



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

Species Choices for SIP Tree Planting

What is this factsheet about?

- This factsheet examines the problem of selecting species for a very 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 identify species suitable to its climate and soils.
- Tree survival and growth—the critical results needed of tree planting within a SIP—depend in the long run on a good fit between species and environment.
- Also, some species are biologically better suited to promoting air quality than others.

What factors are important to consider?

- First, hardiness. This indicates tolerance of the area's average minimum temperature range.
- Second, site tolerance. Groups of species may need to be identified for difficult sites.
- Third, emitter status. Some species emit large amounts of ozone precursors.
- Fourth, pest resistance. Hosts of regionally destructive pests should be avoided.
- Fifth, invasiveness. Invasive species, native and exotic, must be treated with caution.

How should hardiness be judged?

- The USDA's most recent [map](#) of average minimum temperature ranges in the United States is a basic aid.
 - In hot climates, the average maximum temperature should also be taken into account.
 - For the West Coast, the [Sunset Climate Zone Map](#) is commonly consulted.
- Information about the hardiness of most species can be found in standard horticultural works, and in the USDA's [Plants](#) database (native and naturalized trees only).
- The hardiness tolerance of the actual stock being purchased is also important. Ideally, stock will have grown for two seasons in the same hardiness zone as the area to be planted.

What should be known about site tolerance?

- Trees have been genetically adapted through evolution to be competitive on specific types of sites.
- While sites with adequate space (above and below ground), drainage, nutrition, sunshine, and other beneficial traits produce good growth and development for many species, limited sites suit a much smaller range of species.
- Normally, actual [site analysis](#) would be recommended, but the large quantity of sites in a SIP tree-planting program may make that unreasonable.
- When site analysis is not possible, a good alternative strategy is the following:
 - Develop a list of difficult site types (sandy, clayey, rubble, wetland, etc.) in the area.
 - Develop a suitable species lists for each site type.
 - Success will depend on following [guidelines for species diversity](#).
- Site tolerance information is available from standard horticultural works such as [Hardy Trees and Shrubs](#), electronic media such as [Hortipedia](#), and many local Land Grant colleges.

What does “emitter” mean?

- Some species emit high levels of volatile organic compounds (VOCs) such as isoprenes that are part of their natural defense system.
- VOCs are precursors to ozone, which they produce in the presence of airborne nitrogen oxides (NO_x) and sunshine; the higher the temperature, the more ozone is formed.
- High VOC emitters include members of the following genera: oaks, poplars, spruces and willows. There is, however, great variation in VOC emission levels among related species.
- Even though these species emit high levels of VOCs, they still cool the environment—which itself improves air quality—and perform other important functions in urban forestry.
- Emitters can be treated collectively as a genus and submitted to existing [guidelines for diversity](#).

Which pests should be a concern?

- Destructive pests can kill trees within a few years.
- In the northeastern US, for instance, it would be unwise to plant maples in regions where the lethal [Asian longhorned beetle](#) has yet to be contained.
- In Michigan and adjoining states, the [emerald ash borer](#) is killing hundreds of thousands of ash trees in rural and urban forests, so ashes should be excluded from planting lists for this area.
- In areas of California where [sudden oak death](#) is prevalent, susceptible species should be avoided when planting for long-term canopy increase.

Should the species selected be native?

- It depends somewhat on the site, and on the definition of “native.” Species native to the specific region are particularly appropriate for parks, woodlands, wetlands, and other semi-wild sites.
- Some exotic species (such as [ginkgo](#)) make excellent urban trees, tolerating harsh conditions that few native trees can, and it would be a mistake to eliminate them from the available species pool.
- Native species are often better adapted to regional weather (drought, storms, temperature, etc.), and can show better survival and growth where harsh conditions are prevalent.
- Lists of native trees appropriate to urban settings are available for cities (such as [Ann Arbor](#)), areas (such as [North Florida](#)), states (such as [Texas](#)), and regions (such as the [Northwest](#)).

Is invasiveness a concern?

- Unwanted [invasiveness](#) could be a serious problem, especially when an exotic species’s success leads to the loss of species diversity and the destruction of traditional habitats.
- Invasiveness is a property that is tied to [specific regions](#) and sites, and both native and exotic trees can be invasive under suitable conditions.
- Species known to be invasive in specific regions (such as [tamarisk](#) in the West, [Norway maple](#) in the East, or [Australian pine](#) in Florida) should be avoided there.
- On the other hand, the invasive tendencies of some native trees could be managed as an ally in the effort to increase urban canopy, since a single tree planted on a suitable site and with appropriate management could quickly produce multiple offspring through vegetative reproduction.

Where can I find more help?

- The USDA Forest Service has developed a “Functional Species Selection Program” that is downloadable from the “Utilities” section of the [i-Tree](#) website.
- Selection programs are available for particular regions, e.g. the Urban Forest Ecosystem Institute’s online [SelectTree](#) for the Southwest, or the interactive CD [Southern Trees](#) for the Southeast.
- Lists of suitable urban trees are maintained in many states, such as [Recommended Urban Trees](#) for New York or [Recommended Trees for Urban Landscapes](#) for Missouri.

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