice. Also consider exposure levels and aspect - the genius loci.

Tree Needs

Tree roots require water and oxygen to succeed and thrive. A good soil is up to 20% air/oxygen and will allow roots good gaseous exchange. Consolidated soils reduce this and once the oxygen level falls below 10% the ability for roots to develop healthily is also reduced. Build up of CO₂ in the soil also causes root death.

So a soil needs to allow water absorption and drainage of excess water as well as exchange of air/gases. Heavily compacted soils are not healthy for trees to establish in or survive, limiting not only gaseous exchange but also root penetration and water migration/drainage. Compaction is one of the main contributors to poor tree establishment. Any existing soil compaction must be alleviated before planting.



Picture - TDAG Trees in Hard Landscape

Planting pit.

With the location chosen, excavate a shallow square planting pit larger than the roots of the tree.

Square because roots can escape from a square pit more easily than a round pit which may encourage roots to circle (and possibly strangle the tree in time).

Shallow as most roots occupy the top half metre of soil and rarely deeper than a metre. Size – 2-3 times the width of the root ball/root spread (if a bare rooted tree).

Shallow only the depth of the roots/root ball, 30- 50cm depth is usually sufficient. But aerate/spike (not cultivate) below this level to the full depth of a fork (spit depth), this will relieve compaction and assist drainage from the pit without creating soil that will settle.

Also fork the sides of the pit too, allowing better root escape. The forking relieves compaction but not to the extent that will allow any slumping of sub soil after planting—which would drop the planting height.

Break up the excavated soil and sub soil, keeping them separate. The soil should be the local soil which the tree is to establish in and live in for the rest of its life. Research shows that enriching the soil with organic matter has little benefit (it is better used as a mulch). In fact excess organic matter or compost underneath the roots is hazardous, because it will slump and reduce planting depth by 10% and as the organic matter breaks down with anaerobic bacteria, toxic gases are released which can kill tree roots.

Place the sub soil at the base of the pit, create a lightly consolidated mound to rest the roots on and set the planting height accurately. A firm base to the tree pit will support the roots/root ball and limit any settlement. There should be some drainage under the tree's root zone (hence the forking of the pit base).

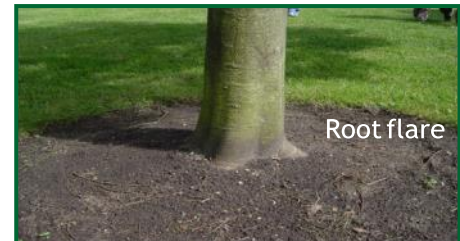
Planting Height - *Get the height right — this is important.*

Plant high, see them grow. Plant low watch them die.

Planting too deep is a major cause of establishment

failure. Planting more than 25mm too deep will have long term negative effects on tree health and may lead to death. Research shows that planting too high by 25-50mm has minimal negative effects and some landscapers successfully plant 50mm high to allow for any settlement.

Place a cane or straight edge across the pit and match this level (the site soil level) with the tree's **root flare** which should also be the soil level it has been growing in (the nursery line). Plant higher but never lower than the nursery line. Higher planting will offset any settlement in the planting pit. The root flare needs to be clearly visible at the top of the rootball before and after installation.



A **root flare** is the point where a tree's buttress roots form and support the tree. They are the tree's natural response to its environment, wind etc. The effect of the wind is a stimulus to root flare development and root growth. It can be suppressed by over-staking trees.

Backfill

Backfill around the tree roots with the broken-up topsoil, (shake the tree if bare rooted) as you back fill to encourage good soil contact between the roots. Firm down and lightly consolidate the backfill, in layers of 15-20cm, but not too firmly as good soil is 20% air and tree roots need to breathe but too loose and the soil will slump. Once backfill is levelled off and the planting height is correct, stake the tree if required.

Irrigation

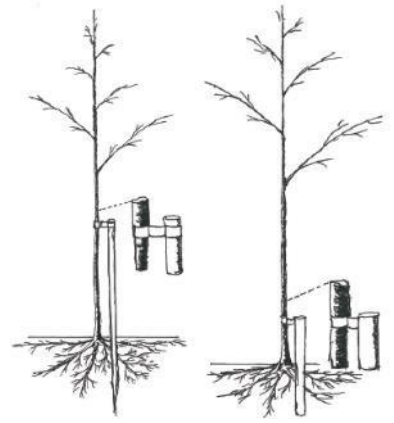
On completion do irrigate the planting well, to field capacity if practical but at least 20 litres. This helps to close up air pockets in the backfill and make a better root soil contact to allow new root hairs to grow and absorb soil moisture.



Staking

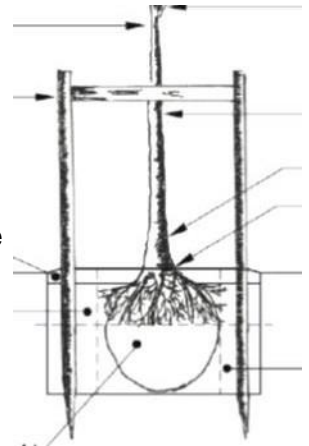
The purpose of a stake is to keep the tree's roots stable in the soil. Not all trees will require staking, though it has become a habit to stake. Stakes are a short-term support keeping the roots stable as they root out and establish a good purchase in the soil.

Stakes and ties do not need to be more than 1 metre above ground level. The movement of the tree's head/crown will stimulate root growth and root flare formation. Ties need to be monitored and adjusted if required twice a year but at least once. In year two if the stake is still required or the site very exposed, reduce the stake height by half and re-fix ties. Stakes left longer than 2/3 years end up holding the tree up and reduce the natural stimulus for root development.



With **bare rooted trees** a single stake can be placed in the planting pit before the tree. Central but offset toward the windward side. In the UK the prevailing winds are from the south-west. The stake needs to be upwind of the tree it is supporting.

With **container grown and root balled trees** it may be appropriate to place two stakes either side of the root ball. A cross bar between the stakes will support the tree from the up-wind side. Alternatively, a diagonal single stake can be used.



Ties and pads need to be flexible and not have hard edges which can damage the tree's young bark, ask about the tree ties we can offer. For information on underground guying—we recommend the Platipus system and can supply these, for more information ask the sales team.

Mulching

Keeping the tree circle - a one metre diameter (at least) circle around the tree free of grass and weeds is essential for establishment. The mulching of this circle will help to retain soil moisture and reduce evaporative losses as well as suppressing weed growth and making maintenance easier.



It also keeps away mowers and strimmers which can cause severe damage to soft young bark. (Strimmer guards are also available)

Mulch with composted or raw wood chippings, bark or PAS100 green-waste compost. Mulch to a depth of 50-75mm but reduce the mulch depth immediately next to the trunk to allow air to circulate (keeping the bark dry reduces risk of fungal infections).

Supplements

Mycorrhiza - these are naturally occurring soil born fungi which team up with the plant in a mutually beneficial partnership. The fungi gets some sugar from the plant and it gives back water and nutrients. The mycorrhiza mycelia grow much faster than roots and can colonise a much greater volume of soil at a micro level. Mycorrhiza are generally species specific and the proprietary versions are a mixture of common forms. They are very beneficial when planting into difficult soil conditions with low levels of organic matter. For example, poor sandy soils or heavy metal contamination. They also help to overcome replant syndrome when planting the same genus/species back into the same sites. Specific products are made for rose planting where this is a common problem.



For mycorrhiza to work effectively they are sold as a powder which can be dusted on to roots or mixed to form a gel paste which roots can be dipped in. There needs to be contact between the powdered mycorrhiza inoculants and the roots for the beneficial relationship to start. Adding mycorrhiza into the backfill will have only a random chance of contact and effect.

Fertilizer - in the first year after planting there is no need to feed trees. Initially their first role is to get secured into the soil. Feed in the spring of year two, with a surface dressing of slow release fertilizer and a topdressing of organic mulch.

Sugar - research by Dr Glynn Percival has shown an application of ordinary sugar at 30grammes per square metre around the base of a tree (up to its canopy line), encourages root development. Do not dose at higher levels (70g/m² can be toxic for some species). This can be particularly helpful with difficult to transplant trees such as Beech, Oak and Birch. If this is to be applied, apply sugar before mulching, and re-treat in the late summer early autumn.

Irrigation

A new tree will need irrigation in its first year after planting and possibly the second year too if dry. In the South East we often get a dry spell in the spring, (12 weeks in 2011). Lack of irrigation aftercare is the second largest cause of establishment failure (the top being planting too deep).

- **How often?** - New trees need irrigating weekly to fortnightly - even if it has rained.
How much? - At least 2 buckets (2x5-10 litres) for a small tree less than 3 metres.
Make sure the irrigation water goes over the tree's roots and does not run off. However a tree watering bag such as a "Treegator" are very effective as they trickle their 75 litre contents over the roots over 8 hours, delivered just where the tree needs it with no run off.
- **What period?** - From March to the end of August which is the main period of water demand for the tree.
- **It has rained do I need to irrigate?** – Generally, rainfall in summer just damps the surface and if heavy will run off. It is useful but do not rely on it to provide all that the new tree needs. Trees and specimens benefit from additional regular irrigation to ensure establishment and secure the investment. Ensure water can penetrate the root zone.

Treegator - watering bags, zip around the tree trunk and can be filled by hose. With a capacity of 75 litres the water trickles down on to the root zone over an 8-hour period via small perforations. A weekly or fortnightly fill gives a known measured irrigation dose to the tree without the risk of run off or incorrect dosing when a hose is used. Bags can be unzipped when not in use or moved to other trees, but they are UV stable and used by many professional organisations and councils.



Maintenance

It is important to give the tree the best start possible. It has a design life of more than 50 years to several hundred for large shade trees. It is worth making this investment work.

Keep a weed free circle around the tree for a minimum of 2 years. Grasses and herbaceous plants are far more effective at getting moisture from the soil than woody plants. Maintain a 1 to 1.5 metre diameter weed free circle - it keeps mowing machines away. If mulched too it adds organic matter to the soil and reduces evaporative water losses.



Newly planted trees will benefit from inspections at 6 monthly intervals to: firm up any root rocking; check for excessive tightening of tree supports; security of tree stakes while required; etc. Strimmer guards also protect against unintentional mower damage.

If you have doubts about your trees health and its establishment, please call the Palmstead sales team for advice. Please note our plant failure policy is on our web site and plants do not come with an automatic guarantee.

Further reading:

British Standard BS8545:2104 Trees: from nursery to independence in the landscape available from BSI

TDAG Trees in hard landscape a guide for delivery—free download from www.tdag.org.uk