

How to Start an Arboretum

1. **Introduction:** Trees offer multiple and direct benefits, too many to cite here. Furthermore, trees native to North America provide the most services and least care. A generalized list of their services include:
 - Oxygen generation and large- scale carbon storage.
 - Winter heating and summer cooling, especially in urban spaces.
 - Storm water absorption (with both canopy & roots).
 - Unparalleled wildlife and bird habitat.
 - Host plants for hundreds of native insect species and pollinators.
 - Erosion control.
 - Soil enrichment and natural, on-site mulch.

2. **Is your property open to the public?** If not, without staff to open and close access we instead recommend Tennessee Urban Forestry Council's (TUFC) Tree Sanctuary Program, which requirements are not as extensive as a formally designated arboretum's.

3. **Native Trees/Shrubs/Plants:** Trees from North American and particularly our southeastern/midsouth region are especially beneficial, for reasons partly listed below. This is a large topic that can be referenced elsewhere (see short reference list below). We strongly recommend that new arboretums use whatever healthy plants are already on the property, but plant additions from the thousands of species native to our region. They tend to be—
 - a) More tolerant of local weather and soil, to include temperature swings and drought cycles.
 - b) Require less watering [exception: all plants and even well-established trees need supplemental water during drought conditions].
 - c) Act as nurseries and host plants to hundreds of native insects and pollinators.
 - d) Provided nesting, food, shelter, and nursery for all bird species, supporting the food chain above them, and many amphibian and small animal species.

4. **References:**
 - Book “Bringing Nature Home”; Doug Tallamy.
 - Website: Home Grown National Park, <https://homegrownnationalpark.org/>.
 - Tennessee Urban Forestry Council. <https://tufc.com/#>.
 - How to plant. <https://www.tectn.org/tennesseetreeprogram.html>.
 - Local, Chattanooga resource is the Tennessee Valley Chapter of Wild Ones, Native Plant Society. They conduct a certificate in native plants program, and have terrific local resources at


































<https://tnvalleywildones.org/plant-info/>. Additionally, this group offers home landscape plans which could easily be converted for churches, synagogues, mosques.
<https://nativegardendesigns.wildones.org/designs/chattanooga/>.

5. **How to get started.**

- a) Find out the arboretum certifying agency and learn their requirements. **In Tennessee the arboretum certifications are acquired through the Tennessee Urban Forestry Council (TUFC).** Other states have different agencies and systems. There are also online certifications available if you do not have a local agency.
- b) Each agency will have a web site laying out its requirements. In Tennessee, TUFC is run by professional arborist volunteers, organized around the 3 geographical regions of our state (east, middle, west).
- We strongly recommend finding the listed points of contact, running down the current person referenced, and talking directly to them. DO NOT HESITATE to call them multiple times and at each stage of certification.
 - If possible, find a local, ISA (International Society of Arboriculture) certified arborist who will advise and help you do this, acting as a mentor to your arboretum. ISA certified arborists are priced competitively with non certified arborists. Their ISA certification requires much study and testing to receive, and indicates a trusted arborist interested in the health of your trees and not just in billing you for 'tree work'. Additional information at <https://www.isa-arbor.com/>.
 - TUFC web page is <https://tufc.com/>. Its Arboreta program is at <https://tufc.com/programs/tree/arboreta/>.

6. **TUFC Requirements.** In brief, TUFC operates four levels of arboreta. The lowest two levels are, in our opinion, simple to certify and maintain; the higher two require formal staff. See diagram below from TUFC's website.

- Level One requires only 30- 59 species, which you may already have on your property (species do NOT have to be native to North America, by the way).
- We certified at Level Two (minimum of 60 species), requiring more species and a map. The map was very difficult to produce, see below. Any certifications at higher levels require staff and seem virtually impossible for volunteer organizations such as in churches and other communities to meet. See <https://tufc.com/programs/tree/arboreta/>.
- All levels require that trees be labeled. More on that, below.
- Requirement chart from TUFC website:

	Level 1	Level 2	Level 3	Level 4
Distinct Species Labeled	30 - 59	60 - 89	90 - 119	120+
Public Access				
Approved Tree List				
Approved Application				
-- Narrative				
-- Governance Plan				
-- Education & Outreach Plan				
-- Map				
Pass Inspection				
Tours Available				
Edu/Outreach Content				
Certification Fee	\$175	\$250	\$350	\$450
Recertification Fee	\$125	\$200	\$300	\$400

7. How we did ours.

a) How we started.

- The church grounds included a large, open outdoor space with several mature canopy trees on it. It operated as lawn and as a green buffer to the church buildings. The church grounds had been spotty and variously maintained over the decades since the church's mid 20th century construction.
- We also had several experienced gardeners and tree lovers, including several certified Hamilton County Master Gardeners.
- By our reckoning, we already had around 28 species of the minimum 30 required for Level One Certification. We decided we had the space and knowledge to shoot for Level Two, so we began a tree planting binge over the next several years.

b) Initial problems:

- Unfortunately, we immediately ran into the Drought of 2016, and lost almost all our new trees. This was discouraging, and expensive. See below on money. It was also our last attempt to buy big trees, which died quickly in the drought. However, we accept larger tree donations if someone wants to give them—we just won't buy them!
- We also ran into a major reorganization of TUFC, during which they held applications for several years. Our response was to plant more trees in that interim time.

- We also decided that--
 - all new trees would be native species,
 - and that we would also add the 'middle story' of large native shrubs and small trees/semi- trees. This often missing layer is extremely beneficial to wildlife and if you add these plants you will see an immediate increase in birds, bird species, and small urban wildlife of all types. This became one of our major goals as we changed the landscape and saw how those changes immediately benefited the richness and variety of urban wildlife. We were literally creating sanctuary for both people and wildlife. This became a more and more important goal as we progressed.
- We wanted these things, but getting certified was our only goal at the start. In retrospect, goals could have been more clear. See "what we'd do differently" below; we hope you can benefit from that list, below in #11
- NOTE: WE HAVE KILLED A LOT OF TREES! FEAR NOT!
- c) We planted trees—and shrubs—and figured out our maintenance plan over the next few years. Yes, we were shooting from the hip and made it up as we went along. In our defense, at least we did know a lot about trees and their care!
- d) We got several local arborists to volunteer to help us identify trees and start out tree list. We just called and asked them- being tree lovers themselves, they were happy to help. The UT Extension can supply a list of ISA certified arborists. We prepared our application over three years, so we made several lists, lost several, forgot several-- better luck to you!

8. Labels.

- a) We finally began labeling. This was expensive and time consuming, even though we had a volunteer welder to help make tags and stands. This volunteer was extremely helpful and saved us money.
 - We decided to go ahead and label most of the shrubs and semi shrubs, even though they wouldn't count on the TUFC required species list: we wanted to teach and educate people. Of course, buying and installing these 'extra' labels cost more money.
 - Tags. We ordered ours from an internet company. We included the Latin name, the common name, and researched our favorite tree databases for a description. We primarily used these two databases; they are in our region and they offered clear, easy-to-understand descriptions.
 - The Missouri Botanical Gardens,
<https://www.missouribotanicalgarden.org/plantfinder/plantfindresearch.aspx>.
 - North Carolina State University.
<https://content.ces.ncsu.edu/identification-of-common-trees-of-north-carolina>

- b) Label Stands. They need to be durable, low/no maintenance, and reasonable. They need to be easy to see. Never, ever underestimate the destructive power of the riding lawn mower! Plus, good old- fashioned sloppiness, and/or outright mischief and vandalism. Expect all.
- c) We built label stand from cutting thick sheet metal into identical rectangles. We cut rebar for 2 foot stands, and then welded the stands to the plates. WE then spray painted them all the same color and taped the tags to the sheet metal with



industrial, two sided tape. None have come off.

- 9. **Final map, required for Level Two (or higher) certification.** We put the trees in as circles and the semi-trees/shrubs as squares. You can come see this at Grace Episcopal Church, 20 Belvoir Avenue, Chattanooga, TN. This kiosk is at the back of the church.



- a) We did not anticipate how hard this would be. It was a major stumbling block for our project, that took several years to resolve into our current map and tree list. We built this kiosk for it, the required tree list, and other items.



- b) Improved software may alleviate the problem for others. We needed the GPS coordinates for each specific tree or shrub to hopefully overlay on a digital map. Another option would be to simply hand draw a map, but we knew species would die and be replaced, so we wanted something we could manipulate digitally.
- First we tried freeware, GPS apps that were free to download. At the time we attempted this, none of them were refined enough, clumping specific trees randomly on the property's google map.
 - We then tried to buy over-the-counter, unspecialized software. It, too, didn't work.
 - Eventually we worked in tedious detail with a geospatial professional using public data.
 - We printed it on specialized printers for the large version we now have, see above.

10. Long term issues and planning.

- a) Watering. Newly planted trees need --
- Initial deep watering, then deep, soaking waterings every 7 days if Nature fails to provide. We monitor rainfall with home gages and also the Chattanooga Airport's official rainfall measurements at <https://w1.weather.gov/data/obhistory/KCHA.html>.
 - Water through dry summers/falls for 2- 3 years. They are more vulnerable to extended drought for 5- 7 years.
 - We never water our mature, canopy trees. But we worry about them!
 - Consult UT's Extension services for more information on proper tree choice and watering. <https://naturalresources.tennessee.edu/extension-urban-forestry/>
- b) Historically, our driest months are *August, September and especially October*. This may extend into November. Climate change may change this. NOTE: native trees and shrubs are more genetically conditioned to withstand occasional, routine dry spells. However, a severe drought will affect all.

- c) Trees need almost no watering during winter dormancy when roots are not growing. This will be after several hard frosts. Note: roots of any living plant will continue to grow in the ground up to around 40 degrees F. This is why fall planting gives such a significant growth boost to trees, shrubs, and hardy perennials.
- d) We consult the Drought Monitor Map for late summer and fall updates, see <https://droughtmonitor.unl.edu/CurrentMap.aspx>,
 - o Trees and shrubs need approximately **one inch of water every 7 to ten days**. They need more when temperatures are very high and the plants are young.
 - o This can be expensive.
- e) We put together a watering crew ad hoc, as required. Don't wait too long "hoping" it will rain (of course, we've done this). We get volunteers to sign up to water a few trees every 10 to 14 days, more if the trees are less than 3 years. It takes a lot of tracking, and it's time consuming to both do and manage.
 - o We recommend naming your tree groups/areas; it's easier to track.
- f) Tree loss & mortality. Depending on how they are maintained, expect 40% tree losses of small whips.
- g) Tree choices. As stated several times, we are committed to adding only native trees and shrubs. We recommend this in the strongest terms.
 - o Requests to bring or donate trees need to be tactfully managed. You may want to set up a policy to help with this. Your donor will invariably offer a tree you don't need and possibly don't want; will want you to come dig it up and plant it; and it will often be too big for volunteers to handle.
 - o Size & Costs. We recommend buying the smallest possible tree sizes. They are much cheaper, and have much greater survivability. Repeated research shows that in 7 years, a tiny 1 to 3 gallon 'whip' will be the same size as a far more expensive 15/20 gallon tree. [Note: larger trees are MUCH harder to transport, place, and plant. They are EXTREMELY heavy].
 - o However, smaller sizes can be hard to find as commercial nurseries make more money selling larger trees.
 - o Tennessee Environmental Council gives away small tree and shrub 'whips'—bare root, pencil thick trees-- every March, or sells them very cheaply (2024: \$2- \$4). You can order them in January. They only use trees native to our region. See <https://www.tectn.org/tennesseetreeprogram.html>. They also have good instructions at <https://www.tectn.org/tennesseetreeday.html>.

- The link above also has very good, basic 'how to plant and establish' information. <https://www.tectn.org/tennesseetreeprogram.html>.
- h) Buying trees. We have had the best luck buying directly from growers; we rarely use a retail type nursery as they are less knowledgeable and their trees are both larger and more expensive. We have also used the internet for very specific species, with mixed results. We use local nurseries such as Reflection Riding, and Thomas Nursery, a tree nursery on the Cumberland Plateau (there are many), as well as Overhill Nursery in Vonore Tennessee.

11. Lessons Learned/What we'd do differently/Recommendations. These are things we would do differently—or strongly recommend-- now that we have been doing this for 6 years, 3 as a certified arboretum.

- a) Make sure your clergy and ruling board/vestry/elders/council, etc are behind your effort. This will allow you to raise donations and manage the project. Get it in writing so you don't have to constantly renew permissions every time persons serving change. Get it in the church/group budget if possible, and get permission to accept donations, as needed.
- b) List goals/intent. This doesn't have to be written in stone, long, or even particularly profound.
 - We recommend concluding with "to love God, love what God loves." God's love of Creation is everywhere throughout the Bible; search your own sacred texts for guidance.
 - A general mission statement might be something like, "Create a certified arboretum to
 - teach our community,
 - to steward our land,
 - to provide habitat for God's creatures,
 - and to create a place of sanctuary, beauty, and respite for all."
- c) Phase your goals. What can you realistically do, with participants of one, two, or ten? "X number of trees" per year? How many can you afford to buy, or grow/propagate yourselves from scratch?
- d) What's the watering plan? Who? When? How long are the hoses and where will they be stored?
 - What we do: we leave our hoses out coiled up on reels by the water spigots. The reels keep it looking neat and are much easier to roll out from; you waste less time untangling hoses.
 - We also use short range sprayers to soak trees for several hours during dry periods.
 - We have some very long, double hose runs. *These hoses are heavy.* They are dirty. It is always hot.

- To water trees and other plantings, you may want to consider adding an irrigation type water point from Tennessee American Water provider. It will be on the street, off one of their feeder pipes coming into the building. The cost is significant. However, an irrigation water point will eliminate the city's sewer charge, a significant savings over time from the 'regular' water coming into the building. You will also have to pay annually for a plumber to check the irrigation point's backflow meter checked.
- e) Keep the congregation informed from time to time of your efforts. Recruiting workers never stops! Getting trees blessed, celebrated, etc., helps keep them before the congregations.
- f) Mulch. Rake/blow dropped leaves back under the trees/shrubs' drip line. They add nutrients, retain moisture, and provide habitat for small invertebrates and beneficial insects, including lightning bugs. Kitchen floors ought be swept clean, but not landscapes! God knew what God was doing when He designed the woods and forests.
 - Keep trees and shrubs mulched about 2 to 3 inches deep under their drip lines—this is where their branches reach out to make a circle around the trunk. Do not heap mulch high against the trunk—this is unnatural and makes the bark susceptible to rot.
 - Expand this mulched area over time to include more space as the trees grow, and/or gradually connect different areas with more leaf litter. This will reduce your lawns and mowing maintenance and continue to enrich the soil naturally, without buying and bringing in commercial mulch.
 - Keep turf grasses from encroaching under the trees—they steal water from tree roots. Grasses are sun plants, and as the trees mature they will gradually shade out grass colonizers, but in the beginning very young trees can struggle dense grasses, especially Bermuda grass.
 - Once the trees are established, say 5 years old, you can plant under them with shade appropriate native plants such as ferns, huecharas (coral bells), foamflowers, and wood asters. Keep the mowers off! NOTE: you may have to occasionally weed out sprouts of monkey grass, privet, ivy, vinca vine from under trees. The seeds blow in from elsewhere. We do not recommend these foreign invasive **plants under any circumstance**.
 - Staking is only needed the first season, if then. *Make sure to take stakes away so that the roots don't rely on them*—roots should be developed to be strong. After 2-3 months, cut them stakes unless the tree is damaged.
 - We generally plant very small trees, so we almost always 'cage' them with homemade fencing tubes we stake around the trees. This helps protects them from mowers, string trimmers, walkers, kids, etc.
 - You may run into very fixed, incorrect ideas about proper tree care. We have found it useful to go to classes and acquire certifications so you can counter these usually very bad, but stubbornly held, ideas.

- We try to get one of Chattanooga’s ISA certified arborists to check and maintain our trees annually with one scheduled day of care. Preventive care really works, especially on large, older trees. This can be expensive, and we try to budget for it each year. If we can’t afford to have all tended at once, we try to rotate the care on a 2 or 3 year cycle.
12. If this seems overwhelming, please note that this took us about 4 years to establish. You can also start with a simpler, smaller scale “Tree Sanctuary” certification from TUFC, see <https://tufc.com/programs/tree/sanctuary/>. This might be a good starting point and is still both an excellent help to the environment and as ‘braggin rights’ for your community.
 13. Good luck in all your endeavors! Please give us a call or email at greengracechattanooga@gmail.com, and we’ll be glad to advise you if that’s helpful.

– Lisa Lemza & Kristina Shaneyfelt

Addendum: University of Tennessee helpful tree publications:

- Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/W227.pdf.
- “12 Common Landscape Mistakes. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/W175.pdf.
- Tree Owners Rights & Responsibilities. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP687.pdf
- Mulching Your Trees & Landscapes. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP617.pdf.
- Post (Tree) Planting Care. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/Sp574.pdf.
- Transplanting Trees. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/sp572.pdf.
- *** Urban Trees for Wildlife. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP530.pdf.

- Changing Colors of Leaves. chrome-extension://efaidnbmnnnibpcajpcgglefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP529.pdf
- Small Trees for Fall Splendor. chrome-extension://efaidnbmnnnibpcajpcgglefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP514.pdf.
- **** Native Trees. chrome-extension://efaidnbmnnnibpcajpcgglefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP515.pdf.
- Plant the Right Tree for the Right Place. chrome-extension://efaidnbmnnnibpcajpcgglefindmkaj/https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/SP511.pdf.