

ESTABLISHING TREENET TRIAL SITES

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The City of West Torrens has been involved with TREENET street tree trials since 1998. Council's approach to establishing tree trials has progressed over time, with current methods based on experience gained over this four-year period. The methods used in West Torrens will not be applicable to all situations though they may assist with development of techniques appropriate to other areas.

1. Rationale

Many conferences, workshops and seminars have for decades detailed the need for increased street tree research and improved information standards. A recent survey of local government (Lawry, D. & Gardner, J. 2001) confirmed these needs and revealed overwhelming support for the TREENET project.

The survey revealed 71% of respondents were dissatisfied with the current range of species used for street planting. 93% of respondents indicated they were interested in testing new varieties. Factors influencing the success of planting programs were also detailed by respondents and given a rating from 5 (very influential) to 1 (not influential.) The influencing factors and their ratings are summarised below:

Factor	Average Rating
1. Availability / quality of information on suitable species	3.9
2. Availability / quality of nursery stock	4.1
3. Difficult site conditions	3.4
4. Availability of funds	3.9
5. Availability of human resources	3.8
6. Access to specialist knowledge/skills	3.3
7. Vandalism	3.7

The survey showed that along with staff and budgets, improved information and stock range are seen as highly relevant to the success of greening programs. TREENET has the potential to guide, support and share the required street tree research and resulting knowledge between all stakeholders.

2. Components of a Successful Street Tree Trial

It is useful to consider tree trials in terms of four fundamental components: staff, the site, trees and time. While numerous factors affect each of these four components it is critical that a simple focus is maintained. The primary objective of tree trials is simple, it is to establish trees in sites with differing conditions and to observe and record their performance over time.

2.1 Staff

West Torrens is fortunate to have an enthusiastic and knowledgeable outdoor workforce, the leaders of the landscaping and arboriculture teams being responsible

for initiating and driving the street tree research program. Maintaining the program has been relatively simple, supporting and working with colleagues who are constantly extending it. The challenge is to keep pace with such staff.

2.2 Trial Sites

West Torrens is caretaker of approximately 700km of road verge, over 120 reserves, bikeways, linear parks and over \$120 million in other properties. The range of potential trial sites is enormous.

Site conditions

The physical, social and political characteristics of a site will determine its suitability for a tree trial, they include:

- Soil
- Average rainfall
- Groundwater, irrigation water quality & availability
- Aspect
- Prevailing wind
- Distance to coast (i.e. salt, weather effects)
- Distance to school (i.e. vandalism)
- Nature of pedestrian and/or vehicular traffic
- Size of the nature strip or planting area
- Local residents – individuals & groups, eg. ratepayers associations
- Local politicians
- Utilities & infrastructure

(examples only, list not intended to be exhaustive)

Some site characteristics (typically the physical ones) remain relatively fixed in our timeframes while others may vary. TREENET aims to compare tree performance relative to fixed characteristics such as soil and average rainfall, which can be quantified and recorded. Following the initial establishment period, tree performance will generally relate to the suitability of the tree to these physical site conditions.

The social and political characteristics of a site will often determine the type of trial that can be undertaken, so they should be determined through effective consultation prior to works beginning. An effective consultation strategy will assist trial planning and will normally increase support for the research.

Site selection

Social, political, horticultural and budgetary considerations all impact trial site selection.

The trial must be large enough to give reliable data, but small enough to limit losses should the species/site combination prove unsuitable.

West Torrens a typical trial might involve five to ten trees, requiring five to ten nature strips. Depending on the level of confidence in the site/species compatibility a larger or smaller trial may be established.

Any site where tree planting can be limited to about ten trees is a potential trial site. Traffic islands, cul de sacs and short streets are all ideal. Adelaide's typical grid layout often uses short links between longer roads, these may be useful but caution is required when setbacks are reduced on corner properties. A long street with few

existing trees, trees that are deteriorating or have other problems may also provide an ideal trial site, allowing species to be exhibited as possible candidates for replacement of the entire avenue when the need arises.

2.3 Trial Trees

There are many factors to consider when selecting stock for a species trial, including:

- species
- subspecies
- provenances
- hybrids
- selected forms
- litter
- infrastructure impacts
- availability
- adaptability to local conditions
- hardiness
- stock type
- stock size
- history / extent of cultivation
- nursery (reputation/service standard/stock quality/delivery schedules)
- client requirements
- mature size
- life expectancy
- hazard development potential
- disease resistance, etc.

The detailed information required to select a tree relative to the above criteria will in most cases be unavailable. Systematic testing of trees under varying conditions will assist TREENET to provide this information but it will involve increased risk in the short term. Replicating successfully established trials in neighbouring areas may be a safe place to begin tree trials, as would extending an existing local trial that shows promise into areas with slightly differing site conditions.

Selecting an unknown tree for trial is an obvious risk. To minimise the risk, small trials are recommended. Extensive research should be undertaken to gain an initial indication of the tree's potential prior to planting. Texts, arboreta, colleagues, the Internet and nurseries are all useful sources of information. They should be used to guide species trials, but never to replace them. The ultimate compatibility of the species/site combination will only be revealed by time.

2.4 Time

Social and political views, opinions and fashions vary with time. As trials develop at any given site new cultivars will be released, tenancy of the properties will change and planning laws may be reviewed. It must be within the trial site host's ability to maintain the trees up to an age where their characteristics can be determined regardless of changing views or fashions. An effective policy on long term street tree management is essential to the success of street tree trials. The recent TREENET

local government survey (Lawry, D., & Gardner, J. 2001) showed only 40% of respondents had a formal tree management policy.

Tree growth rates vary. Trees that develop slowly may be less desirable to stakeholders in the short term. Property values, amenity, shade and habitat may not improve as rapidly with slower species as they might have with faster growing trees. If a species is known to grow slowly, it should be tested in a site where it will have minimal impact and where there will be no pressure to replace it.

3. Site & Tree Combinations

3.1 Experience, Local Knowledge & Logic Vs Assumption & Hearsay

Whether learned through educational resources or personal endeavour, knowledge is based on experience! Knowledge of trees is based on experience with them. When planning a tree trial it is essential that limitations in knowledge be recognised.

Characteristics of seedling trees are often variable. Logically, therefore, the suitability of a particular seedling or selection to a given site may vary from that of others within the species. When experience is limited to a small number of seedlings of any species it will give only a limited knowledge of the species. To assume that all examples of a species have the same characteristics as the limited examples on which one's experience is based may lead to the rejection of the most suitable tree for a particular site.

Characteristics of genetically identical trees are generally more consistent throughout horticultural applications than seedling varieties. Characteristics of cultivars from within a species tend to vary more between the different varieties than between seedlings of the species. It should be recognised, therefore, that different varieties of a species might develop differently on a given site.

The simplicity of the above logic is often ignored or confused in practical horticulture. Because a new selection has the same species name as others or seedlings planted in the past that failed, its use for a particular site may not be given serious consideration even though it might perfectly suit the requirements and conditions. The characteristics of new selections should therefore be tested and determined under a varied range of conditions.

3.2 Which comes first, the site or the tree?

Street trees are typically selected to match site conditions, amenity considerations and other requirements, often in response to site determination based on decay of existing trees coupled with social or political influence. These are exactly the conditions in which a TREENET trial should not be established. The pressure to establish an effective avenue can be immense under these conditions. A proven and reliable type should be used in these situations, established by usual means to give the highest chance of success.

Research should be separate from a normal greening program. Neither the trial trees nor staff should be subject to external or unrealistic constraints or expectations when undertaking research planting.

Staff should focus primarily on tree selection, conduct an extensive literature search on the tree and then apply local knowledge in the search for a site in which it might be expected to grow well. This is in complete contrast to the more common procedure of

applying a limited knowledge of the available tree varieties to the task of making the best tree selection for a given site.

4. Monitoring a Tree Trial Site

Developing a simple but adequate means of recording relevant details about tree trials has involved much discussion, debate and compromise. Increasing the amount of standard data required will increase staff time requirements and so would ultimately reduce the number of sites that can be managed. Reducing the standard data requirements may reduce the usefulness of the database.

The TREENET database is an evolving work-in-progress. Feedback mechanisms have been built into the system to allow it to develop further, so standard requirements may vary with time.

4.1 Standard data entry

The following standard data requirements have been determined with the aim of optimising the usefulness of the database (aimed at local government and the nursery industry as “standard” users) while minimising the time commitment for data collection. To improve efficiencies, data collection has been divided into two standard forms. The forms will be available on-line, where data will be able to be entered directly by the participant.

Form 1. Client Identification.

Information required:

? Organisation name	? Telephone number
? CEO's name	? Mobile telephone number
? Contact name	? Facsimile number
? Address	? Email address

Form 2. Trial Site Information

Information required: (▾ indicates categories selected from drop-down menu)

Site Type/Purpose

? Trial site type	▾
? Purpose of trial site	▾
? Species	▾
? Cultivar	▾
? Deciduous/evergreen	▾

Site Location

? State
? Suburb
? Street
? UBD Reference
? Lat/Long/GPS reference

Proximity to Services

? Service types	▾
? Pipe/conduit material	▾
? Horizontal distance	▾
? Vertical distance	▾

Site conditions

? Average annual rainfall	
? Verge treatment	▾
? Soil pH	▾
? Soil texture	▾

Nursery Stock Supplier

? Nursery or Supplier	▾
? Supplier Mail Address	
? Supplier Phone number	
? Date of planting	

Nursery Stock Details

? Container type	▾
? Stock caliper / diam. (mean)	▾
? Container volume	▾
? Soil (backfill)	▾
? Canopy spread (mean)	▾
? Height (mean)	▾

4.2 Ongoing monitoring and records

TREENET's ongoing data requirements and monitoring intervals are yet to be finalised but are likely to include trial tree measurements, notes and a site summary.

Tree measurement & recording

Ongoing records will be useful to give an indication of growth rate variation due to site conditions and/or stock types and management practices. It is anticipated that this information will be made available by TREENET for selected purposes, primarily for further research. West Torrens uses a standard spreadsheet (Microsoft Excel 97) to simplify recording and data storage. The first part of the record contains a site and plant summary as shown below.

TREENET Records, Acer buergerianum, Byron Avenue Netley

Species	Botanical name:	Acer buergerianum
	Common Name:	Trident maple
	Family:	Aceraceae

Location	Street Name:	Byron Ave Netley
	Location Details	House frontages/verges
	Number Planted:	24

Plant Stock	Form (open/spring ring/pot):	O/R
	Tree Size:	1m tall 10mm cal
	Supplier:	Freshfords Nurseries

Site Details	Soil Description	Sand
	PH	7.5
	Verge treatment/s	Lawn

Planting Date/s	1998
Photograph Dates	21/10/98

Extending to the right of the above on the same worksheet is the table shown below, which is used to record individual measurements. The format of this table is then repeated across the spreadsheet to the right, allowing subsequent measurements to be easily compared.

Street No.	Height m	Trunk caliper mm	Canopy diameter m	Tree condition	Comments
11/12/98	11/12/98	11/12/98	11/12/98	11/12/98	11/12/98
2a	1.8	12	0.3	excellent	branches at 500mm
2a	1.5	16	0.6	excellent	
2	1.5	13	0.4	good	
2	1.5	15	0.6	V /good	
4	1.5	13	0.8	excellent	
4	1.5	10	0.3	excellent	
6	1.8	15	0.3	excellent	
8	1.8	12	0.3	excellent	
8	1.8	12	0.3	excellent	
9	1.3	7	0.2	poor	leaf burn
9	1.2	8	0.3	good	
5	1.4	7	0.2	V /good	
5	1.2	8	0.3	excellent	
3	1.2	7	0.4	V/ good	
3	1.3	8	0.3	excellent	
1	1.2	7	0.2	good	
1	1.2	7	0.2	good	

Ideally all organisations should use a standard system for recording purposes, though differing resource levels may prevent this. It is expected that a standard method will be refined through Internet, symposium and workshop feedback during the initial years of operation of the database.

Trial site summary

A simple document summarising the progress of each trial site could easily be linked to the database, detailing information on maintenance, pests, issues and problems. The document would also provide an opportunity for the trial site hosts promote their organisation and to showcase their work. The Ohio Street Tree Evaluation Project (see www.hcs.ohio-state.edu./ODNR/Urban/ostep.htm and note that the address is case sensitive!) gives an indication of what is possible, a page is reproduced below as an example.



Ohio Street Tree Evaluation Project

Sunburst Honeylocust - Gleditsia triacanthos 'Sunburst'

Brooklyn (Cleveland Area)
8815 Morton

Planted: 1967
Site: 7' Tree Lawn



1971 View

1971 Comments: The trees are upright spreading, uniform in size and habit, and fit well into this size tree lawn with shallow setback houses. There are utility lines overhead on one side of the street. Due to the unusual foliage color of bright yellow in the spring, these trees could be used better on shorter street, cul-de-sacs, etc., where only a few trees are used in a limited area.

...as the
street
appeared
in 1997



1997 Comments: These plants are in 7' tree lawns and they have survived nicely. These plants tend to be slow-growing compared to other honeylocust selections. Plants have caused a considerable amount of disruption to the sidewalk. One resident that we talked with loved the atmosphere that these plants created.

Ninety-two percent of the overall planting survived (70 of 76 trees). 1997 data on the table are based on five trees.

Project Data	1967	1968	1969	1970	1997
Height	22.2'	24.0'	25.6'	--	42.4'
Caliper	4.4"	5.1"	6.1"	--	17.6"
Spread	15.2'	17.2'	18.6'	--	38.4'

Follow [this link](#) to view a QuickTime movie of the above photos (large file! 398K).



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Contributing data on established sites

Information about existing avenues could be summarised and data logged with TREENET to record past experience, eg:



TREENET Trial Site Summary

Site: Malurus Avenue, Lockleys, South Australia

Species: White cedar, *Melia azedarach*

Date Planted: Arbor Day 1936

Page updated: July 1999

Details

Average annual rainfall:	450mm
Verge treatment:	Kikuyu lawn, dolomite & bare earth
Soil pH:	Neutral/slightly acidic
Soil texture	Sand
Average tree height	10 metres
Average canopy spread	12 metres
Average trunk circumference (1m AGL)	2200mm

History / Cultural notes

Trees supplied to residents and students of Lockleys Primary School on Arbor Day in 1936 for community tree planting project.

Trees lopped at intervals in the past, decay resulting. Verges maintained with glyphosate herbicide or by mowing.



Malurus Avenue Lockleys

Issues

Litter and seed germination are major concerns. Seedlings commonly appearing in gardens, reserves and roadsides, where growth is often rapid and destructive.

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Substantial root system, footpath/curb & watertable lifting/cracking common.

5. Conclusion

The potential of the TREENET project is enormous. The interactive database will allow relevant records to be filtered and summary notes reviewed quickly and easily. Data on current research will be made readily available, making it possible to check the progress of species and cultivars that have recently been introduced, to see what is on trial in nearby areas and to check on plantings in similar conditions from around the globe. TREENET's roles are to coordinate the trials through liaison with the nursery industry and local government, to guide and assist further research, and to disseminate information. The challenge to local government is to get involved, to lead the research and benefit from the project.

Reference

Lawry, D. & Gardner, J. (2001) TREENET Pilot study of tree planting in South Australia Horticulture Australia Project No: NY00042 (June 2001), Adelaide University