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**Module 5 The supply, planting, and aftercare of woody plants**
Unit Code: A/602/3936
UNIT GUIDE 2023-24

**LO 5 Understand the aftercare requirements of newly planted stock**

**5.1 Identify the elements of an aftercare program for newly planted trees/shrubs to ensure the successful establishment**

Planting a tree is just the first step.

Over 400,000 saplings, planted by National Highways to compensate for the removal of mature trees in road construction projects throughout England, have perished due to drought conditions and insufficient aftercare. The government-owned entity disclosed that 30.4% of the trees did not survive across nine of its 38 major road initiatives. These trees were planted after the 2020 planting season, just before the heatwave that struck the nation that year, with temperatures soaring to 40°C.

It was reported that *45% of the 860,000 trees planted* along the A14 from Cambridge to Huntingdon have *failed*. Additionally, *75% of the trees planted* at the A45 and A6 Chowns Mill Junction are also experiencing failure.

John Parker, the Chief Executive of the Arboricultural Association, emphasized that projects should prioritise trees' survival over merely increasing the number of trees planted. He noted that these statistics highlight the necessity of shifting the focus *towards the establishment of trees* rather than just their planting, underscoring the importance of implementing maintenance and aftercare plans for these initiatives.

https://www.4thcorner.co.uk/30-of-trees-die-in-national-highways-schemes/#:~:text=Over%20400%2C000%20saplings%20planted%20by,and%20a%20lack%20of%20aftercare.

An effective aftercare and maintenance program is crucial for ensuring optimal plant growth and sustained health. This program may encompass the application of herbicides, maintenance of fences and guards, as well as activities such as pruning and watering.

Instead of being planted in the ground, cell-grown trees are raised in trays or pots that are filled with compost cells. Because the whole root system (cell-grown plant plug) is preserved, these trees may be planted almost any time of year and quickly take root in the ground.

The *advantages of cell-grown trees* include:
They can be planted in any season, except periods when the ground is frozen or excessively wet.
They exhibit a high survival rate and experience minimal transplant shock.
Their root systems remain entirely intact and undamaged.
They commence growth immediately, as there is no "check" period.
They are convenient to handle, transport, and store.
They are free from pests and diseases, adhering to biosecurity regulations.
They are appropriate for a diverse array of species and planting purposes.

Examples of cell-grown trees include:
Noble Fir, Nordman Fir, Norway Spruce, Blue Spruce, and Serbian Spruce (conifers).
Field Maple, Norway Maple, Sycamore, Italian Alder, Common Alder, and Grey Alder (broadleaves).
Crab Apple, Wild Cherry, Bird Cherry, Blackthorn, and Hawthorn (shrubs and hedging plants).

The image below displays several Aspen tree seedlings that have been cultivated in cell trays. You will notice the plugs that have been extracted from the trays in which the seedlings were grown.

https://www.treesbypost.co.uk/blogs/news/what-are-cell-grown-trees#:~:text=Cell%20grown%20trees%20are%20trees,landscaping%2C%20hedging%20and%20environmental%20planting%20.

A **semi-mature tree** is an established tree that has not yet reached its full height and still has significant growth potential. Semi-mature trees have smoother, more flexible trunks than fully mature trees and have not yet produced fruit or flowers.


**What is a whip?**
A whip is a transplant consisting of only a single slender stem, without significant side branching. The term usually refers to woody plants that are between two and four years old. The whip form reflects the natural characteristics of the mature tree. Whilst some species are well branched from a young age, others such as Acer platanoides and Prunus avium are more whip-like.

**What is a feathered tree?**
A feathered tree usually has an upright central leading shoot and a stem furnished with every spread and balanced lateral growths down to near ground level, according to species, the form reflects the natural characteristics of the tree.

https://johnsonsnurseries.co.uk/solutions/tree-size-guide/

Confronted with a multitude of physical, chemical, and biological challenges that may hinder successful establishment, newly planted trees will necessitate the use of various accessories commonly utilized by arborists. These include tree guards and shelters to protect against herbivory, with the latter also serving to create a favourable micro-environment conducive to tree growth and development. Additional accessories such as tree stakes and ties, tree restraints, strimmer protectors, and mulch mats will also be essential. Herbivory refers to the act of animals consuming plant matter, while herbivores are those animals that have evolved to feed on plants. Similar to the dynamics observed in predator-prey relationships, this interaction fosters evolutionary changes in both the herbivores and the plant species they consume.

Unsecured tree trunks are susceptible to snapping in windy conditions; however, the primary reason for staking and securing larger trees is to reduce the movement of the stem which can lead to root ball instability. Issues related to tree establishment that stem from root ball instability are primarily associated with the loss of root hairs that occurs when trees are uprooted in the nursery.

Trees that are planted, excluding those grown in containers, typically experience a significant loss of root hairs during the lifting process in the nursery. These root hairs are minute, fragile structures that extend from root hair cells, forming a narrow band of tissue known as the root hair zone, which is situated just behind the apical meristem and the zone of cell elongation at the tip of the root.

While root hairs are widely recognized for their role in the efficient uptake of water and dissolved nutrients, they also play a crucial, albeit less acknowledged, role in anchoring the tree. This anchorage is facilitated by each root hair's ability to attach to tiny mineral particles, such as sand.

When trees are not secured, they tend to sway in the wind, causing movements that are transmitted down the stem into the root ball. This results in the root ball rocking within the soil, creating a gap or void between the root ball and the surrounding soil. Such a gap hinders the formation of secure attachments between root hairs and soil particles, thereby impeding root growth and development. As a result, trees struggle to absorb adequate water and nutrients, leading to establishment failure.

Here are some key elements of a young tree maintenance program:

**Watering:** Regular and deep watering, especially during dry periods, is essential for establishing a strong root system.
It is recommended that each young tree should be provided with 50 litres of water weekly during the summer months. It is advisable to continue watering trees for the initial three years following their planting to promote optimal survival rates. The best times for watering are in the early morning or late evening when temperatures are cooler.

In the context of National Highways Tree Planting Schemes, water should be directed to the base of the tree and evenly spread over the root ball. If a watering pipe is present, it is suggested that half of the water be poured into the pipe, with the remaining portion applied to the surface around the tree. In cases where a watering bag is utilized, it should be filled accordingly. It is important to note that newly planted trees require watering even after rainfall, as precipitation may not adequately reach the base of the tree.

**Nutrition:**
Trees, like all plants, require a specific set of nutrients to thrive. These essential nutrients are vital for growth, development, and overall health. A deficiency or excess of any of these nutrients can lead to various problems, including stunted growth, weakened structure, and increased susceptibility to pests and diseases.

16 essential nutrients have been discovered by scientists, who have categorised them based on the proportion of each nutrient that plants require:
• The nutrients that are often needed in the greatest quantities are primary nutrients, sometimes referred

to as macronutrients.
• Compared to major or secondary nutrients, micro- or trace nutrients are needed in very small amounts.

| Category | Nutrients |
|---|---|
| Macronutrients (needed in largest quantities) | Potassium, Phosphorus, Oxygen, Nitrogen, Hydrogen, Carbon |
| Secondary nutrients (needed in moderate levels) | Sulfur, Magnesium, Calcium |
| Micronutrients (needed in very small amounts) | Boron, Chlorine, Copper, Iron, Manganese, Molybdenum, Zinc |
| Other nutrients (required by very few plants) | Cobalt, Nickel, Silicon, Sodium, Vanadium |

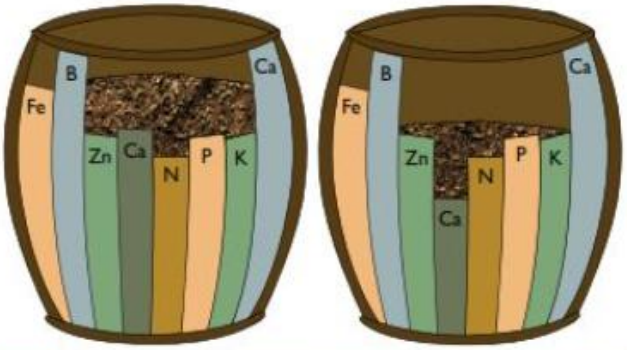



**Figure 1.** Illustration of how nutrients are limiting factors in plant growth. Just as the shortest plank, or stave, of a barrel limits the amount of its contents, so does the amount of a nutrient limit the maximum size or yield of a plant. For the barrel at left, the shortest stave (limiting nutrient) is nitrogen (N); for the barrel at right, the limiting nutrient is calcium (Ca).

Plant growth is limited by the nutrient that is in the shortest supply (Fig.1)
https://agrilifeextension.tamu.edu/library/gardening/essential-nutrients-for-plants/

Trees primarily absorb nutrients through their roots. Soil microorganisms play a crucial role in breaking down organic matter and making nutrients available to the roots. Mycorrhizal fungi form symbiotic relationships with tree roots, enhancing nutrient uptake, particularly phosphorus.

Recognizing nutrient deficiencies can be challenging, as symptoms can vary depending on the specific nutrient and the tree species. Common signs of nutrient stress include:

- Chlorosis: Yellowing or paling of leaves.
- Necrosis: Browning or death of tissue.
- Stunted growth: Reduced growth rate or smaller leaves.
- Fruit abnormalities: Poor fruit quality or reduced yield.
- Weak or brittle wood: Increased susceptibility to breakage.

When addressing nutrient deficiencies, it's essential to consider the specific needs of the tree species, soil conditions, and environmental factors. Soil testing can help identify nutrient imbalances. Appropriate

fertilization practices, including the application of organic or synthetic fertilizers, can help restore nutrient levels and promote healthy tree growth. However, over-fertilization can also harm trees.

**Weed Management**
Grasses and other rapidly growing herbaceous perennials compete with young trees for essential resources such as moisture, nutrients, space, and light. To facilitate the establishment of the tree, it is crucial to maintain a weed-free area of approximately one square meter (slightly over one square yard) around it for a minimum of three years.
Manual Weeding
While manual weeding can be labour-intensive, it presents an excellent opportunity to engage local communities in the stewardship of recently planted trees. It is essential to avoid disturbing the surface roots of the trees. Grasses, woody plants, and herbaceous perennials should be completely uprooted rather than merely cut back or mowed, as this practice promotes further growth. Additionally, hoeing may pose a risk of damaging the roots.

**Chemical weed management** is frequently employed in extensive plantings of young stock, such as whips and transplants, where manual weeding and mulching prove to be economically unfeasible. Nonetheless, the application of pesticides is now subject to stringent regulations. The Pesticides Control Act of 1988 governs the sale, distribution, storage, and application of pesticides. Competence certificates are mandatory for:

- any contractor (including volunteer groups classified as contractors)
- individuals who were under 25 years of age as of January 1, 1989, utilizing pesticides approved for agricultural, horticultural, and forestry applications, unless they are under the direct personal supervision of a certified individual.

There are effective chemical solutions available for managing grasses and grass/broadleaved weed combinations, as well as bracken, heather, woody weeds, gorse, broom, and rhododendron, applicable to conifer plantations, mixed woodlands, and amenity trees.

**Mulching:**
Applying mulch around the tree's base helps retain moisture, suppress weeds, and protect the roots from extreme temperatures.
Mulching serves as a straightforward and efficient method for weed control while also providing several additional benefits. It helps maintain soil moisture and temperature, *eliminates the necessity for lawnmowers or strimmers near trees—thereby reducing the risk of bark damage that could jeopardize the tree's health*—and it circumvents the use of chemical treatments. Organic mulches enhance soil quality over time as they break down, which is especially beneficial for compacted or eroded soils. This practice is particularly advantageous for standard-sized trees and the establishment of community woodlands. Mulch should be applied immediately following planting, ensuring that all weeds have been removed and the tree has been adequately watered beforehand. Generally, a single application suffices, although trees may benefit from additional mulching in subsequent years if natural plant litter is scarce. The optimal time for application is early in the year when the soil is moist, but it should be done only after all weeds have been cleared. It is advisable to avoid mulching during periods of frost or drought. Additionally, care should be taken not to apply mulch too thickly, as excessive layers may hinder gas exchange.

Suitable loose organic mulches include:

• leaf litter

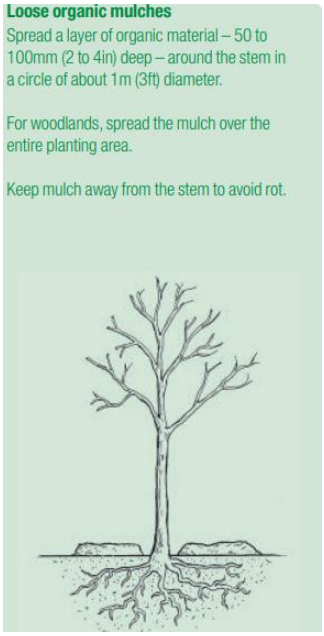
• spoiled hay (sourced from farms)

• well-rotted manure

• well-rotted lawn clippings or grass clippings from the most recent cut

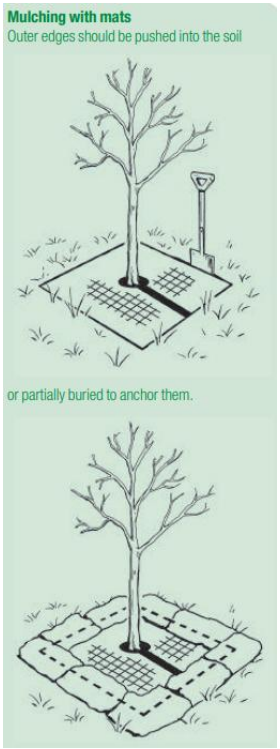
• composted bark

• wood chips, provided they are not fresh, to prevent nitrogen depletion in the soil during decomposition.




https://treecouncil.org.uk/wp-content/uploads/2019/12/TCHandbook_5_Care.pdf

Mulch mats can be obtained from garden centres and various suppliers of forestry products. They are simple to install, significantly less cumbersome than loose mulch, and generally affordable, although prices may vary based on the type and quantity purchased. These mats typically decompose after approximately five years. For smaller plantings, roofing felt or used carpet can serve as economical substitutes.

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Mulching can have the same benefits for *mature trees* as for newly planted ones. To be most effective it should be spread 50 to 100mm (2 to 4in) over an area twice the height of the tree. Keep the base of the trunk free of mulch – leave an area 25 to 50mm (1 to 2in) – or the bark may get moist, and this could lead to decay.

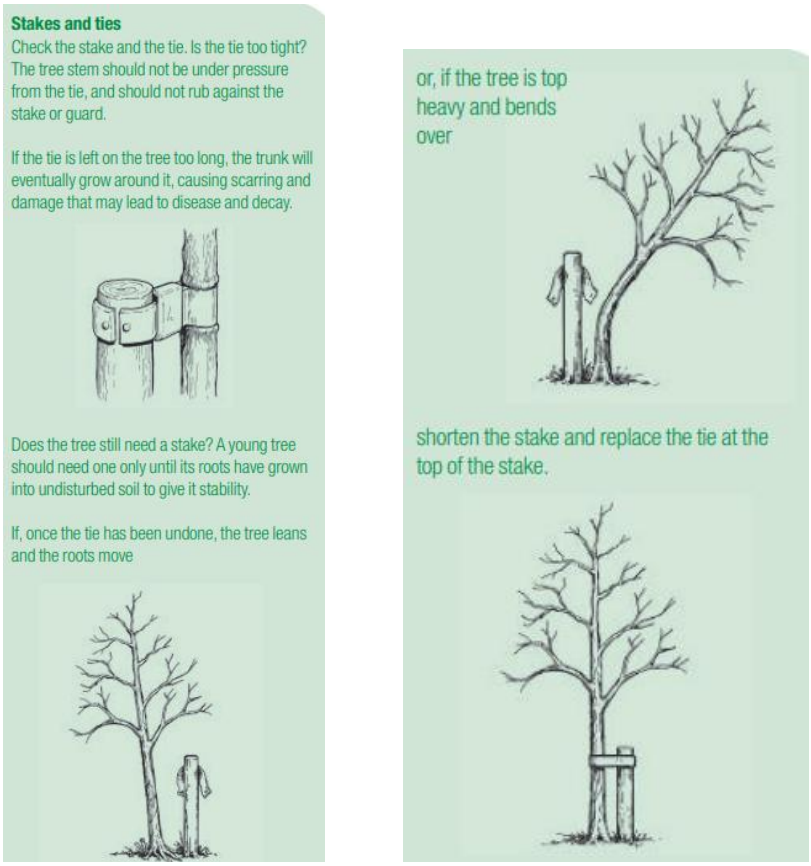
**Pruning**: Selective pruning can enhance healthy growth and shape the tree effectively. However, it is advisable to refrain from heavy pruning during the initial years.

Pruning *Newly Planted Trees*
The proper pruning of young trees is vital to prevent potential complications in their future growth stages. Inadequate pruning can result in tree mortality or create safety risks, highlighting the necessity of proper training. In addition to the removal of dead or diseased twigs and branches, formative pruning is essential for developing a strong lead shoot. For larger varieties, such as feathered and upward trees, this task is generally performed by the nurseryman during the production phase. For whips, transplants, and seedlings, pruning should take place once the tree has reached a sufficient level of maturity, typically after its second year.
Pruning *Established Trees*
Pruning an established tree is aimed at removing dead or diseased wood, as well as branches infested by pests, thereby improving the tree's vigor and structural stability. While deadwood is important for providing habitat and is a natural aspect of a tree's lifecycle, it is crucial to evaluate whether management is necessary, especially in woodland areas where falling branches do not pose significant risks.
Careful pruning or tree surgery can often avert the need to remove a tree that is considered problematic due to safety issues or potential structural damage to nearby buildings. Before undertaking any work, it is important to confirm whether the tree is protected by any legal regulations, such as a Tree Preservation Order.
Tasks involving large, established trees should be carried out by professionals, as they may require specialized equipment, training, and expertise. This work may involve tree climbing, the removal of large limbs, and the use of chainsaws, which necessitate protective gear and appropriate training and insurance, particularly when working on private property or dealing with branches that extend over neighbouring land.

**Wind and frost**
Cold winds can be detrimental to root systems. It is advisable to inspect trees during the initial weeks following planting, particularly after storms, severe frosts, or in early spring before the emergence of leaves, to determine if any roots have been exposed. Once the soil has thawed, it is important to compact the soil around any loose roots to ensure stability and maintain the upright position of the stem.

**Pest and Disease Control:**
Monitor for signs of pests or diseases and take appropriate action if needed.
After three years, it is time to assess the tree's health and development to determine if it can be weaned off the maintenance program.

**Stakes and ties**
It is essential to regularly inspect the stakes and ties on young trees and to remove them promptly. Prolonged retention of ties that begin to constrict the trunk, or those that break or slip, can lead to abrasion from the stake, potentially causing permanent or even fatal damage to the trees.




https://treecouncil.org.uk/wp-content/uploads/2019/12/TCHandbook_5_Care.pdf

**Guards**

Inspect tree guards during the spring and autumn seasons to verify their effectiveness, ensuring that there is no missing bark and that no twigs are bitten or broken. Additionally, check that the guards are not causing any rubbing or cutting into the tree.

- If a guard is found to be insufficient or if the risk factors have changed, consider alternative protective measures, such as utilizing a taller tube to safeguard against deer or installing fencing to deter cows and other livestock.
- Repair or replace any damaged guards as necessary.
- Should a guard be found to be harming the tree, take steps to adjust, modify, or replace it accordingly.
- Once the risk of damage has been eliminated, remove the guard and clear away any accumulated material inside.

**Strimmer guards** are plastic protective devices installed around the collar area of a tree's root or stem. Their primary function is to *safeguard the bark from physical harm caused by strimmers or mowers*, while also serving as vole deterrents. The simplest form consists of wrap-around guards made from thin, flexible plastic that accommodates tree growth; however, this design inevitably creates a widening gap as the edges of the guard separate. More robust and interlocking strimmer guards are available that remain securely in place on the tree stem. All types of strimmer guards effectively mitigate the risk of chemical damage to the collar area from herbicide applications aimed at controlling grass and both soft and woody broadleaf weeds.

Here are some indicators to consider:

**Root System:** The tree should have a well-established root system that can support itself. The roots may need additional support if they are still shallow or weak.

**Trunk Stability:** The trunk should be sturdy and able to withstand wind and other environmental factors. If it is still leaning or unstable, it may require staking for a longer period.

**Health:** The tree should exhibit healthy growth, with vibrant leaves and no signs of pests or diseases.

If the tree meets these criteria, you can gradually remove the stakes and ties. Start by loosening them and monitoring the tree's reaction. If it remains stable, you can remove them completely.

Regular assessments of *established trees*
Trees gain significant advantages from routine evaluations, which can aid in averting substantial issues. Like young trees, mature trees should undergo inspections at least annually to identify any indicative signs, such as:

- diminished twig growth – compared with growth observed over the past three years
- a reduction in leaf size or quantity
- fewer buds present
- dieback in the crown (presence of dead branches in the upper section of the tree)
- trunk deterioration – indicators include loose bark or the presence of fungi
- leaves that are spotted, malformed, discoloured, or dead, potentially resulting from insect activity.

**Remember,** even after removing the support, it is still important to continue monitoring the tree and providing regular care, such as watering and pruning, to ensure its continued health and growth. By following these practices, you can significantly increase the chances of your newly planted tree becoming a healthy and long-lived addition to your landscape.


https://www.trees.org.uk/Trees.org.uk/media/Trees-org.uk/Documents/Tree%20Aftercare/Young-Tree-Aftercare-A3-web.pdf

**5.2 Identify a minimum of three causes of newly planted tree stock failing to establish**

Understanding the root causes of tree decline is crucial for effective prevention and treatment.

*Often newly planted trees decline because of a combination of factors.*

Here is a summary of the key factors:

<u>Environmental Factors</u>

**Water:** Underwatering, overwatering, or poorly drained soil can lead to root rot or suffocation.
**Planting Depth:** Planting trees too deeply can restrict root growth and oxygen uptake.
**Planting Hole:** Insufficiently sized planting holes can limit root expansion.
**Weather Extremes:** Frost, heat, or sunscald can damage tree tissues.

*The tree on the left was planted too deeply and as a result, looks like a telephone pole going into the ground. The tree on the right was planted at the appropriate depth. The trunk flare is visible at the base of the trunk and the uppermost roots are just below the soil surface.*

Tree Health and Care

**Quality of Stock:** Poor root system development or damage during transportation can hinder establishment.

**Insect and Disease Issues:** Stress from other factors makes trees more susceptible to pests and diseases.

**Girdling Wires:** These can damage the tree's vascular system.

**Mulch:** Excessive mulch can suffocate roots or bury the trunk flare.

**Soil pH:** Incorrect pH can limit nutrient availability.

**Species Selection:** Choosing a tree unsuitable for the site's conditions can lead to decline.

**Chemical Injury:** Improper herbicide or pesticide application can harm the tree.

**Mechanical Damage:** Injuries during planting or maintenance can weaken the tree.

Often, a combination of factors contributes to tree decline. By carefully considering these elements, you can take steps to improve tree health and longevity.

TABLE 1. A COMPARISON OF THE CHARACTERISTICS OF THE TYPES OF NURSERY STOCK AVAILABLE.

| Container grown | Balled-and-Burlapped | Bare root |
|---|---|---|
| Grown in containers | Grown in field; must be dug | Grown in field; must be dug |
| Root system completely intact | Root system cut and reduced when dug | Root system cut and reduced when dug |
| Plants can be kept for extended periods before planting | Plants can only be held for short periods of time after digging | Plants need to be planted promptly while they are dormant |
| Soil and containers provide protection for roots | Soil around roots provides limited protection from drying | Absence of soil around roots increases risk of drying |
| Can be planted throughout the growing or dormant seasons | Plant during dormancy in fall or in early spring before active growth begins. | Plant during dormancy before active growth begins |
| Easy to transport and handle during moving; soilless media is lighter than field soil | Heavy due to weight of field soil; usually not shipped long distances | Can be shipped at lower costs due to absence soils |
| If pot-bound, roots may spiral, causing girdling | Roots are severed at edges of rootball | Need to spread roots out in planting hole |
| Difficult to inspect entire root system | Difficult to inspect entire root system | Can inspect and prune root system |

**Container grown**

- Container-grown stock has been growing in a container throughout most of its life.
- Container-grown plants suffer little *transplant shock* because their roots are not disturbed during planting.
- Plant them any time during the growing season.
- Plants that have outgrown their containers may have deformed root systems, which can result in girdling roots.
- Large plants may be root-bound in the container. The root ball of these plants must be torn or cut open to eliminate subsequent circling or girdling roots.

When trees and shrubs are relocated from one growth environment to another, such as from a nursery to a landscape, they experience stress. By employing appropriate transplanting methods and ongoing care, it is possible to reduce this stress, allowing the plants to recover swiftly and become well-integrated into their new surroundings. However, the contrary is frequently observed. Trees and shrubs often experience "transplant shock" due to inadequate transplanting or maintenance practices, which impedes their

recovery. These plants may struggle to recuperate in challenging conditions, leading to a continued decline and, ultimately, death. While plant diseases can contribute to this issue, it is typically the stresses associated with transplanting that are the primary cause of mortality or deterioration in newly planted trees and shrubs. Woody plants may require a period of 3 to 5 years to fully establish themselves in their new environments and to overcome transplant-related stresses. The emergence of leaves and shoots is not a reliable sign of establishment. A transplant is not deemed established until its primary roots have expanded into the surrounding native soil, branched out, and developed adequate feeder roots at their tips. If trees do not generate new, healthy roots or fail to establish effective root systems in their new planting locations, they are likely to experience transplant shock. Such root-related issues can often be attributed to various factors, including stresses encountered during the removal from their original sites, damage sustained during transportation, improper planting methods, and/or inadequate cultural practices.

FIGURE 1. DIEBACK DUE TO TRANSPLANT SHOCK OFTEN BEGINS WITH DEATH OF SCATTERED LIMBS. (PHOTO: JASON SHARMAN, VITALITREE, BUGWOOD.ORG)

Symptoms of Transplant Shock Symptoms of transplant shock can resemble disease and other stresses.

- Decline
- Canopy thinning
- Dieback (Figure 1)
- Leaf scorch (Figure 2), tip burn
- Reduced winter hardiness
- Poor leaf colour
- Premature fall colour (Figure 3)
- Limited stem growth, stunting
- Limited flowering
- Premature defoliation/leaf drop
- Delayed leaf emergence in spring
- Secondary disease problems (Figure 4)
- Secondary insect problems
- Excessive seed or cone production


Figure 2. Leaf scorch is caused by inadequate water availability, which is common in poorly maintained trees. (Photo: Nicole Ward Gauthier, UK)


Figure 3. Premature fall colouration and early leaf drop can result from the stresses of transplant shock. (Photo: Ohio Nursery & Landscape Association, Bugwood.org)


Figure 4. Trees stressed from transplant shock are more susceptible to diseases, such as Thyronectria canker. (William Jacobi, Colorado State University, Bugwood.org)

**Causes of transplant shock** and related stresses can range from pre-plant care to post-plant maintenance:

*Poor plant material*

- Species/cultivars not suited to planting climate.
- Plant not healthy and vigorous due to previous stress, insects, or disease damage.
- Root ball too small for the amount of top growth.
- Plant roots dried out between digging and transplanting, resulting in root damage and/or death.
- Leaves and twigs of plants not protected from wind during transport from nursery to landscape.

*Undesirable growing site*

- Soils poorly drained – including both surface drainage and internal drainage (e.g. subsoil or other high clay content soils).
- "Wet feet" resulting from locations near gutter downspouts or other low-lying areas.
- Compacted soil, resulting in reduced root growth, lack of oxygen and air exchange, and reduced water penetration.
- Shade-loving tree or shrub planted in full sun, or vice versa.

Poor transplant techniques

- Root ball allowed to dry out before planting.
- Root ball allowed to freeze before planting.
- Mechanical injury during digging, moving, or transplanting.
- Planting hole too small, crowding roots.
- Sides of the hole "glazed," preventing root expansion.
- Twine or wire from nursery tags and guides left intact; girdling roots, trunk, or limb (Figure 5)


Figure 5. A wire from tags and guides can girdle branches and trunks if not removed at the time of planting. (Photo: John Hartman, UK)

- Burlap or synthetic (non-biodegradable) “burlap” (Figure 6) or twine left around the root ball.


Figure 6. Burlap does not readily degrade in planting holes and should be removed from plants before installation. This synthetic “burlap” material prevented roots from expanding beyond the original root ball. (Photo: Cheryl Kaiser, UK)

• Container-grown plant is rootbound, and roots continue to grow around or spiral (Figure 7), rather than growing outward.


Figure 7a. Encircling roots often continue this growth habit after installation. (Photo: Ambrose Labs)


Figure 7b. After years of encircling, roots can girdle structural roots or trunks. (Photo: John Hartman, UK)

• Planted at the wrong depth, either too deep or too shallow.

• Failure to protect young tender bark from exposure to temperature fluctuations in winter, leading to sunscald and frost crack injury (Figure 8).


Figure 8. Sunscald damage occurs during early spring on thin-barked trees

- Tree wrap left on trunk more than one season.
- Excessive fertiliser use at planting time, resulting in root "burn."
- Mower or string trimmer damage (Figure 9).


Figure 9. Mower damage causes wounds that girdle trunks. (Photos: Nicole Ward Gauthier, UK)

*Poor follow-up cultural practices*

• Improper watering—little or no watering, excessive watering (especially problematic in heavy clay soils) or frequent light sprinkling.

• Application of high levels of nitrogen, resulting in excessive top growth compared to root growth (root-to-shoot ratio)

**Sources**

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