Treenet Proceedings of the 4th National Street Tree Symposium: 4th and 5th September 2003
ISBN 0-9775084-3-9

THE NEW NATSPEC SPECIFICATION FOR TREES AND ITS RELEVANCE TO TREENET TRIALS

Ross Clark Trees Impact

The new NATSPEC specification for trees was released in February 2003 as part of *Specifying Trees* – Ross Clark NATSPEC//Construction Information. (This follows on from the original NATSPEC specification published in 1996.)

The new NATSPEC specification provides a list of important characteristics, which should be checked when assessing the quality of tree stock.

Some of the attributes of this specification are relatively obvious, while others are more subtle, and may need to be pointed out if their importance and usefulness are to be realised.

Treenet is proposing a long-term trial to assess the performance of trees produced using different container styles - such a proposal sets off alarm bells.

This paper briefly explores some of the attributes of the NATSPEC specification, the obvious and the not so obvious, some of the pitfalls that have the potential to derail the proposed Treenet trials and a possible role for the new NATSPEC specification in those trials.

THE NEW NATSPEC SPECIFICATION FOR TREES – THE OBVIOUS:

For a tree specification to be generally useful, it needs to be comprehensive, quantified, and applicable to all sizes and styles of production. In addition to these requirements, the NATSPEC specification provides a very useful mechanism for describing and assessing trees, when ordering or tendering.

Comprehensive:

For a specification to be effective it must address all the characteristics that go to make a good tree. Think of these criteria as links in a chain. If we leave out any of the links, quality is sabotaged. (eg To only describe a tree above ground is to ignore the critically important below ground half of the tree.)

The NATSPEC specification for trees is comprehensive with criteria grouped into the following categories:

- Above Ground
- Below Ground
- Balance

These criteria are set out and explained in *Specifying Trees* and combine to form an extremely useful list of attributes of tree quality for use when growing, specifying or assessing trees.

Quantified:

Quantifying tree quality criteria involves some arbitrary decisions as to what is appropriate, and, these arbitrary decisions may be open to some debate. However, if you can't measure the criteria in a specification, you can't police them. If you can't police them then the specification is useless.

Therefore, by necessity, the criteria in a specification must be quantified.

With one or two exceptions, all the criteria in the NATSPEC specification are quantified. The benchmarks set are based on long experience and the best information available. Importantly, in this new specification, these benchmarks have been refined as a result of six years of use of the original specification found in *Purchasing Landscape Trees*.

Applicable to all sizes:

For a specification to be generally applicable it must be able to be applied to trees of all sizes.

The NATSPEC specification addresses this need in a variety of ways, including:

1. Using criteria that are applicable to large as well as small trees.
   (eg The criteria for height of root crown states that *"The root crown must be at the surface of the rootball"* . This applies equally to trees in 200 mm pots and trees in 1000 L containers.)
2. Expressing criteria in terms of ratios and relationships rather than finite numbers.
   (eg The criteria for stem taper states that *"The calliper at any given point on the stem must be greater than the calliper at any point higher."* This allows the criterion to apply equally to trees with a calliper (at 300 mm) of around 200 mm as to trees with a calliper (at 300 mm) of 20 mm.
3. The inclusion of information relating to trees over a wide range of sizes.
   (eg Tables 3.2 and 3.3 provide indicative calliper and either rootball volume or minimum rootball diameter for trees from 1.5 m tall to 8.0 m tall.

Applicable to all production styles:

Good trees can be grown using a wide range of containers and production styles. In fact, for larger stock, a combination of two or more styles is often used. Therefore, for a specification to be generally applicable it must apply to all production styles that may be used. Conversely, growers must be free to choose the production processes they use to achieve the desired end result.

The NATSPEC specification has been designed to focus on the end product and allow all styles of production to be appropriately assessed.
(eg Tables 3.2 and 3.2 provide options for either rootball volume or minimum rootball diameter for given height/calliper combinations. This allows, when species and timing are appropriate, for both container growers and in-ground growers to be able to comply.)

Follow your nose approach to ordering and assessing trees:

Poor tree descriptions in inquiries, tenders and orders can cause significant problems with the quality of trees supplied. For example, if a "height only" specification is used there is no control over container sizes or calliper – tall skinny trees, that have been grown too close together in undersized containers, can be offered. Similarly, if a container only description is used, there is no control over the size of the tree – small, recently potted stock can be offered. And once the substandard (and probably cheaper) options have been included in the options offered, it can be very difficult to explain to the financial controllers, why these trees should not be used.

The new NATSPEC specification for trees provides pro-forma actions sheets (1 and 2), a description processes and supporting tables that allow trees to be described in a theoretical balanced manner. The grower can then respond with the details of the trees available, that approach this theoretical description. These trees can then be assessed, according to the criteria in the specification. (See pages 21-27 *Specifying Trees.*)

This process allows the designer and/or client to ensure that substandard trees are not seriously considered in the first place. And, for them to gain a far more realistic idea of tree sizes (and hence likely costs) before the inquiry is made or tender documents drawn up.

This "follow your nose" approach to describing and inquiring about trees has met with a particularly favourable response from the industry.

THE NEW NATSPEC SPECIFICATION FOR TREES – THE NOT SO OBVIOUS:

On the surface, the new NATSPEC specification for trees has a great deal to offer as a generally applicable tree standard. However, some of the most important attributes of the specification and the greatest opportunities it offers for the assurance of tree quality and tree quality management, are less obvious.

The following notes outline some of the very powerful aspects of this specification that may go unnoticed unless pointed out.

Generic nature of criteria:

Specifications can be written such that they describe the characteristics desired for individual species, groups of species or, through a generic approach, all species.

Writing specifications for individual species is a complicated process. This could mean a different specification for every species, variety or cultivar used. Added to the complexity of such an approach to specifications is that a given species may perform differently in different climates and may need to be described differently for each. (eg *Lophostemon confertus* grown in Victoria will be a very different from those grown in Queensland.)

Grouping trees with similar form and habit is simpler than the single species approach. (These like formed groups may be referred to as matrices.) By grouping trees together it greatly reduces the number of different specifications required. However, you are still left with a relatively complex specification and faced with the

problem of allocating the species in question to the appropriate group. And, a species may well fall into one specification group if grown in a cool climate and another if grown in a warm climate.

A better approach to specifications is through the use of generic criteria – criteria that work using ratios and relationships rather than specific numbers. The NATSPEC specification for trees is generic.

For example:

1. Rather than describing trees in terms of specific heights and callipers. By combining the two criteria *"Self supporting"* and *"Stem taper"* the NATSPEC specification provides for appropriate stem form and strength for all species, all sizes.

   The criterion for *"Stem taper"* states *"The calliper at any given point on the stem must be greater than the calliper at any point highr on the stem."* while the criterion for *"Self supporting"* states that *"Trees must be self supporting."*

   These two criteria combine to ensure that the stem of the tree is tapered in the correct direction and stem is thick enough to support the tree. They work just as well for evergreen natives as they do for deciduous exotics,. And they work just as well for a Brush Box grown in Queensland as for one grown in Victoria.

2. By assessing the balance between the above ground parts of a tree and the rootball, using Size Index* (and the associated *Tree balance formula*) rather than a specific combination of height, calliper and rootball size, this criterion can be applied equally to tall thin-stemmed species and thick-stemmed stocky species. (eg A *Corymbia citriodora* 5.0 m tall with a calliper of 100 mm has a Size Index of 500. [By referring to table 3.5, this equates to a rootball volume of around 550 L]. While a *Ficus macrophylla* 3.6 m tall with a calliper of 140 mm has a Size Index of 504 [which also equates to a rootball volume of approx. 550 L]).

This means that the new NATSPEC specification offers the simplest possible approach to describing and specifying trees – one specification fits all.

Size Index (and the tree balance formula):

By far the most innovative and powerful aspect of the NATSPEC specification is the concept of Size Index (and the associated *Tree balance formula*).

As well as providing a quick and efficient mechanism for relating the above ground parts of the tree to rootball volume, Size Index is an extremely powerful tree management tool for production and supply contracts.

As background:

1. *The concept of balance:*
   The concept of balance is not new to *Specifying Trees* and the NATSPEC specification. The importance of balance is raised elsewhere. (eg In the "Florida Grades and Standards for nursery plants" ranges of heights, given calliper, are suggested for standard container sizes.)

   However, as the NATSPEC approach involves one simple formula rather than the series of matrices used in the Florida specification making it simpler. Also, the

NATSPEC specification benefits from not being tied to a limited number of standard container sizes.

Relation to in ground root systems:
The volumes generated by the NATSPEC *Balance formula* have been, at times, criticised for being excessive. However, there is a deal of support for the volumes shown and, the calculated rootball sizes typically represent only 1%-2% of the theoretical volume the root systems trees would occupy, in the ground. (eg A 5.0 m tall tree with a 100 mm calliper has a calculated rootball volume of approx. 550 L. (0.55m^3) If we assume that the root diameter of that same tree, growing naturally in the ground, is approx. 10 m (2 x tree height) and the functional root depth is 500 mm, the volume occupied is approx. 39 m^3. (ie The calculated rootball volume is only approx. 1.4% of the soil volume that tree might access, in the ground.)

(Note: These "theoretical" soil volumes are excessive if compared with the magnitude of the soil volumes suggested by authors such as Urban 1996 who suggests we allow approx. 0.6m^3 for every square metre of crown projection. Using this formula, if our 5.0 m tall tree has a crown projection of 3.6 m then the soil volume required becomes 12.2 m^3. The rootball volume provided under the NATSPEC specification for trees being approx. 4.5% of the suggested volume required.)

2. *Variability in the industry:*
   A recent check of available tree sizes currently offered by Australian growers revealed that:
   - the calculated volumes for trees sold as 200 L trees can range from 75 L – 450 L.
   - the calculated volumes for trees sold as 400 L trees can range from 150 L – 800 L.

   (ie Their appears to be no consistency as to just how much tree you get in, say, a 200 L or 400 L container under the current system.)

The following notes briefly outline some of the less obvious, but very important, aspects of the new NATSPEC specification.

Impact on production:

Maintaining a reasonable rootball volume while growing trees provides some important benefits to tree quality. Experience has taught us that, for larger trees, if they are potted up in accordance with the NATSPEC *Balance formula,* under general conditions, they can stand up by themselves. This allows trees to be grown unsupported. And, as there is no longer a need for expensive support structures, trees can be grown at wider spacings. The benefits in terms of lower foliage growth, stem calliper and the ability to be self supporting are great.

Benefits when planting:

These benefits flow from the nursery to the planting site. If a tree can stand-up by itself in the nursery (above ground) it can stand-up by itself when planted. This removes the need for staking, their cost, their potential to damage the tree and their ability to mask structural above ground problems (eg trees are not self supporting) and root problems (eg root systems pot bound at some earlier stage of development).

Size Index and potting-on:

Size Index and the *Balance formula* can also be used as a guide for potting-on. It makes far more sense to pot trees on "when they need it" rather than according to some other more arbitrary criterion (eg in winter). And, if some seasonal potting regime is preferred, Size Index can be used to determine the size of the container increase needed so that potting sequences can be better tailored to growth rates.

Size Index and irrigation:

Similarly, Size Index can be used to drive irrigation rates. When trees are newly potted, they need to be watered according to their physical size rather than according to the size of the new bigger container. Watering rates can then be increased in line with the increase in the size of the tree. Adopting such a watering policy will result in a better match between tree needs and application rates, water savings (becoming a scarcer and more valuable commodity) and will help reduce the risk of root damage commonly associated with excess water in the mass of new potting mix, following potting-on.

Size Index and Grow-On contracts:

Size Index is also an invaluable tool when managing grow-on contracts for tree supply. Under such contracts, delays in delivery are common. Currently the potting-on process for trees during such delays is haphazzard. And, tree quality is often compromised when the client resists the nurseryman's requests to pot-on (to avoid the associated costs) and the trees eventually end up being delivered in a tired and overgrown state.

By linking the potting-on process in contracts to Size Index, a mechanism is created that protects the quality of the trees and avoids unnecessary potting charges that can result if trees are simply potted-on on some time-driven basis.

Variations:

Finally, under the NATSPEC specification there is ample provision for variation. If, as a grower, you believe that your production systems deserve to be exempt, from the balance criterion, you can contact your client and inform them of the intended variation. If your client is happy with that variation, an amendment to the specification can be applied to that transaction and the balance of the specification applied.

** Size Index = Height – above ground (m) x Calliper – 300 mm above ground (mm)*

TREENET TRIALS

When I first became aware of the proposed Treenet trials to assess the performance of trees, over an extended time frame, grown using different container styles, alarm bells rang loudly.

To assess the performance of trees and relate that performance directly to the container styles used has the potential to mislead and misdirect our industry. And, if a particular container is "shown" to produce better results we run the risk of lulling our industry into a false sense of security. To lead our industry to believe that a particular container will guarantee good trees would set our quest for improved quality back immeasurably.

The problem with "specifying by container", is not the container itself, but rather, the all too common assumption that the nominated container will "do the job for you".

To be able to grow trees to high standards, consistently we need a sound knowledge of the horticultural principles involved, the role the container plays and a good understanding of the strengths and weakness of the production systems adopted.

A brief list of issues related to containers and quality we must consider is as follows:

Containers are tools:

Containers are tools in the tradesman's hands (the grower being the tradesman). Good tools make the tradesman's job easier but the quality of the job (in this case the tree) will be primarily a function of the skill of the tradesman.

To state that the grower must use container "X" is like saying that house painters can only use, say, Oldfields paintbrushes. Even though Oldfields paintbrushes may be excellent, the brand of paintbrush used will have little impact on the quality of the job.

All containers have their weaknesses as well as their strengths:

All styles of containers have their strengths and weaknesses – it is only through a thorough understanding of both, that the containers can be used effectively. And, the container's greatest strengths, those for which they are promoted, can also be their greatest potential weakness.

Consider the following examples:

1. *Air pruning in propagating containers:*
   Propagating cells (pots) with air pruning holes are produced and marketed for the advantages in lateral root division that can be gained through air pruning. However, the trees can be very difficult to remove from these small containers. Why? Because the roots get stuck in the air pruning holes.
2. *Hard-walled containers with root trainers*
   Hard-walled containers with root trainers are designed to prevent root circling or girdling by trapping the developing roots and turning them vertically downwards. However, if the trees are left in these containers too long, the now hardened vertical roots direct new root development to the bottom of the new container (potting-on) or down into the subsoil (planting out). Why? Because the roots have been pointed downwards by the root trainers and, having now been allowed to harden, can be incapable of lateral division. (Correct timing of potting on is

very important to the success of the system.)

Conversely, a container or container style's greatest weakness will offer the greatest scope for improved production.

For example, trees grown in cheap hard-walled containers will exhibit root circling and girdling at the edge of the container caused by the developing roots coming into contact with a smooth curved surface. (We are all familiar with the disasters that can occur if such malformed roots are not treated.) However, with hard-walled containers this root deformation is obvious and, as it is concentrated right at the edge of the container, easily removed by root pruning prior to planting out or potting-on.

Producing good trees is far more a function of the grower's understanding of the strengths and weaknesses of the containers or production styles they are using, and the strategies adopted to exploit their strengths and deal with their weaknesses than it is about the container itself.

Containers are only a part of the production system:

The container used by a grower is only one component in a production system.

Other important components of those systems will include; the genetic quality of the seed or cutting material used, propagation techniques, growing media, irrigation techniques etc. And, all these components will exert an influence on the quality of the trees produced.

When you assess the performance of trees grown using different containers or production styles, you are not comparing the containers, but rather the various components of the different production styles and how well they combined to produce the trees.

In theory it might seem reasonable to standardise all other components of the growing systems so the only variable is the container style. However, in practice, to do so would be to promote some containers at the expense of others.

For example:

Different types of containers function best with different types of growing media. If a standard mix is used it will suit some container styles and not others. The results would therefore be skewed in favour of the "lucky" pots.

However, if you use appropriate (different) media for each container style and then compare the outcomes you have an added variable, which may well confuse the results.

In Summary:

The new NATSPEC specification includes some obvious attributes. It is comprehensive, quantified and applies to all sizes and production styles. It also offers a very useful mechanism for describing and assessing trees, when ordering or tendering.

In addition to the more obvious attributes, this specification is generic (ie allows for a single specification to be applied to all trees) and, through the concept of Size Index and the *Balance formula* offers significant benefits when growing trees and when managing trees under grow-on contracts.

Specifying by "Container Style" is not an option, we must assess the ends and not the means and the new NATSPEC specification offers the best mechanism available for assessing these ends.

References:

Grades and Standards for nursery Plants – Second Edition 1998 – Florida Department of Agriculture ad Consumer Services.

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