

Specifying Trees

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Ross Clark

A photograph of a man in a light blue shirt and dark pants standing on a white step ladder, reaching up to inspect the foliage of a large, dense green tree. The tree is one of many in a nursery setting, with other similar trees visible in the background. The ground is covered with black protective mulch.

a guide to assessment of tree quality
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Cover photo of Fig trees (Ficus hillii), 4-4.5 m tall, in 500 L containers: photography by David Young.



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Preface

Trees are often the major component of landscape works but generally represent a small part of the total project costs. It therefore makes sense to ensure that the trees supplied are good i.e are trees that have been grown to a standard that allows them to establish rapidly and grow to maturity.

Good trees in the landscape grow from good trees supplied by the grower.¹

As with the first edition, the second – and retitled – edition of this book provides a list of important characteristics, which should be checked when assessing the quality of tree stock, and briefly explains why they matter. These characteristics are comprehensive, quantified, apply to all sizes and species of trees independent of production style and cover the different approaches taken in Australia and in other parts of the world.

When growing, using or assessing trees it is important to remember that they are living entities and not manufactured items. Unlike manufactured items, trees that can be supplied may well differ from what is ordered.² The criteria listed in *Specifying Trees* act as a guide to what to look for, provide a means of describing good trees when purchasing or supplying and allow us to assess and compare the trees offered.

There is nothing exceptional about either the characteristics described or the criteria used. In fact they simply describe the good trees that have always been available. However, by using this book (and the guide specification in Appendix 2) good trees can be described and supplied *every time*. It is hoped that this specification is widely adopted and becomes a standard for our industry.

Having said this, it is important to remember that a good specification is not in itself a guarantee of successful tree plantings. The quality of the trees is only one part of the process and must be combined with good planning and design, good species selection,

1. For consistency, the term “supplier” will be used from now on to refer to growers who supply (and tender to supply) trees.

2. For consistency, the term “purchaser” will be used from now on to refer to clients or customers who purchase (and order) trees.

good planting and establishment techniques and good maintenance.

The success of tree plantings also depends on an understanding of the particular needs of trees, by all parties involved, and communication and cooperation between those parties.

The approach taken in this book (and the trees supply guide specification in Appendix 2) differs from any other specifications seen in that it deals with aspects of tree quality in a quantified and generic manner.

The benchmarks included are based on long experience with trees and, where applicable, benchmarks used elsewhere. In some instances, benchmarks set in the first edition have proved to be difficult to achieve and some of these have been relaxed a little in this edition.

Approaching aspects of tree quality in a generic manner greatly simplifies the specification and does away with the need to group like-formed species in extensive lists or tables.

The specification must be included in any purchasing documents for trees and the supplier advised at that time that either

- they will have to certify that the trees conform; or
- the trees will be inspected by the purchaser or their agent to check conformity.

While the specification has been designed to accommodate the variations found in trees there may be instances where a supplier believes that minor nonconformance is acceptable. For example, removing nonconforming roots greater than 10 mm in diameter at the extremity of the rootball of a semi-mature fig may not cause significant set-back when the tree is planted. If this is the case, the supplier must advise the purchaser of the minor nonconformance and explain why they believe this should be accepted.

The purchaser may then accept this variation in writing, and having done so that variation will become part of that supply contract. The supplier may notify the purchaser of any such minor nonconformance at the time of quotation or at some stage between quotation and delivery. As the purchaser is not obliged to accept any such nonconformance the supplier would be well advised to notify the purchaser at the earliest opportunity. Nonconformance that has not been accepted in writing before shipment may lead to rejection of all or part of the batch.

The book is aimed at the entire industry:

- For students, as a guide to understanding what makes a good tree.
- For landscape architects, as a means of specifying good trees.
- For responsible suppliers, as a guide to good tree production and as a means of ensuring that their efforts are not undermined through the acceptance of cheaper sub-standard trees.

- For end-users (councils, developers and so on) as a means of ensuring that the trees supplied to their projects are of a consistently high standard, so that they do not only look good at planting, but grow on to maturity and achieve theirs and their designer's vision.

The first edition received strong support from a wide section of the industry – from arborists to landscape architects to nursery staff. A major boost to the wider acceptance of the guide specification was its adoption by the Olympic Co-ordination Authority for the Sydney 2000 Olympics.

The first edition also received some criticism of the difficulty in applying the specification, understanding the tables and information presented and carrying out the inspections required. There was also some objection to the description of acceptable root development and to the size of rootballs specified. Much work has gone into the second edition to make discussion of roots easier to understand, interpret and apply. The descriptions of acceptable root development have been revised so as to be far more achievable, and the inspection process has been better defined and made more practical. The section on balance has been completely overhauled, to make it simpler and easier to understand and apply.

The work in this edition is largely original. It is based on my own experience and the experience of the nursery industry in eastern Australia, and the desperate need for a workable, generally accepted, tree specification. However, sections of the text that relate to pruning have been revised so as to conform with AS 4373-1996 *Pruning of amenity trees* and the importance of a number of other reference texts is acknowledged, primarily:

- The Florida Department of Agriculture and Consumer Services – Division of Plant Industry (1998), *Grades and standards for nursery plants* (2nd edition), which is a comprehensive attempt at constructing a meaningful tree specification. Several of the criteria included have proved useful as stimuli for the generation of criteria included in this work though the specification remains far simpler.
- Handreck, KA and Black, ND (1994), *Growing media for ornamental plants and turf* (revised edition), University of NSW Press, Randwick, which is widely recognised in Australia as *the* reference for growing media.
- Harris, Richard W, Clark, James R and Matheny, Nelda P (1999), *Arboriculture: integrated management of landscape trees, shrubs and vines* (3rd edition), Prentice Hall, New Jersey. The authors have long been well regarded by arborists and horticulturalists.

As with the first edition, this work has also benefited greatly from contributions from many professionals within the horticulture industry in particular Judy Fakes, Head Teacher at the Northern Sydney Institute of TAFE – Ryde College, Ingrid Mather of

Mather & Associates Landscape Architects and Jim Warner of Karignan Plantation. Sincere thanks also go to Peter Sinclair of the Byron Tree Plantation, Andrew Lawson of Andrew Lawson Horticultural Services, Sue Clark of Falls Creek Nursery, Darren Mason of Andreasens Green Wholesale Nurseries and Graham Fletcher of Fletcher Consultants.

Thanks must also be extended to Terry Wright, Deborah Singerman, John Horridge and the team at NATSPEC. Without their continued support and input *Specifying Trees* would not have been possible.

In recent years there has been an encouraging trend toward the improvement of the quality of trees produced by responsible Australian suppliers. The first edition contributed to that trend and I am hopeful that the changes in this new edition will make the book and the specification much easier to use and be far more widely accepted. Through the application and enforcement of these standards we can better support responsible tree suppliers and continue to lift the standard of trees supplied.

Ross Clark
January 2003



Glossary

The following terms are a mix of accepted botanical, horticultural and arboricultural terms and terms introduced for the purpose of this book. Terms relating to pruning and included bark are as defined in AS 4373-1996 *Pruning of amenity trees*.

Air filled porosity. the volume (%) of a medium filled with air at container capacity after saturation.

Air pruning the use of bottomless containers, or containers with holes in the sides, that allow air to arrest root development.

Apical. relative to the apex or apice of a structure.

Apical dominance. of growth, the dominance of the terminal bud to lateral buds.

Balance. the relationship between the above-ground parts of the tree and the below-ground parts.

Balled and burlapped. trees grown in the ground that are lifted with a ball of soil containing the roots, which is then tightly wrapped in hessian and twine to hold it together during shipment.

Branch. a secondary shoot or stem arising from any junction (i.e. trunk or leader but not a secondary trunk).

Branch bark ridge. raised or furrowed bark in the branch crotch that marks where the branch wood and trunk or branch wood meet. Formed by compaction or expansion as the girth of the trunk and branch increase.

Branch collar. trunk tissue that forms around the base of a branch between the main stem and the branch or at the base of a secondary branch of a larger branch. As the branch decreases in vigour or begins to die, the branch collar becomes more pronounced.

Bud. embryonic vegetative or reproductive tissue, which may be terminal, axillary or adventitious in origin. Buds can be active or dormant.

Calliper: the stem or trunk diameter at a nominated point. Generally measured at 300 mm above ground.

Cambium: a continuous sheath-like layer of meristem with the main role of production of xylem (wood) and phloem (bark).

Central leader: the clearly defined single, dominant stem.

Clean stem height: the height of the trunk above ground, which is free of branches.

Codominant stems: stems or trunks of about the same size originating from the main stem at the same position.

Crotches: a forked region formed by the junction of stems, branches or stems and branches.

Crown: the portion of the tree consisting of branches and leaves and any part of the trunk from which the branches arise.

Cultivar: a variety or strain produced in cultivation.

Decurrent: trees that achieve their form through the division (and re-division) of the main stem or trunk.

Destructive inspection: the washing away of all soil from a rootball to allow inspection of root development.

Excurent: having an undivided main stem or trunk.

External inspection: assessment of a tree's ability to be self-supporting, its balance and its root development, without the washing away of soil from the rootball.

Ex-ground trees: trees grown in the ground and dug for delivery. Includes both balled and burlapped and in-ground container-grown trees.

Extension growth: the seasonal increase in the length of shoots.

Extruded bark: the outwardly formed bark at the junction of branches or codominant stems.

Fastigate: having erect branches often appearing to form a single column with the stem.

Fibre: a component of woody tissue in the form of a strand or filament.

Final cut: the final cut when reducing or removing branches and stems.

Flush cut: an incorrect cut that damages or removes the branch collar or branch bark ridge and damages the stem tissue.

Graft: the union of living parts from different origins to form a structure physiologically acting as a single unit.

Graft union: the junction point of grafted stock.

Hydrophobic: to resist wetting by water.

Included bark: inwardly formed bark at the junction of branches or codominant stems.

In-ground container: a plant container made from fabric that is buried in the ground. Fabric structure is designed to allow small roots to escape but strangling them as they expand.

In-ground trees trees grown in natural soil.

Internode: that part of a stem between successive nodes, which are that part of a stem from which arises a leaf or branch.

Investigative inspection: any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.

Lateral: a branch arising from another branch or stem.

Partial inspection: a method of exposing a section of a root system to enable inspection of root development by washing the soil away in a wedge-shaped section from the stem to the extremity of the rootball. This soil can be gently replaced so the tree is not damaged.

Point of initiation (of roots): point at which the new root emerges, from either the base of the trunk or from a previously existing root.

Primary division (of roots): the division of roots that takes place at the root tip (commonly occurring at the severed root end, following root pruning).

Provenance: of a seed or species. The geographic origin or source.

Reduction pruning the removal of the ends of branches to internal or lateral branches rather than the removal of the entire branch.

Rootball: the root system and the mass of soil associated with it.

Root plate: the wide flat mass of roots resembling a saucer or plate resulting from the collective root system of a tree that radiates out from the trunk, very close to the surface.

Rootstock: the part of a plant forming the root system of a grafted cultivar/variety.

Root crown: the junction between the below-ground parts of the tree (roots) and the above-ground parts.

Scion: of a graft, the part (usually a shoot or bud) from a source external to the grafting (forms the shoot system of a grafted cultivar/variety).

Secondary division (of roots): the division of roots that takes place behind, rather than as an extension of, the root tip.

Self-supporting trees able to stand firmly in their containers and withstand reasonable winds or leverage, without support (e.g. from stakes).

Size Index: a numerical expression of the size or physical bulk of a tree above ground. It is the product of the height (m) and calliper (mm) at 300 mm above ground.

Stem: the organ that supports branches, leaves, flowers and fruit.

Stem bark ridge: the ridge of bark that forms in the union between two codominant stems.

Suckering: the process of forming suckers, which are shoots developed from a root or stem close to or below soil level.

Sun-hardened: trees grown in such a way that all foliage is exposed to the sun.

Tree balance factor: a number established through examining a wide range of trees which, through experience, were considered to be balanced, that allows the tree balance formula to be applied to trees of different sizes.

Tree balance formula: for calculating the relationship between the Size Index and either the container or rootball volume.

Thick-stemmed species: a grouping of tree species that typically grow with relatively thick trunks; includes broad spreading species e.g. Moreton Bay fig (*Ficus macrophylla*), many conifers e.g. Western red cedar (*Thuja plicata*), and some rainforest species e.g. Lilli pilli (*Acmena smithii*).

Thin-stemmed species: a grouping of tree species that typically grow with relatively slender stems; includes some more upright deciduous exotics e.g. Silver birch (*Betula pendula*), Eucalypts and related species e.g. Lemon scented gum (*Corymbia [Eucalyptus] citriodora*) and some of the more slender conifers e.g. Norfolk Island pine (*Araucaria heterophylla*).

Tree: a long-lived woody perennial plant greater than (or potentially greater than) 3 m in height with one or relatively few stems.

Trunk: the main stem.

Variety: a minor category of plants at a level below species.

Specifying Trees provides guidance and specifications for the supplying and purchasing of trees that will establish rapidly and grow strongly to maturity every time.

An essential reference for the whole landscape industry – designers, teachers, students, growers and contractors – this new edition incorporates feedback from the industry and provides:

- Criteria for assessment of all tree stock irrespective of how it is produced.
- Benchmarks and calculations.
- Methods for root development and tree balance.
- A guide specification, based on the assessment criteria, in NATSPEC format.
- Inspection sheets, diagrams, tables, glossary and a comprehensive index.



Ross Clark has a long association with trees, beginning with a forestry degree from the Australian National University and a further two years with the university's Forestry Department. He has spent much of the last 15 years devoted to the development of nursery practices designed to produce trees of consistently high quality.

A NATSPEC GUIDE

What they said about the first edition

"...this publication is an overdue and valuable tool to aid the grower, the purchaser and the designer of trees in the landscape."

The National Arborists Association of Australia

"...recommended for those involved in ordering and selecting trees and also nursery people who are attempting to meet the strict requirements outlined in this book."

Landscape Architecture

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