6

DRIVERS OF STREET TREE SPECIES SELECTION

The case of London planetrees in Philadelphia

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The London planetree (or London plane in the UK: *Platanus* × *hispanica*) is one of the most common street trees in the world. Planetrees currently comprise nearly one-third of the street trees in Paris,[1] and over one-tenth in New York City.[2] London planetrees are also ubiquitous in many other cities.[3] Today, the planetree is referred to as the 'big shade tree of boulevards around the world,'[4] and it has long had a reputation as tolerant of air pollution. For instance, John Claudius Loudon suggested that planes 'bear the smoke of the city.'[5] But street tree species selection is based on more than environmental suitability; it is also rooted in the legacies of past decision-making and the interactions between social and biophysical considerations.[6] Scholars writing about urban trees in the USA have investigated the cultural and political symbolism of American elms (*Ulmus americana*) in New England,[7] and palms (family *Arecaceae*) in California,[8] but the historical popularity of the London planetree has received far less attention. Although the international popularity of the London planetree has been attributed to British colonialism,[9] the English origins of landscape gardens,[10] and Italian precedent,[11] these explanations are superficial and miss central elements of the London planetree's story.

Focusing on Philadelphia – one of the oldest cities in the USA – we illuminate intersecting drivers that have shaped street tree composition and led to the dominance of the London planetree in this city: species misidentification, international diffusion of cultural and political symbolism, horticultural priorities in species selection and the role of real estate developers. The London planetree is one of the most common trees along Philadelphia's streets today, constituting almost one-tenth of the total street tree population.[12] London planetrees once dominated street tree planting: from 1934–1941, 32.1% of 16,661 planted trees were planetrees, the highest proportion of any species.[13] Philadelphia is a fascinating place to trace the historical rise and eventual decline of the planetree's popularity. This city has been called the 'cradle of American horticulture'[14] due to its preponderance of early botanists and horticulturalists.[15] Philadelphia's tree professionals had connections throughout America and Europe, making opinions about tree species selection in the city inexorably tied to national and international trends.[16]

Street tree planting in American cities blossomed in the mid-to-late nineteenth century, as part of broader civic beautification movements that responded to swelling human populations, industrialisation, pollution, and public health concerns.[17] By the early twentieth century, American cities were transformed into 'an immense arboreal landscape,'[18] and street trees were increasingly considered a municipal responsibility.[19] Philadelphia's street trees were placed under

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local jurisdiction in 1911, specifically, the Fairmount Park Commission (FPC).[20] This commission also created Philadelphia's immense park system, and along with the City Parks Association (CPA), operated as de facto city planners in the late nineteenth and early twentieth centuries.[21] But the FPC was chronically under-funded, a situation partially offset by non-governmental organisations like the CPA.[22] Street tree management in Philadelphia has long reflected the co-produced influence of a multi-stakeholder governance system typical of urban forestry in the USA.[23] Street tree species selection resides at the nexus of many actors: municipal arborists, nonprofit urban greening professionals, nursery operators, landscape architects, researchers and developers. While previous scholars have sometimes simplified street tree planting in American cities as the purview of municipal staff, planting choices are shaped and controlled by a range of public and private actors.[24]

As street tree planting in the USA flourished in the early twentieth century, monocultures were common, with single species routinely used for entire neighbourhoods, although this practice has since become disfavoured due to pest and disease vulnerability.[25] Another once-ubiquitous monoculture species, the American elm, was ravaged by Dutch elm disease (*Ophiostoma* spp.; DED), with cities such as New Haven and Milwaukee losing most of their street tree canopy in the 1950s-60s.[26] In Philadelphia, planetrees were historically more popular than American elms, but both were under siege in the mid-twentieth century. Another fungal disease, canker stain (*Ceratocystis platani*), is endemic to North America and was first discovered in the Philadelphia suburbs in the 1930s.[27] Canker stain caused the deaths of thousands of London planetrees in Philadelphia during the 1970s, although many survived. American elms were essentially decimated in many American cities, while the London planetree endured. In this chapter, we detail the rise and fall of the planetree's popularity in Philadelphia, while connecting species choices in this city to broader discourses among tree professionals, and the underlying cultural, political, economic and horticultural drivers of species selection.

Species confusion

The London planetree is a hybrid between the oriental plane (*Platanus orientalis*), native to Eurasia, and the American sycamore (or western plane in the UK: *P. occidentalis*), native to eastern North America.[28] The currently accepted name for the hybrid is *P.* × *hispanica,*[29] although *P.* × *acerifolia* is still widely used. Until the mid-twentieth century, the hybrid London planetree was often mistakenly referred to as the oriental plane – which is relevant to our story because of the cultural and political symbolism of the oriental plane.

Throughout this chapter, we use 'London planetree' or 'planetree' when the cited text itself specifically refers to the hybrid. Many older texts referred to the genus *Platanus* more broadly, or *P. orientalis* specifically, with the generic moniker of 'plane'. We follow the names used in the sources cited, and we note that 'London planetree' is the current typical common name in the USA. It is not clear where and when the name 'London planetree' originated, although the common name 'London plane-tree' was used in England in the late nineteenth century.[30] But when planetrees were at their height of popularity in Philadelphia in the early twentieth century, nursery operators, city staff and tree planting advocates spoke of the oriental plane.

Appreciation for planes among tree scholars goes back to the influential early forestry book *Sylva* by John Evelyn, first published in 1664. The entry on planes exalted the ancient history of this tree in Greece, Rome and Persia, and suggested that planes 'might be propagated to the incredible Ornament of the Walks and Avenues to Great-mens Houses.'[31] An emphasis on the cultural importance of planes to human civilisation was repeated in Thomas Nuttall's 1842 update to François André Michaux's *North American Sylva*. Nuttall's entry on the oriental plane

begins with, 'The Oriental Plane (*Platanus Orientalis* [*sic*]) deserves to be planted in the United States as an ornamental tree'.[32] Nuttall, an Englishman, was well-connected to Philadelphia's botany scene[33], and his praise for oriental planes as street trees would likely have resonated with the city's tree professionals. In a preview of the London planetree's enduring reputation, Nuttall praised the oriental plane's large size, fast growth, longevity and lack of insect problems.

Emulating Paris and London

Tree planting advocates and landscape architects in early twentieth century Philadelphia looked to Paris for inspiration. Philadelphia's Benjamin Franklin Parkway, designed by Frenchmen Paul Cret and Jacques Gréber, was modelled on Parisian boulevards, especially the Champs-Élysées.[34] Philadelphia's park advocates at the CPA felt that opening the Parkway in 1916 would bring Philadelphia, which had been eclipsed economically and politically by other American cities, into the pantheon of great world cities[35]. Making Philadelphia 'a world-class city on par with New York and Paris' was a priority for city politicians of the period,[36] and creating a grand tree-lined boulevard was seen as an important step toward this goal. The Parkway is also emblematic of the contemporaneous City Beautiful movement and is home to many museums, including the Rodin Museum (Figure 6.1), also designed by Cret and Gréber. Cret also redesigned nearby Rittenhouse Square in 1913 – a park in a wealthy area of downtown Philadelphia, not far from the Parkway (Figure 6.2).[37] These landscapes were meant to evoke the aesthetic appeal of Paris, which included the plane. Furthermore, CPA annual reports in 1904, 1912 and 1918 praised street tree maintenance in Paris and bemoaned the lack of appropriate tree budget in Philadelphia.[38] Paris' reportedly well-funded street tree system was explained

FIGURE 6.1 London planetrees along the Benjamin Franklin Parkway by the Rodin Museum, Philadelphia, are emblematic of the City Beautiful movement. *Source*: I. Zapata, 2018.

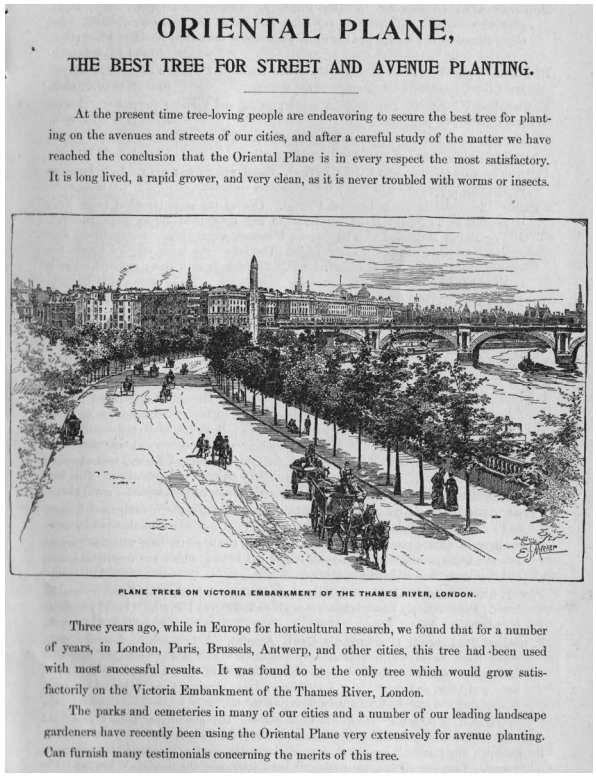
FIGURE 6.2 London planetrees in Rittenhouse Square, Philadelphia, were meant to evoke the aesthetic appeal of Paris. *Source*: Lara A. Roman, 2019.

as sound fiscal policy, providing returns on investment with respect to tourism. Although the CPA and FPC reports occasionally mentioned other international cities, Paris was the model to which these reports repeatedly returned. When Philadelphia's park leaders sought to elevate the status of their city – to usher in the twentieth century with a new boulevard, reinvigorated squares, and extensive street tree planting – it was entirely fitting that they would look to Paris, the same place that inspired urban design in the American capital, Washington DC.[39]

Although we have focused on Paris, any discussion of London's eponymous tree must also address London itself. The popularity of planes in London was indeed mentioned in America in the late nineteenth and early twentieth century, but we must emphasise again that the name 'London planetree' was not yet broadly used. For example, 1890s catalogues from Andorra Nurseries in Philadelphia included an illustration of so-called oriental planes along the Thames Embankment in London (Figure 6.3).[40] The planting of planetrees in Philadelphia thus emulated trends in both Paris and London through the influence of nurseries, English botanists, French landscape architects and local park advocates.

Horticultural priorities in species selection

There are numerous considerations when selecting street tree species, and tree professionals had (and continue to have) varying opinions on this topic.[41] In 1903, William F. Fox, Superintendent of State Forests in New York, listed American elms first on his list of most desirable



ORIENTAL PLANE,

THE BEST TREE FOR STREET AND AVENUE PLANTING.

At the present time tree-loving people are endeavoring to secure the best tree for planting on the avenues and streets of our cities, and after a careful study of the matter we have reached the conclusion that the Oriental Plane is in every respect the most satisfactory. It is long lived, a rapid grower, and very clean, as it is never troubled with worms or insects.

PLANE TREES ON VICTORIA EMBANKMENT OF THE THAMES RIVER, LONDON.

Three years ago, while in Europe for horticultural research, we found that for a number of years, in London, Paris, Brussels, Antwerp, and other cities, this tree had been used with most successful results. It was found to be the only tree which would grow satisfactorily on the Victoria Embankment of the Thames River, London.

The parks and cemeteries in many of our cities and a number of our leading landscape gardeners have recently been using the Oriental Plane very extensively for avenue planting. Can furnish many testimonials concerning the merits of this tree.

FIGURE 6.3 An advertisement from 1895 for oriental planes by the Andorra Nurseries, Philadelphia, which claimed to have introduced this tree to the USA, included an illustration of the planes along the Thames Embankment, London. *Source*: Biodiversity Heritage Library.

street trees, on account of their rapid growth, size, beauty and suitability to roadside conditions. The oriental plane was much further down his list.[42] Other northeastern and midwestern American cities planted elm monocultures.[43] This makes Philadelphia's commitment to planes noteworthy: while 32.1% of street trees planted 1934–1941 were listed as oriental planes, only 2.2% were American elms. Cultural and political symbolism clearly contributed to the oriental plane's dominance in Philadelphia (which we now know to be the London planetree), but there were also ecological and budgetary factors. Here, we discuss horticultural priorities in species selection, including tolerance of stressful urban conditions, susceptibility to pests and diseases, planting and maintenance costs, growth rates, and climate suitability.

In the early twentieth century, urban air pollution from industry was a challenge for both human health and tree health. Indeed, public health concerns in polluted, overcrowded cities were a major driver of the American urban parks movement of the nineteenth century.[44] City trees were thought to 'purify the air,'[45] but ironically, they also needed to withstand 'smoke' – a trait attributed to the oriental plane. The American elm had a similar reputation,[46] but the plane seemed even more renowned for its tolerance of stressful urban conditions. In 1922, an urban forester in New Jersey, William Solotaroff, stressed that,

> In cities suffering from the smoke nuisance it is very difficult to grow many of the ordinary street-trees. The European and American planes will stand adverse conditions better than any of the other good street-trees.[47]

Tolerance of air pollution was crucial in Philadelphia, whose exploding manufacturing sector in the late nineteenth and early twentieth centuries produced a 'smog of steam and smoke.'[48]

Another important factor in species selection is susceptibility to pests and diseases, which can decrease tree health and incur management costs. The oriental plane was touted as having few pest concerns in horticultural texts and nursery catalogues[49], and by Oglesby Paul, FPC landscape gardener in the early twentieth century.[50] This was a critical management consideration, given that Paul also reported that Philadelphia's park budget was small in comparison to New York City. Meanwhile, the American elm, so popular in other American cities, was depicted as having more intensive maintenance demands, including the need for elm leaf beetle and tussock moth treatments,[51] which were concerns decades before DED. Indeed, some early-twentieth century tree experts urged caution in planting elms on account of their insect problems.[52] We surmise that Philadelphia's municipal foresters were willing to plant elms as street trees, but not too many, because of their concerns about pests and lack of capacity for expensive maintenance. Budgetary considerations also extend to purchasing costs, and oriental planes and American elms were among the least expensive species at local nurseries.[53] The plane was thus a sensible choice in light of limited budgets for both planting and maintenance.

The plane's popularity in Philadelphia continued with another influential tree professional, Samuel Newman Baxter, who became the head Arboriculturalist and Landscape Gardener with the FPC in the 1930s and 1940s. Baxter wrote that 'There is perhaps no street tree that more readily accommodates itself to adverse conditions than the Oriental Plane (*sic*).'[54] He articulated key criteria for species choices as fast growth and low costs. He then listed the oriental plane as one such tree and went on to warn against planting American elms due to their susceptibility to pests. Baxter's remarks help to explain the high proportion of planes planted in the 1930s when he oversaw the city's street trees. Furthermore, Baxter's comments also align with the broader urban tree discourse in the early twentieth century. Fast growth and large stature were important in an era when *shade tree* was nearly synonymous with *street tree*, and roadside plantings were expected to provide thermal comfort prior to the widespread use of air conditioning.[55] This language endures today with Shade Tree Commissions – advisory boards that support urban forest management – which exist throughout Pennsylvania and New Jersey.

Climate suitability was another consideration in species selection. In 1922, Charles Lathrop Pack, President of the American Tree Association, praised the London planetree and noted the tree's stately appearance, rapid growth, and lack of serious pests. But he cautioned that this tree is 'subject to… frost crack and winter killing' in New England.[56] Elms, on the other hand, were recommended as better suited to New England, where colder winters might better control insect populations. For example, the 1892 catalogue of Morris Nurseries (in a Philadelphia suburb) stated that elms 'Are not recommendable for Pennsylvania… They thrive well in Northern States.'[57] Nurseries in the Philadelphia area therefore seemed well-aware of species-specific climate concerns. Another oft-discussed downside of the plane was its reputation for aggravating people's allergies – called the 'plane tree cough' – due to small hairs on the leaves.[58]

Despite these concerns, in the early twentieth century, tree professionals from Massachusetts to California called the oriental plane the 'ideal street tree.'[59] Andorra Nurseries claimed to have introduced the oriental plane to the USA[60] – a dubious claim, but one which points to the nursery operator's marketing strategy to sell this popular tree. Solotaroff summarised the plane's glowing reputation:

> The oriental plane combines, to a greater degree than any other tree, the characteristics of rapid growth with everything that is desirable in shade-trees… All points considered, the oriental plane makes such an admirable street-tree that there is a temptation to plant it to the exclusion of other trees.[61]

The role of real estate developers

Real estate developers played a critical, yet underappreciated, role in species selection. Nursery advertisements in the early twentieth century stressed that the oriental plane's fast growth and attractive form enhanced streetscape aesthetics and thereby increased property values (Figure 6.4).[62] Similar messaging circulated in real estate publications.[63] For instance, in 1927 an Ohio arborist wrote in a real estate journal about the many social, environmental, and economic benefits of trees planted near homes, stressing that a return on investment was assured, and offering the oriental plane as a preferred species because it was a hardy tree without insect problems.[64]

Many city blocks in Philadelphia today have rows of large, old London planetrees that appear to have been planted around the same time that houses were built. One example is a block of twin houses on Glenview Street in Northeast Philadelphia currently lined with planetrees (Figure 6.5), constructed in the 1930s. A young street tree is discernible in a newspaper photo of this development shortly after construction.[65] Advertisements stressed that these homes were on 'exceptionally large lots' by Philadelphia norms[66] – distinguishing twin houses with yards from the older, narrow Philadelphia rowhouses that lacked yard space. A resale of a home on Glenview Street in 1954 stated, 'Beautiful tree-lined street.'[67] The London planetree, associated with a cosmopolitan aesthetic and Parisian sophistication in downtown Philadelphia, was becoming commonplace in the city's expanding quasi-suburban neighbourhoods.[68]

Other American cities parallel this experience, echoing the pastoral ideas commonplace in the planning and design of American urban landscapes. There was a uniquely American aspiration for a 'pastoral city' – rooted in veneration of rural life and a certain antipathy to urbanism – which drove large-scale street tree planting around the turn of the twentieth century.[69]

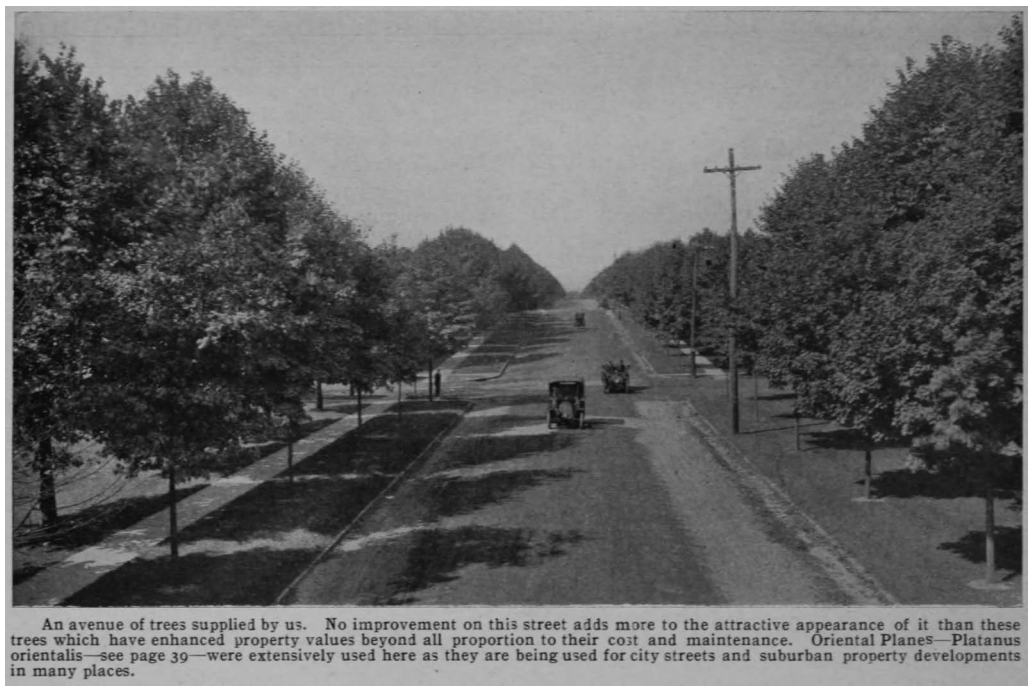


FIGURE 6.4 Glenwood Nurseries, Philadelphia; advertisement from 1912 for oriental planes stressed that their fast growth and attractive form enhanced streetscape aesthetics and thereby increased property values. *Source*: Biodiversity Heritage Library.

FIGURE 6.5 In the 1930s the London planetree, associated with a cosmopolitan aesthetic and Parisian sophistication in downtown Philadelphia, was becoming commonplace in the city's expanding quasi-suburban neighbourhoods. *Source*: Lara A. Roman, 2020. The 800 block of Glenview Street, lower Northeast Philadelphia, planted c.1933.

In Chicago, real estate businessmen utilised street trees to delineate the shape of new residential neighbourhoods, as part of the 'commodification of improved residential landscapes' that became an antithesis to, and physical separation from, the denser inner-city areas.[70] A 1917 article by a nurseryman about street tree planting in New York City also emphasised the central role of developers: 'the most active workers are proving to be the real estate operators of the city – they realise the practical, which to them means financial, benefits of shade trees.'[71]

This brings us back to the FPC planting records, and the question of who, ultimately, planted the plane. From 1934–1941, 75.8% of the so-called oriental planes planted were 'planted by owners with permit.'[72] We surmise that many of these owners were, in fact, housing developers, as this timing aligns with the construction of new neighbourhoods, including streets lined with shade trees. The FPC planted relatively few street trees with its own funding during this time frame, as the street tree management budget crashed during the Great Depression. In 1931 Baxter observed:

> Philadelphia is believed to be the world's ranking centre in the beautification of real estate with shade trees… this city's total for shade trees exceeds those of such famed cities as Washington and Paris… Mr. Baxter pointed out that all trees are planted or removed at the expense of the owner, the Park Commission merely caring for their maintenance and

> issuing permits specifying the kind of tree in order to attain a uniform effect and economy of maintenance. Only one type is permitted per block. This feature is one of the advantages of municipal control of the tree situation…[73]

Here we see a yearning for Philadelphia to be considered the peer of other major cities, as well as a requirement for monocultures along each block, in alignment with street tree management approaches of the time.[74] The passage continued with a complaint about inappropriate street tree spacing in new developments, with builders 'at fault' – suggesting that developers could be broadly bound in planting decisions by FPC oversight, but not completely controlled, as the builders themselves were carrying out purchasing and planting. Crucially, this 1931 article also remarked that 'The Oriental Plane is the dominant type here,' aligning with Baxter's earlier remarks on the suitability of the plane to Philadelphia.

The evidence thus indicates that Philadelphia's street trees on residential blocks were largely planted by developers seeking a return on investment. The decision regarding what to plant in new neighbourhoods lay at the intersection of builders and municipal foresters, and was reinforced by marketing from nurseries and input from other tree professionals. Only in 1967 was an ordinance passed *requiring* street tree planting in new housing developments.[75] In contrast, the widespread planting of street trees by developers earlier in the twentieth century was *permitted* but not strictly *required* by municipal policies.

Declining popularity

The once-dominant planetree declined in popularity by the 1950s. FPC planting records from 1949–1959 show that of 16,951 trees planted, only 0.9% were London planetrees. What explains this reduction from a few decades prior? First came canker stain, and second, a shift in species preferences.

Baxter noted the emergence of a new 'plane tree blight' in 1939[76] – the canker stain. By 1946, the FPC reported that approximately 7,500 London planetrees in the city's sidewalks had succumbed.[77] In 1962, Robert McConnell, the arborist in charge of street trees at the FPC, reported that the disease was 'far from under control.'[78] Furthermore, that same year, McConnell declared his disapproval of planetree plantings.[79] Sterilising pruning tools prevented transmission from tree to tree[80] – a technique still employed today[81] – but the FPC struggled to manage the disease and removed many thousands of trees. The combination of canker stain and DED (which arrived in Philadelphia in 1946) led the FPC in 1972 to refer to these tree diseases as epidemics.[82]

While American elms on Philadelphia's streets were essentially eliminated by DED, many London planetrees did not die during the epidemics of the 1940s-1970s. Sterilisation of pruning tools seems to have helped curtain the wholesale destruction of planetrees. Alternatively, perhaps the American sycamore, parent species of the hybrid London planetree, has some natural tolerance because the disease is native to the USA. Some surviving planetrees infected with canker stain, unhealthy but not dead, may have endured simply from lack of funds for removal.[83] The FPC's funding situation became dire in the late twentieth century, as Philadelphia's post-industrial challenges included closed manufacturing plants, depopulation, poverty and reduced tax revenue.[84] The FPC lost 66% of its personnel between 1970 and 2000.[85]

With those personnel losses, the FPC's capacity to plant and maintain street trees was substantially diminished. To help fill this gap, the non-profit Pennsylvania Horticultural Society

launched Tree Tenders in 1993 as a community-based tree education, planting, and stewardship program.[86] This program remains active today, and it plants free street trees at residents' request, with species for each planting location selected by municipal arborists.[87] From 2003–2015, out of 15,321 trees planted, 2.4% were London planetrees. In contrast, small-statured tree species constituted 51.5%.[88] This shift from large-stature species in the early twentieth century to small-stature species today can be attributed to the emphasis in modern professional arboriculture on planting the 'right tree' in the 'right place':[89] a set of best practices to match species to suitable planting locations, such as avoiding planting large-stature species beneath overhead wires and in small sidewalk pits – two conditions common in Philadelphia's streetscapes. Managing conflicts between trees and built infrastructure have become a major focus of professional arborists, who often have to prune or remove large, old trees in locations where such species would no longer be deemed appropriate. Furthermore, since the 1970s, urban forest managers have prioritised diversity in their planting palettes due to the history of devastating tree losses from pests and diseases in monocultures.[90] Whereas Philadelphia's streets were once planted with monocultures of tall shade trees, today's plantings are an array of species, often weighted towards small ornamental species.

Conclusion

Several themes emerge from the history of the London planetree in Philadelphia. The ascendance of this large shade tree as a commonplace element of the city's streets in the early twentieth century was driven by a combination of cultural, political, economic and ecological factors. Seeking to elevate the city's cosmopolitan stature, Philadelphia leaders looked to European precedent, and the ubiquity of so-called oriental planes in Paris and London offered a readily perceptible aesthetic norm.

Horticultural and budgetary factors also explain why the London planetree – and not the American elm – dominated Philadelphia's streetscapes. Horticulturalists identified species that could tolerate the severe conditions (especially air pollution) of industrialised urban landscapes. Philadelphia's tree professionals were also wary of the maintenance costs of the elm, whereas the planetree was touted as pest-free. The fast-growing, inexpensive planetree was also a favorite of local nurseries and real estate developers. The alignment of supply (from nurseries) and demand (from developers and municipal arborists) enabled the adoption of planetrees as the most commonly planted tree in early twentieth century Philadelphia.

Mature London planetrees remain a characteristic feature of Philadelphia's streetscapes, but planetree popularity has waned over the decades. This transition began with concerns for canker stain and continued as species preferences shifted. Today, arborists and other urban tree professionals seek to diversify species palettes and often plant smaller, ornamental trees which are less likely to conflict with built infrastructure.[91] In effect, monocultures of large shade trees lining Philadelphia's streets are an artifact of a bygone era.

The aforementioned changes in planting priorities and norms illustrate the intersecting legacy effects of past cultural, political, economic, and ecological factors in urban tree systems.[92] Our portrait of the London planetree in Philadelphia demonstrates the influence of tree professionals as well as the under-appreciated role of real estate developers, and we suggest that similar drivers and actors have likely shaped street tree composition elsewhere. On that note, we encourage scholars to explore how place-based legacies have structured urban forest systems and may continue to inform urban greening practice in culturally and ecologically diverse cities.

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