



Building the Case for Urban Tree Canopy Inclusion in a State Implementation Plan

Size and Form for SIP Tree Planting

What is this factsheet about?

- This factsheet examines the choices of size and form for a large tree-planting program
- It is one of a series of short factsheets written to aid anyone considering the possibility of integrating tree-planting into a SIP

Why does it matter?

- A very large tree-planting program will need to make an early decision on the size and form of the trees it is going to plant
- Size and form link tightly with questions of selection, equipment, costs, mortality, and personnel

What sizes are available?

- Trees are sized by trunk diameter, and small trees are standardly measured 6” above grade
- Small: less than 1.5” caliper (seedlings, liners)
- Medium: 1.5-3” caliper
- Large: more than 3” caliper

What available forms are suitable for SIP planting?

- Containerized
 - Small to large sizes
 - Most popular form on the market in most regions
- Bare-root
 - Seedlings, [liners](#) and young trees
 - Seedlings are rarely used in urban forestry, but might have a role in large plantings
 - If considering liners, specify that they be 2-yrs old and branched
 - Evergreens are usually unavailable as bare-root stock except as seedlings
 - Special [handling methods](#) improve survivorship of large stock
- Ball-in-burlap (AKA: balled-in-burlap, balled and burlapped, B & B)
 - 2 inch caliper and larger
 - Burlapped balls are routinely enclosed in wire baskets for handling ease

How should choices be made?

- In choosing size and form, it often helps to start with the factor perceived locally as the most limiting
 - For instance, if available labor is restricted, then the choice might fall on small sizes or bare-root stock, so that the volunteers could be used
 - In stressful areas with a high pedestrian rate, on the other hand, larger B&B trees may perform best over the long run
- In making choices, it is important to avoid short-term savings when that increases long-term costs
- From a SIP perspective, the critical consideration must be the quality of the root system
 - [Root problems](#) are responsible for the vast majority of urban tree long-term failures
 - Root system quality depends first on the initial [root structure](#) of the purchased stock
 - Subsequently, the best root structure will come from a good [fit between species and site](#)
- For large tree-planting programs, the choice may often be made by plant supply—there just might not be enough of the desired species, size and/or form
- The stock with the best root system that fits local limitations will be the best SIP choice
- By aiming for [size diversity](#), the planting program will have greater flexibility and resilience

What are the strengths and weaknesses of the different sizes and forms?

Type	Advantages	Disadvantages
Container	<ul style="list-style-type: none"> • Easy to handle • Available anytime during year • Different container types obtainable • Large quantities available 	<ul style="list-style-type: none"> • Root defects common • Light medium may fall apart • Easily water-stressed • Species selection somewhat limited
Bare-root	<ul style="list-style-type: none"> • Least costly • Tend to have larger root mass • Can be easily handled 	<ul style="list-style-type: none"> • Subject to drying out before planting • Only available early spring and fall • Species and quantity limited • Not applicable to all regions
B & B	<ul style="list-style-type: none"> • Roots protected by soil before planting • Large sizes available • Stress-tolerant during establishment • Often largest species selection 	<ul style="list-style-type: none"> • Heavy (mechanical equipment needed) • Root flare not always visible • High root loss during harvesting if not root pruned regularly in nursery

Size	Advantages	Disadvantages
Small	<ul style="list-style-type: none"> • Least costly • Large numbers usually obtainable • Quick establishment 	<ul style="list-style-type: none"> • Highest mortality rate • Subject to predation, vandalism and suppression by weeds
Medium	<ul style="list-style-type: none"> • Often good cost-benefit ratio • Widely available for most species 	<ul style="list-style-type: none"> • Subject to vandalism on some sites • Root structural problems common
Large	<ul style="list-style-type: none"> • Lowest vandalism rate • Instant tree presence 	<ul style="list-style-type: none"> • Long establishment period • Most expensive size

What other stock factors are important to consider?

- Production
 - [Many techniques](#) have been developed to reduce defective roots, particularly associated with container trees
 - [Root control bags](#) use various means to reduce root circling or exiting
 - [New container types](#) are available that reduce root problems
 - [Air root-pruning](#) can also reduce girdling roots, and has been claimed to increase fine root density
 - Specifying in the bid that “The trunk, root collar (root crown) and large roots shall be free of circling and/or kinked roots” is a good means of getting good root structure
- Origin
 - Because of genetic variation, species’ tolerance of [abiotic \(non-living\) stress](#) varies
 - Lists of regional source dealers from Cooperative Extensions (e.g., for [Indiana](#),) often exist
 - Trees grown in a similar environment for two seasons usually perform well
- Specifications
 - Using good [buying specifications](#) will maximize the new canopy from a planting program
 - The [American Standard for Nursery Stock](#) provides stock specifications for reference
 - Stock inspection is critical, and may require using a [suitable sample size](#)
- Availability
 - The more common the species is in the trade, the more available will be large stock numbers
 - In general, availability should not be a problem for stock < 2” in caliper, though multiple sources and a middleman or broker may well be required

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