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An Introduction to Nursery Production Systems and their Impact on Urban Tree Growth & Development

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Many tree planting programs have been implemented to increase the number of trees and the percentage of urban tree canopy cover in cities, nationwide (Harper and Bloniarz 2018). These include the million tree campaigns in New York City and Los Angeles, and other programs like “Grow Boston Greener” and the “energy tree”

initiative in Springfield, MA. Many municipalities, however, struggle to obtain sufficient funding to cover installation, watering, and long-term maintenance costs for urban trees. Urban trees typically do not survive as long as compared those in native or more natural settings (Roman and Scatena 2011; Stobbart and Johnston 2012), hence, replanting is often necessary. Tree survival in an urban setting depends on many factors, including proper tree selection for the site, planting location, installation, and post-planting care (Jutras et al. 2010). Tree nursery production systems have been shown to influence post-transplant establishment and growth of trees (Levinsson 2013) and thus may be an important parameter in choosing nursery stock relative to planting trees in the urban environment.

Young trees are generally produced using one of three main types of nursery production systems: container-grown (CG), field-grown root ball-excavated and burlap-wrapped trees (B&B), and field-grown bare-rooted trees (BR). The objective of these systems is to produce healthy nursery stock efficiently and cost-effectively. However, there are

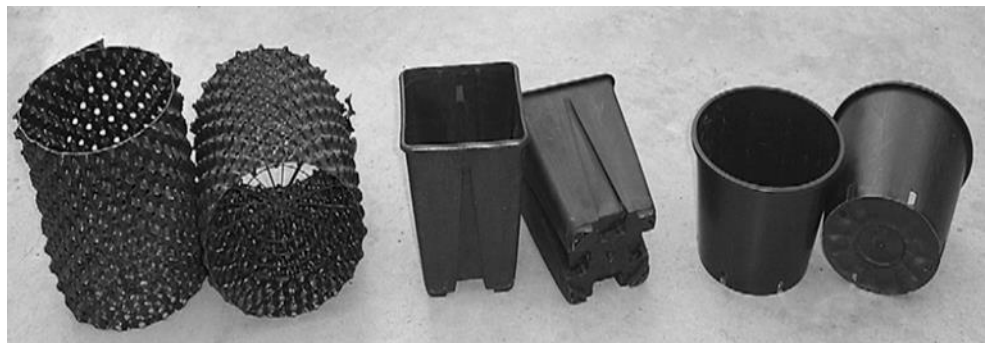


Figure 1. Three container designs, L-R: Superroots Air-Pot™ (The Caledonian Tree Company, Pathhead, UK), Quadro antispiralizzante (Bamaplast, Massa e Cozzile, IT), and traditional rigid container (Cultistop; ARCA spa, Osio Sotto, IT). (Photo credit: Amoroso et al. 2010) ground production alternative.

differences between these systems, both in quality of plant material (particularly root development and subsequent transplanting viability), and in affiliated costs (Green et al. 2015). Deeper insight into the effects of nursery production systems on tree morphological and physiological traits may aid in the development and implementation of best management practices to increase post-transplant establishment of urban trees. Here we review and discuss the current literature on the influence of nursery production systems prior to planting and the potential impact of this variable on the performance and survivability of trees after installation in the urban environment in the temperate (northeastern) United States.

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Nursery Production Systems

Several methods are currently used in the production of woody plant material following initial cultivation of seedlings, cuttings, or tissue-cultured trees. These include transplanting liners (young plants) into various containerized systems, including traditional (i.e., rigid) plastic containers (CG), pot-in-pot containers (PIP), and flexible in-ground fabric containers (IGF). Trees can also be field grown and harvested as bare-root (BR) and root ball-excavated and burlap-wrapped (B&B) trees. Each of these methods offers unique advantages and disadvantages in relation to production and installation.

Container-Grown (CG) Systems

Container-grown systems include traditional plastic containers and other designs (Figure 1), which have been developed for ease of handling, appearance, improved drainage, and elimination of circling root systems (Appleton, 1993). Due to the protection provided by the plastic container and use of lightweight soilless growing media, standard containerized nursery stock is less susceptible to mechanical or human-induced injury sustained in the nursery or during transport, as compared to B&B plants (Mathers et al. 2007). Though traditional containers are cost-effective and offer some obvious advantages, concerns have arisen about the negative influence of circling root development on drought stress tolerance, nutrient uptake capacity, and anchorage, leading to decreases in long-term survivability (Warren and Blazich 1991). In order to address these physiological disadvantages, newer designs and technologies have been implemented in the production of containerized trees. Improved designs include variably-shaped (i.e. square; pyramidal) containers and features such as drainage holes and ribbed or stepped plastic, to minimize circling root growth (Appleton 1989, 1993). Container-grown nursery stock retains up to 100% of the root system at the time of planting, in comparison to B&B plants, which may be

transplanted with as little as 5% of the original root system (Blessing and Dana, 1987). However, this estimate does not reflect concerns associated with root deformation and necessary pre-transplant pruning, nor does this ensure higher post-transplant survival rates.

Advancements in container production include the incorporation of air pruning to increase fine root biomass and lateral shoot growth. Air pruning containers feature holes that allow pockets of air to contain root growth inside the container and kill growing root tips to promote fine root biomass and branching (Amoroso et al. 2010). Air-Pot™ cylindrical plastic containers (Caledonian Tree Company, Ltd., Scotland) utilize air root pruning and have been shown to minimize circling root growth and other root deformations in *Acer rubrum* 'Florida Flame', *Ulmus minor* (syn. *Ulmus procera*), and *Tilia cordata* (Amoroso et al. 2010; Gilman et al. 2010a).

In-ground fabric (IGF) containers (Figure 2) have been repeatedly modified and improved in commercial-scale nursery production (Appleton, 1995). These containers are made of flexible fabric and sometimes include a clear polyethylene base (Cole et al. 1998). In-ground fabric-grown root balls may retain the same density of roots (Figure 3) in half of the volume of B&B root balls. Warren and Blazich (1991) found that IGF containers



Figure 2. Flexible, In-ground fabric (IGF) containers, which can also be implemented as an above-ground production alternative.

significantly reduced circling root growth in several woody plant species, as compared to CG stock. One study using three-year old *Pinus elliottii* seedlings showed that the trees were slower to establish when transplanted into the ground as CG stock than IGF or B&B trees (Beeson and Gilman

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1992). Another experiment compared post-transplant establishment of IGF and B&B-produced *Ilex x attenuata* 'East Palatka', and results indicated that IGF-grown plants showed signs of abiotic stress and reduced photosynthetic activity during establishment, thus requiring more irrigation than field grown trees after transplanting (Harris and Gilman 1993). IGF containers do not offer the same level of protection during production, transportation, and installation as do traditional containers (Appleton 1995; Cole et al. 1998). The initial investment cost of IGF containers may be a barrier for growers considering the adoption of this practice, though IGF systems have been found to grant cost savings in harvest, transport, and planting-associated costs compared to B&B (Green et al. 2015).

In a study comparing several CG designs with an IGF container, *Buxus microphylla*, *Salix nigra*, *Pinus strobus*, and *Koelreuteria paniculata* showed reduced circling root growth when grown in IGF and a stepped-pyramid container design, as compared to the other CG designs (Appleton 1989). However, in the same study, *Lonicera pileata* and *Rhododendron* 'Hershey's Red' did not develop circling roots in IGF or traditional containers, instead establishing a fine fibrous root system (Appleton 1989). These results suggest an interaction at the species-specific level, which indicates that some production systems may be advantageous over others for increasing tree establishment and survival.

A study of four CG designs compared root and shoot growth of *Rhododendron* 'Delaware Valley White', *Ilex crenata* 'Green Luster', *Juniperus horizontalis* 'Plumosa Compacta Youngstown', and *Viburnum plicatum* f. *tomentosum* 'Shasta' using traditional containers, stepped pyramidal containers, square containers, and IGF containers (Warren and Blazich 1991). Stepped pyramidal containers, square containers, and IGF containers significantly reduced circling root growth in all four species compared to traditional containers. Plants were installed in a landscape after one and two

years in containers, and shoot and root dry weights were measured after 16 weeks in the landscape setting. The authors measured above-ground plant tissue, as well as root tissue shaved from the original root ball. Shoot-to-new-root ratios showed variation by plant species after one or two years' production in containers. This study provided useful information concerning root growth tendencies in different containerized systems and demonstrated the difficulty in comparing the effects of these production systems across several species with varying root system morphologies.

Pot-in-pot (PIP) container systems consist of plant material grown in a plastic "liner" container, which is placed inside a permanent in-ground "socket" container (Mathers 2003). This system can also be utilized above-ground (Appleton 1995). PIP systems can be advantageous as compared to traditional container systems, due to an apparent reduction in heat damage sustained by plant roots (Appleton 1995). Air space between the two pots reduces thermal heating of soil and heat kill of roots during the summer, and this temperature buffering effect increases root survival during the winter (Appleton 1995; Kirk et al. 2004). These systems can also minimize damage from blow-over, and help to minimize loss of substrate, fertilizer, and herbicide amendments (Appleton 1995). PIP systems can increase survival and vigor of healthy plant material during production, though the initial costs of installation may be a deterrent to some growers. The liner pot is constructed from rigid plastic, and so the root systems of plants produced using this system may be subject to species-specific circling tendencies similar to other CG nursery stock (Figure 3) (Appleton 1989; Warren and Blazich 1991). Otherwise, the PIP system offers the same post-transplant survival benefits as other CG systems, including protection from pre-transplant injury and retention of the root system.

Another benefit of containerized systems is that container materials can be treated with copper hydroxide root growth-regulating products such as

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SpinOut™ (Griffin Corp., Inc., Valdosta, GA). These products are used to chemically prune roots in nursery production systems to reduce malformed root-systems, increase fine root biomass, and improve post-transplant survival (Appleton 1995; Gilman et al. 2010b; Struve 1993). Chemical pruning approaches have been reported to be effective for containing root growth or preventing circling root development and do not appear to be detrimental to post-transplant establishment (Appleton 1995).

Field-Grown Nursery Production

Trees grown in a production field can be harvested BR or B&B. The B&B root ball excavation process can leave as much as 95% of the tree's total root system in the field, with estimates of up to 30% of that mass as fine roots (Blessing and Dana 1987; Mathers et al. 2007). This can be detrimental due to the loss of fine root biomass, which is critical for water and nutrient acquisition (Yin et al. 2014). Field-grown BR production of trees requires removal of the soil from the root system and can be economically advantageous to the grower due to the elimination of container costs, retention of field soil, and decreased water use (Buckstrup and Bassuk 2000; Harris and Gilman 1993; Reiger and Whitcomb 1982; Richardson-Calfee and Harris 2005). Bare-root trees may require further preventative measures, such as root-dipping in hydrogel (a hydrophilic absorbent polymer substance), to prevent root desiccation following harvest (Buckstrup and Bassuk 2000; Landis and Haase 2012). BR and B&B plants are often larger at the time of transplanting than containerized nursery stock, but may sustain greater mortality rates compared to smaller trees due to a number of production-based practices (Struve 2009). One study showed that large-caliper *Quercus rubra* transplanted alongside smaller-caliper trees produced significantly more caliper growth four years after transplanting, though only 42% of the larger trees survived, as compared with 100% of the smaller trees (Struve et al. 2000). This is

contrary to the commonly accepted observation that larger trees will grow more slowly than smaller trees after installation. However, smaller-sized *Quercus virginiana* demonstrated increased rates of stem and height growth, as compared to larger trees, which supports the idea that larger trees will take more time to re-establish shoot-to-root growth ratios following transplanting (Gilman et al. 1998; Watson 1985).

Plants harvested BR have the highest success in establishment when transplanting occurs in the narrow windows of tree dormancy between soil thawing and bud break in the spring and leaf drop and soil freezing in the fall (Harris and Bassuk 1994; Struve 2009; Watson and Himelick 2013). BR trees can suffer reduced rates of establishment, as compared to CG and B&B plants, and BR plants are more vulnerable during transport due to the risk of root desiccation without the protection of moisture-retaining soil, necessitating treatment with anti-desiccants or additional irrigation (Struve 2009). Sundström and Keane (1999) found that CG *Pseudotsuga menziesii* had a higher percentage of survival than BR trees (of which 80-90% of trees survived) ten years after planting, though this slight advantage was not statistically significant. Buckstrup and Bassuk (2000) compared growth responses of B&B and BR trees, transplanted in the spring and the fall into urban "tree lawns" or strips ranging from 5-15 feet in width. The trees examined in this experiment were *Celtis occidentalis*, *Ostrya virginiana*, and *Quercus bicolor*. When transplanted in the fall, BR *C. occidentalis* had better growth responses than B&B trees. However, B&B *C. occidentalis* out-performed BR trees when transplanted in the spring. All species and treatments fared well with few significant differences after the first year (Buckstrup and Bassuk 2000). This study confirmed the viability of using BR production as an alternative to B&B during the fall transplanting season for these common urban tree species.

Watson and Himelick (2013) note that field-grown B&B trees generally establish more quickly than

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container-grown trees. As with the other nursery production systems reviewed, B&B trees may have relative advantages or disadvantages, including being able to source larger plant material at the time of installation (Harris and Bassuk 1993). Comparison of production and planting costs of *Q. bicolor* and *Q. rubra* revealed that B&B nursery stock was shown to cost on average \$11.01 per tree for preparation, loading and unloading, and planting, while PIP, IGF, and BR trees cost significantly less per tree (\$6.52, \$5.38, and \$4.38, respectively) (Green et al. 2015). Trees harvested B&B also require a higher cost for harvesting, as compared to IGF and PIP systems, and removal of soil from the field production sites raises long-term environmental concerns related to sustainability (Lass and Neal 2014; Neal and Lass 2014). As B&B is a common method of nursery production, it does offer specific advantages, including widespread availability of plant materials during the spring and fall. Though B&B trees are planted with only a fraction of their original roots systems intact, the quality of roots present may be superior. According to Neal and Lass (2014), “the strong radial distribution of structural roots observed in field-grown trees is purported to be the best structure for long-term tree health” (Figure 3).

Other Production Methods

Additional production techniques have been developed in order to mitigate the influence of nursery production on survivability and limit transplant shock, including root pruning and undercutting of seedlings or early root-cuttings. The timing of transition between propagation (i.e., field-grown liners) to production and cultivation systems can affect root development as well; in Sweden it has been reported that moving young field-grown nursery stock into containerized systems up to two years prior to transplanting increases fine root biomass (Levinsson 2013). Pre-establishing



Figure 3. *Betula nigra* root systems (L-R) harvested from the rigid liner pot of a pot-in-pot (PIP) system, in-ground fabric (IGF) system, and balled & burlapped (B&B) method.

methods also expose plants to transplant stress while still under a heavy management regime, which is thought to prepare them to better withstand transplant shock in the future (Struve 2009; Levinsson 2013). The Missouri gravel bed system, in which trees are heeled in to a gravel mulch substrate, can be utilized for BR and B&B trees for easier handling and extended transplanting times (Starbuck et al. 2005; Struve 2009). Transplant timing plays a role in tree survivability following installation, and in a study *Q. bicolor* and *Quercus macrocarpa*, optimal transplant timing varied for each species (Yin et al. 2014). In addition to extending the transplanting period, the Missouri gravel bed system may be advantageous for cultivation of difficult-to-transplant trees or larger bare-root specimens, with higher survival and growth rates observed using this technique to heel in *Fraxinus pennsylvanica* ‘Summit’ and *Q. rubra* prior to summer transplanting (Struve 2009). This system has been shown to encourage root regeneration and reduce transplant shock and requires larger transplanting space for installation, which may aid further in establishment (Starbuck et al. 2005).

In part II, nursery production systems and their potential influence on root formation, pest susceptibility, establishment, and tree survivability will be discussed.

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Species Spotlight, American chestnut, *Castanea dentata*

By Yoni Glogower

The American chestnut (*Castanea dentata*) was

once one of the most important canopy tree species in the northeast, prior to its decimation by an introduced fungal pathogen in the early decades of the 20th century. A common component of many different forest types in its range, American chestnuts were most abundant across the uplands of the Appalachians and New England, often co-occurring with oak species (*Quercus* spp.). These trees were often massive, regularly reaching 100 feet or more in height. A member of the beech family (Fagaceae), American chestnuts are readily identified by their long leaves that are both narrower and more sharply toothed than those of our related American beeches (*Fagus grandifolia*).

Like all other chestnut species, the American chestnut produces tiny flowers on long slender spikes (called catkins) that produce copious amounts of wind-dispersed pollen. The fruit is a bristly capsule that ripens on the tree. Once mature, it falls to the ground in early autumn and splits open to reveal its dark brown nuts. Because they fruit more prolifically than the other nut-producing tree species in the region, chestnuts were once a major food resource for a wide array of wildlife, including bobwhites, wild turkeys, bears, and white-tailed deer. The vast crops produced annually by adult trees were also an important



American chestnut stump sprout, showcasing its long, coarsely toothed leaves. (Photo by Yoni Glogower)

source of sustenance for the Native American nations of the region and for later Appalachian settler communities. By the turn of the century, chestnut gathering was a major industry in states like Virginia and Georgia, which supplied all the major cities of the Atlantic Coast.

The wood of the American chestnut is the most versatile of any hardwood species in the United

States. Light, straight-grained, and resistant to rot,

it was used to build everything from furniture to railroad ties, and many old barns and farmhouses in the region today still sport their original ceiling joists made from massive chestnut trunks. The longevity of the wood is owed to a high tannin content which makes it less susceptible to decay. For this reason, both the wood and bark of American chestnut was used

extensively in the tannery industry as well, along with eastern hemlock (*Tsuga canadensis*).

The chestnut blight (*Cryphonectria parasitica*) is a species of pathogenic fungus believed to have been introduced to North America on imported Chinese chestnut (*Castanea mollissima*) and Japanese chestnut (*Castanea crenata*) trees in the late 19th century. It was first discovered infecting American chestnut trees at the New York Botanical Garden in 1904, where staff noticed significant leaf dieback and orange dots clustering around cracks in the trunks and branches. The fungus spreads through spores that germinate underneath the bark and grow a network of tendrils (called filaments) through the living tissue of the tree. The chestnut species of eastern Asia co-evolved with the blight, and have the ability to grow cankers that isolate any infected areas from spreading to the rest of the tree. The American chestnut developed no such resistance, and infected trees almost always succumb to the blight by dying back to the base of their trunks. In this way, virtually all adult American chestnuts would be wiped out across the



One of the most famous photos of mature American chestnut trees, taken in the Great Smoky Mountains of Western N.C. and originally published in the 1910 issue of *American Lumberman*. (Public domain photo, courtesy of the Forest History Society)

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Species Spotlight, American chestnut, *Castanea dentata*



Mature American chestnut, MA (Photo by Jay Girard)

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species' entire native range just a few decades after the blight's introduction—an estimated four billion trees.

Today there are fewer than 100 adult-sized American chestnuts within its original range. Additional trees survive on plantations that were established outside of that native

range in Wisconsin and northern Michigan, prior to the arrival of the blight. Because the blight only targets the boles (trunks) and leaves the belowground portion unharmed, American chestnut trees have the capacity to re-sprout from the original root systems of adult trees (that are, by now, often centuries old!). These shrub-sized chestnuts are still a fairly common sight in southern New England forests, usually achieving a height of only 10-15 feet before succumbing to the blight and dying back to the base once more. On account of the American chestnut's incredible capacity for rot-resistance, even dead stumps and wood fragments from trees that died over 100 years ago can still be found intact and gathering moss in many places.

There have been several attempts to breed American chestnuts for resistance to the blight, including efforts by the USDA and Connecticut Agricultural Experiment Station (CAES). The American Chestnut Foundation (TACF) was formed in 1983, with the goal of restoring the species by creating hybrid individuals with the already resistant Chinese chestnut. By backcrossing the offspring with pollen from some of the few remaining adult American chestnuts over several generations, TACF has succeeded in producing individuals that retain 96% of the American

chestnut genes and still have proven resistance to the blight.

Though not yet commercially available, these resistant chestnut trees show strong promise for plantings in urban areas, the reclamation of Appalachian surface mines, and perhaps full reintroduction in forests across the species' original range. With these prospects loom some important ethical considerations. Hundreds of tree cultivars and hybrids exist for sale in the nursery market, but this would be the first instance of a breeding for the purpose of release back into natural areas. Though nearly genetically identical to our native chestnuts, it is still unknown whether these hybrids will retain the same growth form as the mighty giants of yore at full maturity, or occupy the same ecological niche.



Open chestnut burr in VA (Photo by The American Chestnut Foundation)

Still, it is an exciting time for those of us who yearn to see the species thrive once more.

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Growing on Trees

2019 Arbor Day Poster Contest
Trees Have Mass Appeal
 All 5th grade students in Massachusetts are invited to participate in this annual contest that combines art and science.

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dcrc
 Massachusetts

Fifth-grade classes from public and private schools across the Commonwealth are encouraged to participate in the annual Arbor Day Poster Contest by having fifth-grade students create posters highlighting this year's theme, **Trees Have Mass Appeal**, and then hosting a school poster contest. The winning poster from each school can be submitted to DCR. Home-schooled or non-participating school students may submit their posters and enter the contest individually.

The Arbor Day Poster Contest is sponsored by the Department of Conservation and Recreation, the U.S. Forest Service, and the Massachusetts Tree Wardens' and Foresters' Association.

For complete rules and guidelines, go to the [Arbor Day Poster Contest page](#) on the DCR website.

Grants

2019 DCR Urban and Community Forestry Challenge Grants

Thank you to all the communities and organizations that submitted Urban and Community Forestry Challenge Grant applications. We had a record 23 projects submitted! Staff from DCR and the Executive Office of Energy and Environmental Affairs are currently reviewing applications. Grant recipients will be announced in spring 2019.

New England ISA Arbor Day Grant

The Arbor Day Grant supports small communities in building their Arbor Day programs. This grant awards up to \$1,000.00 to a municipality, non-profit organization, or institution that demonstrates need to support their Arbor Day celebration.

Deadline: March 31, 2019.

Find out more: www.newenglandisa.org

Download the [Arbor Day Grant Application](#) or [Apply Online](#).



Greening the Gateway Cities Winter Tree Workshops

Brockton

Tree Workshop

Wednesday, February 6, 2019, 5:30 – 6:30 p.m.

Brockton Main Library

304 Main St., Brockton, MA 02301

Pittsfield

Understanding Trees: Their Care and Benefits

Thursday, February 7, 2019, 5:30 – 7:00 p.m.

Hotel on North

297 North St., Pittsfield, MA 01201

Note: workshops are cancelled if school or school-related events in town are cancelled that day/evening.

THE CITIZEN FORESTER

Tree Warden of the Year—Rich Parasiliti, Northampton

Sturbridge—The Massachusetts Tree Wardens' and Foresters' Association (MTWFA) has presented its 18th annual Seth H. Swift Tree Warden of the Year award to Richard Parasiliti of the City of Northampton.

MTWFA President Alexander Sherman presented the elegant silver tree award to Mr. Parasiliti at the association's 106th annual conference, held this year at the Sturbridge Host Hotel and Conference Center on January 8-9, 2019.

Richard Parasiliti was recognized for his commitment and dedication to the protection of public trees and for his work with his community to maintain and improve tree growth and health. A long-time employee with the city's Department of Public Works, Rich Parasiliti was appointed tree warden just four years ago in a new "Forestry, Parks and Cemetery Division."

In that short time, Rich has demonstrated exceptional leadership and commitment to the city's urban forest, creating a model tree management program and an effective partnership with citizen volunteers. He manages a full-time tree crew, and he works closely with a vibrant Public Shade Tree Commission to apply for grants, create management plans, draft tree-protection ordinances, and plan ambitious Arbor Day events.

Rich collaborates with over one hundred volunteers from a local non-profit organization, Tree Northampton, to plant trees throughout the city. In 2018, Rich oversaw the planting of three hundred trees and an Arbor Day/Earth Day event that involved distribution of 500 free whips.

Rich has been highly successful working with young people to educate them on the importance of trees in the urban environment. He has taught elementary students how to plant and care for trees. He has encouraged local high school students on projects that include: propagating and planting rare blight-resistant American chestnut tree seedlings; labeling specimen shade trees with QR codes that link to audio recordings about the trees; and supporting student volunteers from Northampton High School's Environmental Club to



Richard Parasiliti, Jr. (Photo by Kristina Bezanson)

plant trees in a visible downtown event.

As a result of all these efforts, in 2018, Northampton received its second Tree City USA Growth Award and celebrated its eleventh year as a Tree City USA.

Trained originally in turf management at the Stockbridge School of UMass Amherst, Rich now focuses his arborist skills and his contagious love of trees on the preservation and growth of Northampton's urban forest. The MTWFA is proud to recognize Richard Parasiliti as its Tree Warden of the Year and will honor Rich again in the spring with an Arbor Day commemorative tree planting in Northampton. Details will be posted on www.masstreewardens.org.

The Massachusetts Tree Wardens' and Foresters' Association is the nation's oldest urban and community tree protection organization, founded in 1913 for the protection and preservation of trees. The position of tree warden is a municipal one, mandated under Massachusetts General Law Chapter 87, with the charge to protect public shade trees within the 351 cities and towns of the Commonwealth.

The Tree Warden of the Year award was created in 2002 to honor the late Seth H. Swift, a longtime tree warden for West Springfield and an active member of the association. For more information about the position of tree warden and about the association, visit www.masstreewardens.org.

Growing on Trees—Join Up!

Massachusetts Tree Wardens' and Foresters' Association

The Massachusetts Tree Wardens' and Foresters' Association was founded in 1913 as a forum for municipal tree managers to share their concerns and to promote the preservation of public shade trees. In 2013, the mission expanded to encompass preservation of the entire urban and community forest. Members include tree wardens, city foresters, utility representatives, commercial arborists and companies, education professionals, and citizen tree advocates. Activities include education, programs, and advocacy to achieve well-trained, professional municipal tree wardens and foresters, allocation of adequate fiscal resources to manage urban and community forests, and partnerships at all levels to work toward healthy trees and a healthy environment.

Events: Annual Conference, Professional Development Series, Mass Qualified Tree Warden program, webcasts. **Find out more:** www.masstreewardens.org

Massachusetts Arborists Association

The Massachusetts Arborists Association (MAA) is a professional trade organization that has been serving the commercial arboriculture industry since the late 1930s. The MAA advances the goals of its tree service professional members through tree care education, research support, arborist certification, and promotion of the value of arboriculture to the public.

In 1957, the MAA initiated a voluntary certification program and established the Massachusetts Certified Arborists Examining Committee. The title "[Massachusetts Certified Arborist](#)," through its comprehensive examination and continuing education requirement, has become the symbol of tree care professionalism in Massachusetts.

Events: Dinner meetings, Safety Saves program, twice-yearly MCA Exam. **Find out more:** www.massarbor.org

New England Chapter ISA

The New England Chapter of the International Society of Arboriculture (NEC-ISA) offers opportunities for professional development through educational workshops, trainings, public service, and events throughout New England. Through these activities, the NEC-ISA helps members enhance their technical proficiencies and stay abreast of technical and scientific developments in the field of arboriculture. The New England Chapter locally administers the ISA Certified Arborist Exam.

Events: Annual Conference, Tree Climbing Competition, ISA Certification, Tree Risk Assessment Qualification, Workshops. **Find out more:** www.newenglandisa.org

Society of Municipal Arborists

Founded in 1964, the SMA is an organization of municipal arborists and urban foresters. Members also include consultants, commercial firms, and citizens who actively practice or support municipal forestry.

A professional affiliate of the International Society of Arboriculture, the SMA has members from across North America and beyond. Through the magazine *City Trees*, SMA conferences, the website and the many active members, the SMA strives to create networking and educational opportunities that promote the sound, professional management of a vital and invaluable resource.

Events: Annual Conference, Municipal Forestry Institute **Find out more:** www.urban-forestry.com

Massachusetts Horticultural Society

Founded in 1829, the Massachusetts Horticultural Society is dedicated to encouraging the science and practice of horticulture and developing the public's enjoyment, appreciation, and understanding of plants and the environment.

Since 2001, the headquarters of the Massachusetts Horticultural Society has been at Elm Bank, in Wellesley and Dover.

Events: A variety of events are held, see the website for details. **Find out more:** <https://masshort.org/>

Ecological Landscape Alliance

Founded in 1991, the Ecological Landscape Alliance (ELA) is a nonprofit, member-based organization made up of professionals, businesses, and pro-active community members who believe in using landscape practices that are environmentally safe and beneficial. Through education, collaboration, and networking, ELA promotes the design, installation, and maintenance of landscapes that are guided by a knowledge of, and respect for, natural ecosystems.

Events: Annual Conference, Workshops, Webcasts, Educational Programs. www.ecolandscaping.org/

Joining an organization (or many!) is a great way to stay connected with the urban forestry community and we are fortunate to have many local, regional, and national forestry organizations to join.

(Continued on page 15)

Growing on Trees—Webcasts and Events

Urban Forestry Today Webcast

February 7, 2019 | 12:00 – 1:00 p.m. (Eastern)
From Seed to Shade: Managing a Municipal Nursery – Alex Sherman, City Forester/Tree Warden, Springfield

To attend live and receive free CEUs, go to: www.joinwebinar.com and enter the ID code: 183-771-419.

Archived webcasts are available at www.urbanforestrytoday.org under 'Videos.'

Free, 1 ISA CEU and 0.5 MCA credit available.

The Urban Forestry Today Webcast Series is sponsored by the University of Massachusetts Department of Environmental Conservation, in cooperation with the USDA Forest Service, Massachusetts Department of Conservation and Recreation, University of Massachusetts Extension, and Massachusetts Tree Wardens' & Foresters' Association.

Urban Forest Connections

Upcoming webinar:
February 13, 2019 | 1:00 p.m. (Eastern)

For current webinar information, go to <https://www.fs.fed.us/research/urban-webinars/>

Cape Cod Landscape Association Education Seminar

February 26, 2019 | Hyannis
Featured speaker: Michael Dirr, *New Trees and Shrubs for Cape Cod Landscapes*

Other topics include: Tree Climbing Gear Inspection, Caterpillars and Borers Attacking Trees, and more!

For more information go to:
www.capecodlandscapes.org

Online Forest Adaptation Planning and Practices Course

New Dates: February 19 - April 2.
Free. Register by February 11.

For more info: <https://www.forestadaptation.org/FAPPOnline>

TREE Fund Webinar

February 5, 2019, 2:00 p.m. (Eastern)
The Salt Dilemma: Growing Better Urban Trees in Northern Climates

James Urban, FASLA (Urban Tree & Soil)
Andrew Millward, PhD (Ryerson University)
Adam Nicklin (PUBLIC WORK)

More information is at www.treefund.org/webinars

Upcoming TREE Fund Webinars:

May 29, 2019

June 11, 2019

August 29, 2019

For more information: www.treefund.org/webinars

UMass Community Tree Conference

March 5, 2019 | UMass-Amherst

Topics include: Choosing Trees for Storm Resistance * Creating Habitat for Birds in Urban Settings * Selecting Trees to Improve Public Health in the City * Climate Change at the Local Level: Trees in the Urban Landscape * Insects and Disease: Strategic Approaches to Managing Threats * and more

Find out more and register at ag.umass.edu.

25th Annual ELA Conference & Eco-Marketplace

March 6-7, 2019 | UMass Amherst

Forests and natural systems are under enormous pressure from the effects of climate change, insect damage, invasive plants, and rapid urbanization. What can you do to protect these systems? Join us to learn more how to restore lost ecological connections, better manage urban land, and create beautiful, highly functioning landscapes!

Find out more at: www.ecolandscaping.org/.

Cape Cod Tree Health Update

February 22, 2019 | Hyannis. | See page 16.

Growing on Trees



Emerald Ash Borer Update

Detections of emerald ash borer as of January 25, 2019. Detections in 2019 include Stockbridge, Wales, Brimfield, and Monson.

EAB Identification and Detection Workshop Series

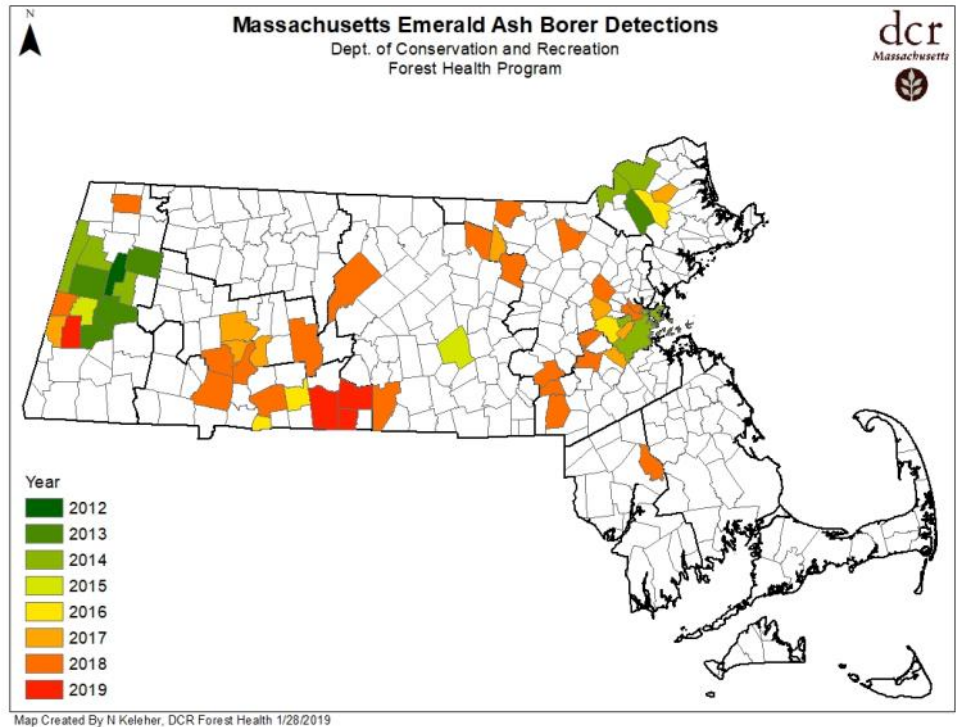
Presented by the DCR Forest Health Program. Free, but registration required.

Tuesday, April 9, 2019

10:00 am–12:00 p.m.
Holliston Town Forest
Adams St, Holliston, MA

Thursday April 11, 2019

10:00 am–12:00 p.m.
Bachelor Brook Resource Area
Rt. 47, South Hadley, MA

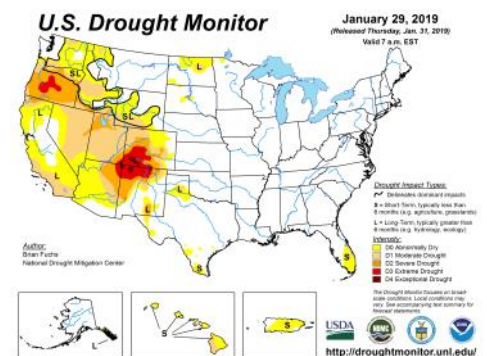


For more information on these workshops and to register, go to: <https://www.mass.gov/service-details/forest-health-program>

Drought Monitor in the News

Listen to this four-minute story on the U.S. Drought Monitor: [There's a Lot at Stake in the Weekly U.S. Drought Map.](#)

As of January 29, 2019, no parts of Massachusetts were classified in a drought status or as abnormally dry, though parts of the western United States continue to experience short and long-term drought conditions.



Tickology



Check out the new series **Tickology**, by the Barnstable County Cape Cod Coop Extension. Larry Dapsis, Entomologist, reviews tick disease education and prevention in 10 exciting, closed-captioned videos. Each video ranges from 6 to 14 minutes in length.

View all ten episodes on YouTube at: <http://bit.ly/tickology>.

Episodes

- | | |
|---|---------------------------------------|
| 1. Tick Identification and Ecology | 5. Skin Repellents |
| 2. Tick-Borne Diseases | 6. Perimeter Yard Spray |
| 3. Lone Star Tick: The New Tick in Town | 7. Pet Protection |
| 4. Permethrin-Treated Clothing | 8. Tick Biteology |
| | 9. Tick Testing |
| | 10. Deer Tick – The Disease Ecosystem |

Growing Greener—in Lynn

By **Michael C. Griffin** This past year, the Lynn Housing Authority and Neighborhood Development (“Lynn Housing”) partnered with the DCR Greening the Gateway Cities Program to make a large tree planting push in a small neighborhood of West Lynn, recently renamed Oak Grove. This area has a lot of paved surfaces and vacant lots without much tree canopy cover, limiting potential planting space for new trees. With grant funds, Lynn Housing was able to contract sidewalk cutting so that DCR could plant trees in areas without canopy. The DCR crew planted over 150 street trees last year in the newly-cut tree pit and also in existing spaces. Each street had a planting theme related to the street name. Oakville Street primarily contained pin oaks and fastigiate oaks, whereas Elmwood Avenue



Oakville Street with new street tree pits. (Photo by Michael C. Griffin)



A row of fastigiate oaks planted on one of the new house lots. (Photo by Michael C. Griffin)

highlighted Dutch elm disease-resistant elm cultivars. Lynn Housing also started acquiring vacant lots, breaking up pavement, and building houses. One lot resulted in four single-family houses where another 20 trees were planted by the DCR planting crew. This partnership has been very successful and will continue in 2019, with more trees planned throughout the neighborhood. To learn more about Greening the Gateway Cities, go to the [DCR website](#).

Michael C. Griffin is an urban forester with the DCR Urban and Community Forestry Program in Lynn.

Gleanings

Massachusetts Climate Change Clearinghouse

The Massachusetts Climate Change Clearinghouse (resilient MA) is a gateway for policymakers, local planners, and the public to identify and access climate data, maps, websites, tools, and documents relevant to climate change adaptation and mitigation across Massachusetts. The goal of the website is to support scientifically sound and cost-effective decision-making and to enable users to plan and prepare for climate change impacts. The vision is a dynamic site where users can find information in multiple ways, including through interactive tools that use data from different sources.

Find out more: <http://resilientma.org/>



THE CITIZEN FORESTER

Join-Up (Continued)

(Continued from page 11)

Massachusetts Nursery and Landscape Association

The Massachusetts Nursery & Landscape Association, Inc. (MNLA) is a statewide nonprofit association dedicated to advancing the interests of green industry professionals. Members are businesses and individuals committed to promoting awareness of environmental horticulture and to upholding the highest standards of the nursery and landscape industry. MNLA is the largest green industry business development vehicle in Massachusetts, providing its members with educational opportunities, industry news, legislative representation, and business development resources. First established in 1910, MNLA has represented the needs of nursery and landscape professionals for more than 100 years.

Events: Annual Conference and Trade Show, Job Fair, Workshops, Plant Something Day, Mass. Certified Horticulturalist Exam. **Find out more:** www.mnla.com/

New England Wildflower Society

Founded in 1900 as the Society for the Protection of Native Plants, New England Wild Flower Society is the nation's oldest plant conservation organization and a recognized leader in native plant conservation, horticulture, and education. The Society's headquarters is at Garden in the Woods, a renowned native plant botanic garden in Framingham, MA. From this base, 25

staff and more than 700 volunteers work throughout New England to monitor and protect rare and endangered plants, collect and preserve seeds to ensure biological diversity, detect and control invasive species, conduct research, and offer a range of educational programs. The Society also operates a native plant nursery at Nasami Farm in western Massachusetts and has seven sanctuaries in Maine, Massachusetts, New Hampshire, and Vermont that are open to the public.

Events: Workshops, Demonstrations, Educational Courses, Certificate in Field Botany or Native Plant Horticulture and Design. **Find out more:** www.newenglandwild.org/

Your Local Arboretum or Botanic Garden

Most offer educational programs and events. By joining, you may be eligible for free or reduced admission to botanic gardens across the region and the United States.

To name a few...

Arnold Arboretum - Boston
Berkshire Botanic Garden - Stockbridge
Garden in the Woods - Framingham
Mount Auburn Cemetery - Cambridge
Polly Hill Arboretum - West Tisbury
Tower Hill Botanic Garden - Boylston

News Headlines in Brief

[Northampton's Rich Parasiliti Wins Tree Warden of the Year](#)

[Tree-Ring Analysis Explains Physiology behind Drought Intolerance](#)

[Houston's Urban Sprawl Increased Rainfall, Flooding during Hurricane Harvey](#)

[Once Considered Outlandish, the Idea That Plants Help Their Relatives Is Taking Root](#)

[Counting the Trees: Canadian Urban Foresters Using Google Street View](#)

[The Vital Role Urban Forests Play In Our Lives](#)

[Free Trees? Many Detroit Residents Say No Thanks](#)

[How a Massive Tree-Planting Campaign Eased Stifling Summer Heat in New York City](#)

[Just How Good Are Trees At Storing Carbon?](#)

On the Horizon

- Feb 5** TREE Fund Webinar, 2:00 pm (Eastern), www.treefund.org/webinars
- Feb 6** ISA Exam, Springfield, www.newengland.isa.org
- Feb 6** Brockton Tree Workshop, 5:30-6:30 p.m., Brockton Main Library, DCR Greening the Gateway Cities
- Feb 7** Spotted Lanternfly Preparedness Conference, UMass Extension, Milford, www.umassgreeninfo.org
- Feb 7** Urban Forestry Today Webcast, 12:00 p.m. (Eastern), www.joinwebinar.com
- Feb 7** Pittsfield Tree Workshop, 5:30 – 7:00 p.m., Hotel on North, DCR Greening the Gateway Cities
- Feb 22** Tree Health Update Workshop, Hyannis, Cape Cod Co-Op Extension, www.capecodextension.org
- Feb 24- Mar 1** Municipal Forestry Institute, Society of Municipal Arborists, Silverton, OR, www.urban-forestry.com
- Feb 19- April 2** Forest Adaptation Online Course, USDA, register by 2/11, www.forestadaptation.org/FAPPonline
- Feb 26** Cape Cod Landscape Association Education Seminar and Trade Show, Hyannis, www.capecodlandscapes.org
- Mar 2** MACC Annual Conference, Worcester, www.maccweb.org
- Mar 2** ISA Exam, Wellesley, www.newenglandisa.org
- Mar 5** UMass Community Tree Conference, www.umassgreeninfo.org
- Mar 12** Western Mass. Tree Wardens Dinner Meeting, Northampton, www.masstreewardens.org
- Mar 23** MassLand Conservation Conference, Worcester, <http://massland.org/conference>
- Mar 26** ISA Exam, Pittsfield, www.newenglandisa.org
- Mar 29** Wood Chipper Operation and Safety, BayState Roads, Douglas, www.umasstransportationcenter.org/umtc/Baystate_Roads
- April 9** EAB Identification and Detection Workshop, DCR Forest Health, Holliston, www.mass.gov/service-details/forest-health-program
- April 11** EAB Identification and Detection Workshop, DCR Forest Health, South Hadley, www.mass.gov/service-details/forest-health-program
- April 13** ISA Exam, Amherst, www.newenglandisa.org
- April 26** Arbor Day in Massachusetts
- Apr 27** Park Serve Day, www.mass.gov/dcr
- Oct 25-26** DCR Tree Steward Training, Petersham

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Charles D. Baker, Governor

Karyn E. Polito, Lieutenant Governor

Matthew A. Beaton, Secretary, Executive Office of Energy and Environmental Affairs

Leo Roy, Commissioner, Department of Conservation and Recreation

Peter Church, Director of Forest Stewardship, Department of Conservation and Recreation

If you have a topic you'd like to see covered or want to submit an item to *The Citizen Forester* (article, photo, event listing, etc.), contact [Mollie Freilicher](#) or click [here](#).

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