URBAN ISLANDS
Trees and Shrubs for the Inner City
This urban island in Newport, Rhode Island, includes *Ginkgo biloba* and a species of *Juniperus*. Photograph by Gary Koller.
Urban Islands: Who Will Maintain Them?
Charlotte Kahn

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Books
Camels can live in zoos; dolphins can live in aquariums; human beings can walk on the moon; trees can live in urban islands. What is at issue is not technical feasibility but extraordinary care. The question is this: in an era of diminishing will on the part of taxpayers to pay for improvements to the public sector, can we justify creating high-maintenance streetscapes that have more in common with exhibits in a zoo than with natural and self-sustaining ecosystems? And if so, how?

On a clear summer day in June 1984, Robert McCoy, parks commissioner for the city of Boston, and William Geary, head of the state’s Metropolitan District Commission, met to celebrate the opening of the newly renovated Franklin Park Zoo. Standing together during the ceremonies, they noted with pleasure a distant view of yews being installed by a contractor in the median strip of Blue Hill Avenue. Their pleasure turned to chagrin when they realized that no funds had been appropriated to either agency to maintain the new median strip, nor had either of them been informed of the installation.

The improvements to the median strip were themselves the culmination of years of community pressure to refurbish a once flourishing commercial district: the plantings were meant to symbolize the city’s commitment to sustained economic development and a brighter future for the neighborhood. Without an appropriation to one of the two agencies in question, or an organized effort to transfer stewardship responsibility to neighborhood residents or businesses, the two parks commissioners feared that the federally funded project would become instead another testament to the unmet needs of the community.

Like hundreds of trees and shrubs before them, these plants were being placed in their “urban island” habitats with a final squirt of water and perhaps a prayer. Few city and state tree-planting contracts specify the first (and most important) year’s maintenance program, although most contracts guarantee replacement in six months or a year in the case of death. The plants struggle through their first year, their sparse green leaves barely acknowledging life, only to fail or become overgrown by weeds thereafter, beyond the reach of contract commitments.

Statistically, the life of a large plant in a small hole — whether planter or pit — is relatively short. The average life expectancy for a shade tree planted in a small urban island is but a fraction of its potential life span. Ac-
cording to Professor Clifford Chater of the University of Massachusetts’ Shade Tree Laboratory in Waltham, such trees may live in their islands for “twenty years at most, and it may be down to ten on a practical basis.”

Despite his own finding that 87 percent of the trees planted in Boston under contract within the past five years are alive, Professor Chater is not sanguine about the future prospects of these island inhabitants: “Don’t expect them to grow normally. What you’ve got is essentially potted plants. Their roots are restricted, and roots can’t grow without air. They’re going to grow slower and die sooner. The roots of potted trees freeze earlier and harder, whereas those of most other trees in the Northeast keep growing until December. They struggle along but they don’t look like much.”

The huge old maples and oaks that we see in our mind’s eye as we watch new street trees being installed were all likelihood planted before cars or electricity were invented and before streets and sidewalks were paved with impermeable materials. Long past the early vulnerable years, their roots by now have had time to locate nourishment scores of feet from their stout trunks, to find pockets of water and air to sustain them. Plantings in urban islands, on the other hand, require extra attention: more design, more construction, more water, more care in watering, and more pruning because of winter dieback or vandalism. A tree or shrub whose roots cannot self-reliantly search for nutrients and water in a park, yard, expansive tree lawn, or generous 2 × 4 m tree pit is dependent for its survival on people.

The source of the problem is not a lack of technical know-how. Studies of plants in the urban environment usually contain charts detailing various tolerances and intolerances of plant species to a grim list of urban environmental woes: salt from streets and sidewalks, air pollution, compacted soil, constrained roots, night lighting, drought, and flooding. Urban islands of the usual sort subject their inhabitants to most of these. No tree (except the ubiquitous ailanthus, which literally seems to have found its ecological niche in a crack in the pavement) is adapted to all of the adverse conditions of most American cities. Plants in artificial environments require artificial life-support systems.

The people nominally responsible for their care in all likelihood work for a public agency — usually a parks department already staggering under budget cuts in the wake of recent taxpayers’ revolts and cuts in federal funds. It cannot realistically be expected to provide the care required.

A newly transplanted tree requires about 40 liters of water per week during the growing season, preferably for two years. Alternatively, it needs a thorough soaking eight to ten times annually while in active growth. Even in a very wet year, nature will not provide enough water at regular intervals for a transplanted tree to thrive.

No matter how well planted or mulched, plants in urban islands will eventually be sharing their space with vigorous weeds. No matter how well loved by their human neighbors, they will occasionally require an expert’s attention to prune a broken limb, examine a trunk for signs of insect infestation, or repair damage from a collision with a bicycle, tricycle, or truck.

Isolated trees and shrubs in urban islands, unlike those in parks or groves, often bear the marks of human aggression, frustration, or need. Plants already showing signs of
stress are often the first victims of vandalsim. On the other hand, plantings that are well-maintained often escape injury, even in the most heavily trafficked parts of a town or city.

A good example of these extremes can be found on the Boston Common at Tremont Street. There rows of flowers in rectangular brick planters at sitting level grow in undisturbed splendor day after day as pedestrians pass by or rest at their edge. Next to them, single trees in well-maintained, well-mulched round planters provide a neat visual counterbalance. Several of the trees in the round planters, however, are less vigorous and not so well maintained, for some reason, as the others. Weeds have come up through the mulch and several branches have died. These are the planters that attract bottles, trash, and sometimes sleeping persons. And why not? While the flower planters are clearly someone's pride and joy, the weedy tree planters just as clearly are not. It is unusual to see violence perpetrated on a space that succeeds in being a cheerful, thoughtful, well-maintained amenity for the people of a city. In this sense maintenance is not merely necessary to satisfy the horticultural requirements of urban island plantings but is essential in order to protect them from attack.

As a background to the question of maintenance, let us observe two recent trends: first, the environmental movement, which gained prominence on Earth Day 1970. As Richard Nixon's fledgling administration responded by setting up the Environmental Protection Agency, it also began to dismantle Lyndon Johnson's armaments for the war on poverty. Social programs, such as that created by the Comprehensive Employment and Training Act (CETA) (which for years enabled the Boston Parks and Recreation Department to hire provisional maintenance workers), were cut back. In Boston the number of parks department employees, including CETA and other workers not in the civil service, has decreased from a high of 2,042 in 1977 to about 350 today. The budget is dwindling, down to $7 million from $9.3 million in 1980 (when then Parks Commissioner Alan Austin characterized his budget as "grossly underfunded"). Despite the cuts in the parks department's funds, the number of urban islands in its care is rising. By the early 1980s auxiliary maintenance crews were gone. "Bricks and mortar" capital-improvement programs, on the other hand, were increasingly viewed as permanent investments in the urban fabric and continued to receive support. Although federal capital-improvement funds continued to flow, maintenance funds did not.

The environmental movement had set up expectations for human habitations: lace curtains came down; potted ferns and spider plants went up. A new generation of city dwellers began to expect plantings at the intersection of downtown streets. Landscape architects, urban designers, and federal administrators were only too glad to oblige. Urban islands were seen as a permissible green frill on the bricks-and-mortar investment: they made the brutalist architecture look better; people liked them; and they were relatively inexpensive. Maintenance funds, however, were out of the question. That was a job for local government.

Unfortunately for local government, a second societal trend paralyzed its ability to handle its new high-maintenance greenery. By the 1980s, taxpayers were enacting laws with names like Proposition 13 and Proposi-
tion 2½, designed to limit the power of state and local governments to raise revenues. Many middle-class families with children had moved to the suburbs, and older urbanites were experiencing the effects of mounting inflation. Faced with diminishing tax bases and a taxpayers’ revolt, cities began to cut back, and parks departments’ budgets (almost always among the first to go) were slashed.

After the passage of Proposition 2½ in Massachusetts, the Boston Parks and Recreation Department budget was cut 60 percent. In a report published by the Massachusetts Recreation and Parks Association, Boston was cited as “getting out of the recreation aspect and concentrating just on maintenance of physical facilities.” The report went on to declare that “bathhouses and pools will be closed. No more water in park fountains or in the Public Garden pond. No more Christmas lights. Close all gymnasiums. Cut off all lighting of athletic fields. Closing of all city golf courses at Franklin Field and Hyde Park. Soccer, baseball, basketball, and other leagues sponsored by the Department will now have to find own coaches, referees, and equipment.” Funds to maintain urban islands slid to the bottom of and finally off the charts. In Boston, they had never really been on the charts in the first place.

In 1979, for instance, at a time when urban islands were already looking perilously more like graves than groves, Mayor Kevin White, in a preelection city-improvement project, spent between $300,000 and $400,000 on cement planters for downtown streets. He had them filled with cherry, linden, and honey-locust trees. Nine months after the election, most were

An urban-island planting maintained by adjacent businesses.
in decline for lack of maintenance.

According to Michael Conners, chief horticulturist for the Boston Department of Parks and Recreation, all plants in the city 20 or 30 years ago were installed by or in careful coordination with the parks department. The locations of new plantings were based on a list of priority areas derived from requests from residents, and the parks department knew where the new plantings were. In Boston today, after almost a quarter century of one new initiative after another — urban renewal projects undertaken in the 1960s and early 1970s, Federal Highway Administration street improvements in the 1970s and 1980s, neighborhood revitalization with Federal Community Development Block Grant funds in the 1980s — the parks department has already given up trying to keep pace with new plans and plantings. Proposition 2½ was simply the last hole in an already leaking vessel.

Nevertheless, Boston’s Department of Parks and Recreation is held responsible for almost half of the publicly owned green space in the city, the newer parts of which tend to be high-maintenance playgrounds, islands, and plantings of street trees. According to a recent Boston Globe article, the total area is 2,500 acres, including 50 parks, 90 playgrounds (with 168 ballfields), two golf courses, 82 squares and malls, 16 historic cemeteries, three active cemeteries, 125,000 trees, seven recreation centers, and two indoor and two outdoor pools. The department’s horticulturists, however, only select plant materials for the replanting of city parks. All other planting — for new parks, islands, or street trees — is done by agencies or individuals who are not going to be responsible for the care of the plants over time.

A well maintained public planting on Boston Common that seems to inhibit vandalism.
Despite the complete inability of the parks department to take on any new responsibilities without an increase in funds, more new plantings are turned over to the city every year.

According to Valerie Burns, director of planning for the parks department: “Boston has no capacity to support new landscaping in the city. Nevertheless, new parks, urban islands, and street trees continue to be passed on to the department for maintenance after completion of the construction contracts. When another agency is planning to build a new park or streetscape, they talk to our engineers but not to our horticulturists.” Burns says that some of the new plantings are “beautiful in design and execution but very difficult to maintain. Many of the new areas are very heavily planted and not very practical in terms of conception or execution. Not many landscape architects can see a project with a city department’s eye. Trees and shrubs simply shouldn't be planted without a maintenance plan.”

“Since Proposition 2½ we’ve only had two inspectors working on trees,” says John Ruk, executive secretary of Boston’s parks department. “Counting all the street and park trees, that’s two men for more than 125,000 trees. In terms of tree planting, we can only respond to 5–10 percent of the requests. We subcontract out pruning and tree removal, and then only after we’ve had a complaint. It’s impossible to fertilize — and water, forget it! We considered getting a water wagon once, but we realized that there was no way we’d have enough people to water the trees.” Ruk remembers when the parks department had a budget that enabled the city to have a tree division with annual spring and fall plantings. Even then, he re-
calls a parks commissioner in the early 1970s saying, “My God, the city’s going bald!” He estimates that in the forties, fifties, and sixties, perhaps three times as many trees were planted in the city annually as are planted today. He sees the city’s older, larger trees dying, mostly from old age or disease. Unless the city maintains its older plantings and replaces them as they die with young trees destined to have a better shot at their normal life expectancies than those now being planted in urban islands, Boston will indeed be bald.

Valerie Burns and Boston’s parks commissioner Robert McCoy are trying to affect the way that public-improvement projects are funded. Says Burns: “I have never seen a project — ever — that had maintenance money attached to it. Some percentage of the federal capital-improvement monies has to be allocated for maintenance.”

Money for maintenance — or the lack of it — is at the heart of the survival issue for urban planting projects and is especially critical for urban island designs, which by definition require extraordinary care. Like other elements of the public realm that our culture used to value and pay for, such as education and clean streets, city trees in islands or in parks now no longer seem affordable to a society that prides itself on being the richest nation on earth. Building the wealth of the public realm requires patience, commitment, stewardship. Trees and shrubs are planted in inappropriate places or without appropriate care and expected to produce benefits regardless: shade, flowers, cleaner air, and seasonal interest. All too often, they are destined to be stunted, leafless, with trunks gashed or limbs broken. While we know full well that few urban islands will

The lindens in this picture, installed in an urban island in 1979, were dead in July 1984.
produce their own version of a climax forest, we plant them nevertheless, taking advantage of this or that federal or state or city capital-improvement program without taking into account the long-term needs of the trees.

Boston's case is perhaps extreme. While most major cities incorporate many of their outlying suburbs within their limits (and thus are able to raise adequate funds through their property taxes), Boston is a relatively poor city surrounded by wealthier neighbors that do not contribute to its operation. As a result, Boston property owners and residents must pay for the maintenance of areas trampled daily by tourists, commuters, and visiting businesspeople. Taxes on meals, hotel rooms, and other sales go directly to the state: only a portion returns to the city as local aid.

To make matters worse, more than half of the property within Boston's city limits is tax-exempt — owned by large nonprofit cultural, religious, and educational institutions. In 1984 it is estimated that Boston lacks $50 million required for already trimmed basic city services. San Francisco, a city of equivalent population and parkland acreage, spends $55 per capita annually on its parks; Boston spends $12. Next year it may be less.

Money, however, is only part of the solution. Even cities with adequate financial resources do not necessarily allocate them to the maintenance of street planting. In Dallas, Texas, that city renowned for its oil and associated wealth, the same issues regarding maintenance recently arose. Trees for the Town, Inc., a nonprofit organization in Dallas, begins a pamphlet thus:

A failed planting in downtown Boston.
No municipal government that we know of maintains what are known as "street trees" (trees that grow in your parkway). In one sense these trees grow on municipal property. Traditionally, municipalities that maintain parks departments have their hands full maintaining municipal parks. Most city governments feel that they would have to maintain a larger labor force and buy more equipment to service these trees and thus leave the ordinary maintenance of the trees to the citizens. Many citizens still harbor the idea that their municipality maintains the street trees. This is not true here or elsewhere.

The solution arrived at by the founder of Dallas's Trees for the Town, Inc., Mary Robertson, is to organize neighborhoods block by block to hire arborists to maintain the plantings. "In our block there were five hackberry trees and twenty-three smaller red oaks. The arborist that we have selected to do the job charged $140.00 each for the four hackberry trees and $15.00 each for the red oaks, a total of $900.00 for the entire block. There are 18 houses on our block so we decided the costs of the project should be borne at $50.00 a house." For this price the trees were pruned and generally cared for, disease and injuries were treated, and girding roots removed. While Trees for the Town, Inc., is residential and upscale, it is nevertheless a practical approach to maintaining urban-island plantings in upper-income or business districts.

The state of California's Department of Forestry in 1979 produced a handbook entitled The Hip-Pocket Urban Tree Planter. It stated that "the limited city budgets allocated for trees frequently must be spent largely to remove dead or damaged wood, which presents a public safety hazard. Very little money is left for routine maintenance or for tree planting. With cutbacks in government spending, this problem seems bound to increase. Just as government can help people plant trees by providing professional advice and a streamlined permit process, people can help government by shouldering greater responsibility for planting and caring for trees. Through citizen Tree Boards, people can even take on some of the administrative, regulatory, and planning functions needed for a fully viable urban forest."

The handbook advocated forming a citizen's task force on trees, officially sanctioned by the city, to assess the city's tree-related problems and opportunities and work in partnership with government to solve them. This group, it states, "could evolve into a permanent tree board, working on a volunteer basis within government on behalf of trees."

Finally, the handbook recommends that arrangements be made for long-term maintenance. "Only plant what you can care for. Make sure that each neighbor understands his or her responsibility . . . If the city is to help with maintenance, be sure this is clearly understood and that long-term maintenance funds are available."

Boston has had and still has its own version of this kind of program. In a project recently organized on Beacon Hill, one of the city's wealthiest neighborhoods, residents donate half of the funds needed to purchase the plants. The Beacon Hill Civic Association donates the other half, and the Boston Parks Department excavates and helps to plant the trees. Resident purchasers are then expected to care for their new greenery.

In the South End of Boston, for more than a decade the largest urban-renewal district in the nation, potted trees and urban islands have been planted as part of a variety of federal, state, and city programs. At one point
in the early 1970s, the Boston Redevelopment Authority was encouraged to communicate with residents on several side streets being planted with trees. A beautifully printed green and blue card was attached to doors up and down the block: "Have you noticed the new trees in your neighborhood?" it asked. "These trees were planted by the Boston Redevelopment Authority as part of the public improvement program for your neighborhood. A tree provides oxygen, humidifies and circulates the air and most importantly, it humanizes and beautifies the city. However, there are some things you must do to keep it alive and well:

1. Water the tree regularly during the growing season. About 10 gallons a week is sufficient.

2. Keep the base neat and weeded, and keep pets away.

3. Keep salt away in winter.

"These trees are yours to enjoy and care for."

Roger Erikson, landscape architect with the Boston Redevelopment Authority, credits this personal approach with the success of the trees planted 12 years ago. Also, Fred Smith, then a professor of landscape architecture at Harvard, insisted that the trees be surrounded by bricks in sand to permit the passage of water and air to the trees' roots.

A visit to a contemporary tree-planting project in the South End today, however, reveals that the bricks are being set in concrete, not sand, and that the trees are confined to 1-square-meter pits. It seems the Federal Highway Administration refuses to approve the use of bricks in sand in plantings, despite the obvious better health of trees planted in porous materials. No cards accompany these recent immigrants to the South End streets, despite the obvious "better chance" such communication would afford them. In an institutional context, it is as if each administration had begun its new term with a profound case of amnesia. Despite the advances of modern science, with regard to urban islands we seem to have forgotten more than we have learned.

In 1910 the Boston Parks and Recreation Department's landscape architect Arthur A. Shurtleff wrote to the Metropolitan Improvement League concerning an examination of Beacon Street, Boston, between Arlington Street and Massachusetts Avenue, to consider the feasibility of planting street trees upon its borders and to secure actual bids for planting such trees carefully in adequate pits and maintaining them for a period of two years after planting. . . . The attached specifications require the installation of irrigation pipes in each tree-pit and stipulate that the trees shall be properly watered by means of them during a period of two years. At the end of this period it is assumed that the care of the trees would lapse into the hands of authorities especially entrusted with the future maintenance of these trees. To permit the trees at this period to shift for themselves or to be cared for by the individuals upon whose sidewalks they might be growing would be to repeat the general history of Boston street-tree planting: while a few trees might thrive, the majority would decline through ill-advised care or the want of the most ordinary attention. To entrust them to the city would be to condemn them to a demise almost as certain, unless the authorities were bound by agreement to provide care which in the past they have not afforded to the city street trees at large. The residents of Beacon Street should assure the success of the tree-planting project, and realize a proper businesslike return for the money invested in the trees by taking perpetual care (or long-term care) of the trees through the same organization which carries out the plantings. In no other way can hoped-for results be assured.
Such assured but conservative advice may seem unduly pessimistic and expensive to admirers of urban greenery. And yet it is probably true. John Ruk of today's Boston Parks and Recreation Department agrees that to maintain urban islands and street trees properly, "I would have to have an army doing nothing but watering, weeding, fertilizing, and pruning."

Says Professor Chater, "It's going to take money, that's all. You want trees, you've got to pay for them. You want parks, you've got to pay for them. But also, some money ought to be spent educating people, to make people more tree-conscious."

Unfortunately for Boston, which is certifiably broke, urban islands and perhaps even street trees may be a luxury. In a city facing high rates of unemployment among teenagers and young adults, it is not for lack of workers or need that its urban islands are not maintained by John Ruk's "army," but lack of funds. A Youth Conservation Corps or summer work program is all that would be needed to repair, replace, and maintain Boston's green heritage and future wealth, but funds are not available.

The only real solution to the problem is a change in funding priorities. Especially in areas where traffic is heavy, urban greenery must have a maintenance budget attached before it is planted. Federal and state officials must recognize that living amenities are not equivalent to bricks and mortar, and the public must begin to understand that you get what you pay for (unless you are prepared to volunteer to take up the slack, in which case you get what you work for). The public realm is our common wealth: we will never individually own and maintain what we could communally create and enjoy. Urban islands, like others aspects of the public realm, will be what we make them: symbols of our stewardship or proof of our indifference.

Charlotte Kahn is executive director of Boston Urban Gardeners, a nonprofit organization dedicated to improving the quality of life in Boston's low-income neighborhoods.
Island and Median-Strip Planting

A generation ago the use of plantings to divide highways or regulate the flow of traffic on roads was rare, confined to wealthy residential areas in such cities as Philadelphia, Richmond, and Boston, to cite a few well-known examples. The parkways of Westchester County, New York, and Connecticut, as well as the Shirley Parkway along the Potomac River, were among the first divided roadways with planted strips between them. The plantings were meant to create restful driving conditions and to screen out headlight glare at night. After World War II, highway planting began on a nationwide scale when the huge network of the so-called national defense highway system was installed. Almost all of the superhighways had separated roadways for opposing lanes of traffic, and in all but the most congested urban areas the strips between the roadways were planted with trees and shrubs. Carefully kept accident-rate statistics for old-fashioned and divided-lane highways proved beyond a doubt that the benefits for median-strip planting far exceeded the costs of installation and maintenance.

Now the use of island plantings has begun to spread to other sites. Among these are the parking areas surrounding modern suburban shopping centers. These expanses of pavement become unbearably hot in the summer months, and locked cars quickly reach oven temperatures during the daylight hours.

More and more local planning boards therefore are requiring islands of trees to provide shade and add visual appeal to these otherwise unsightly spaces. Merchants, too, find that although the islands reduce parking space somewhat, they are more effective than painted lines on the pavement in keeping automobiles aligned. Thus, improved utilization of space compensates for the loss.

In selecting trees and shrubs for islands or median strips, one must be aware of the special difficulties that such sites impose. Narrow median strips are especially difficult for trees and shrubs because of wind whip from speeding traffic. On highways especially, with cars and trucks speeding by at 60 miles per hour, the wind damage to foliage can be severe, both in the spring when the leaves are soft and tender and in the summer when weather is hot and dry. For this reason plants with tough, thick leaves are most successful.

In the colder parts of the United States and Canada (zone 6 and below), road salting in winter presents additional difficulties. Speeding traffic can create a salt spray as concentrated as ocean spray. The salt settles on plants and soil, and prevailing winds deposit large concentrations on the downwind side of roadways. It is essential, therefore, that trees and shrubs chosen for these areas are salt tolerant. It is no coincidence that tree species that thrive at the seashore are also successful in island plantings. Thus sugar maple, which is one of the choice...
species for residential suburban planting in its native range, is a poor choice for island or median-stripe planting, while sycamore maple does well. Canada hemlock, which is also exceptionally susceptible to salt spray, should be avoided, while green ash and Japanese black pine (where it is winter hardy) are sound choices. Indeed the sugar maple decline in New England, about which so much was written 20 years ago, has since been attributed to salt kill. Maintenance crews tend to use salt with a lavish hand, a practice that ought to be vigorously curbed. Meanwhile, salt-sensitive species must be avoided in island plantings for cold areas.

Salt injury to trees in island plantings in parking lots can be very serious even though traffic is too slow to create salt spray. Here salt is spread on the pavement, and often before the snow is melted the salt and snow mixture is scooped up by front-end loaders and disposed of “out of the way” on the islands, to the detriment of the vegetation planted on them.

Ecological Requirements

The forested areas of the north temperate zone contain a wide variety of tree and shrub species. The greatest number occurs in areas where the old Tertiary forest was not extirpated during the last Ice Age, particularly the eastern United States, Japan, and parts of China. When cleared land is abandoned in naturally forested areas, a gradual process of forest regeneration begins. The first trees are “pioneer” species that can stand exposure to full sun and drying winds. After these have colonized the open field and matured, they are slowly replaced by so-called climax species, which are long-lived and shade tolerant when young. Climax species ultimately comprise the entire forest except on very exposed sites.

The ecological conditions of island plantings on highways are extremely harsh for tree growth, and only pioneer species or species from dry, inhospitable climates can be expected to grow well. Island sites are exposed to full sun and wind, as well as the turbulence caused by vehicular traffic. They are also narrow, so that natural penetration of rain to the root zone is inhibited. It is essential therefore to plant only those species that are tolerant of dry soil. Among the many species of small maples, the Japanese maple (Acer palmatum Thunb.), which is strictly an understory tree in the woodlands of Japan, quickly succumbs in island plantings. The Amur maple (Acer ginnala Maxim.), in contrast, thrives under conditions that are lethal to the Japanese tree. Not surprisingly, the Amur maple comes from the harsh climate of the Amur river valley of China, which is bitter cold in winter and hot and dry in summer. Our native eastern flowering dogwood (Cornus florida L.) grows poorly and is subject to drought stress and severe borer infestations in island plantings, whereas the native species of hawthorns are excellent for such locations. The cornelian cherry (Cornus mas L.), which grows out to the edge of the steppes of Russia, is another tree of choice.

Island plantings of shade trees are particularly exposed to wind damage. Although the Bradford callery pear (Pyrus calleryana Decne.) is otherwise suitable for islands, it is susceptible to breakage when it matures. It has been dropped by many state highway departments because of this but is still a favorite for sheltered locations in the downtown areas of cities. The tough-wooded
bur oak \( (Quercus macrocarpa\) Michx.) can serve as an alternative to Bradford pear. This tree comes from the Plains States, where violent thunderstorms routinely occur each summer.

**Trees and Shrubs Recommended for Island Planting**

The following is a list of trees and shrubs that have proved adaptable over a wide range of soils and climates in the East and Midwest. For the subtropical climate of Florida and the desert conditions of the Southwest, of course, entirely different lists are needed.

**Trees**

*Acer ginnala* Maxim. Height 5–6 m. Hardy to \(-50^\circ F\). Amur maple.

This small tree has the unique characteristic of tolerance of extremes of heat, cold, and drought. It can be grown with several trunks or pruned to a single stem. The Amur maple's beauty lies in its leaves, scarlet in fall and a glossy dark green in summer. A similar species, *Acer tataricum*, merely turns yellow in fall and is much less cold hardy. The Amur maple is very tolerant of salts and alkaline soil and can substitute well for the Japanese maple \( (A.\ palmatum)\) in the Midwest, where the latter is not winter hardy.

*Acer platanoides* L. Height 15–18 m. Hardy to \(-30^\circ F\). Norway maple.

The common Norway maple has been much maligned in recent years because trees of seedling origin vary greatly, and many are distinctly inferior in growth habit, growth rate, and quality of foliage. The best grafted clones are much improved, however, and should rate high on the list of trees for difficult sites. The Norway maple will grow well in island plantings and in polluted conditions in cities, where the sugar maple and red maple will not thrive. It is one of the few species with attractive flowers, which are a clear chartreuse color and abundantly borne. The fall color is a fine yellow.

*Acer pseudoplatanus* L. Height 15–18 m. Hardy to \(-30^\circ F\). Sycamore maple.

Although it is not a particularly distinguished tree, the sycamore maple ranks high wherever salt spray or deicing salts are a problem. After the hurricane in the summer of 1948, it was the only deciduous tree with green leaves [no browning whatsoever] along the coasts of Rhode Island and Massachusetts. Trees from seeds are often mediocre, but the best clones of the variety *purpureum* are vigorous and shapely, and the purple undersurface of the leaves is particularly attractive. The tree tolerates dry soil, pavement glare, and alkaline or saline soils.

*Celtis occidentalis* L. Height 12–15 m. Hardy to \(-30^\circ F\). Hackberry.

The hackberry is one of the last trees to disappear from the landscape as one journeys west across the prairies. It also grows in the thin soil on basalt and granite hills in New England. It is not surprising therefore that it endures the stressful environments of island plantings. Plants from seedlings are variable, and many are subject to unsightly twig and foliar diseases. Grafted clones are available, however, which are both shapely and disease free. Clones and seedling trees are very tolerant of dry, alkaline soil and exposure.
The hackberry tree (*Celtis occidentalis*). Photographs with this article from the Archives of the Arnold Arboretum.

*Cornus mas* L. Height 5–6 m. Hardy to −30°F. Cornelian cherry.

The toughest of the tree-sized dogwoods, the cornelian cherry grows wild on the bleak steppes of Russia. It is not as showy as the large-flowered species (*Cornus florida*), but it becomes a haze of yellow in early April. The dark green leaves are thick and leathery and do not scorch in summer droughts. It is difficult to grow *Cornus mas* in tree form; it is best grown as a large clump. This tree is
free of the borers or diseases that plague Cornus florida.

Crataegus crus-galli L. var. inermis. Height 6–8 m. Hardy to −30°F. Thornless cockspur hawthorn.

The common cockspur hawthorn is one of our toughest small trees, but because of its long, needle-sharp thorns, it constitutes a danger in areas where pedestrian traffic is present. The thornless form has the favorable qualities of the species without the dangers: tolerance of drought and exposure, fine glossy foliage, and long-lasting red fruits.

Crataegus phaenopyrum (L.f.) Medic. Height 6–9 m. Hardy to −30°F. Washington hawthorn.

One of the finest small-flowered trees for island planting. In the mini parks of downtown New York City, it thrives under the most adverse conditions. It is attractive, although not spectacular, in bloom. The glossy foliage turns red in the fall, and the brilliant red berries hang on until the following spring. Unfortunately, no thornless clone of this species is available, but its thorns are much shorter and less dangerous than those of C. crus-galli.

Fraxinus pennsylvanica Marsh. Height 15–18 m. Hardy to −40°F. Green ash.

While the white ash (Fraxinus americana L.) is preferable for its superior autumn color, it is not as suitable for stressful environments as the green ash, which will tolerate drought, heat, cold, and saline and alkaline soils with impunity. Seedling trees are variable, and many female trees set large crops of seed and defoliate very early in the fall. As is common to trees with a broad latitudinal range, green ash has a number of geographical races. Trees grown from Florida seed are as hardy as orange trees in North Dakota, while trees from North Dakota provenance grow as well as balsam fir would in Florida! Several fine male clones are available, all from the North Central States, where green ash is an important shade tree. ‘Marshall’s Seedless’ is unsuitable, however, because nurserymen have found that it has begun to seed overabundantly.

Gleditsia triacanthos L. var. inermis Willd. Height 15–18 m. Hardy to −30°F. Thornless honeylocust.

The selection and introduction of a number of thornless clones with shapely crowns have transformed the honeylocust from an unattractive weed tree into an important street tree. The thornless honeylocust is rapid growing, easy to transplant, and tolerant of very difficult urban environments. Like green ash, it is among the trees that persist longest as one crosses the northern prairie states with their harsh extremes of
climate and alkaline soil. Such tolerance for adversity is an indication of the honeylocust's suitability for island planting. It is particularly desirable for parking lots because its tiny leaflets blow away after dropping and do not have to be removed. Though cold hardy, it does not thrive in the very acid soils of parts of Maine and Nova Scotia.

*Malus baccata* (L.) Borkh. Height 9–12 m. Hardy to −50°F. Siberian crab apple.

A native of one of the world's harshest climates, the Siberian crab apple is a first choice among flowering trees for island plantings. It survives drought and a wide range of soil conditions. The flowers are red to pink in bud and pale pink to pure white on opening. Bloom is heavy on alternate years. The tree is virtually immune to apple scab disease and mildew and resistant to fire blight. In fact, in the Pennsylvania crabapple trials, which have been conducted for many years, the only clones to receive recommendations have been *Malus baccata* seedlings or hybrids derived primarily from *baccata*. A very desirable feature of this species is its disease-free foliage, a trait that is shared by *M. × atrosanguinea* (F.L. Späth) C. K. Schneid. and *M. floribunda* Siebold ex Van Houtte. Crab-apple trees chosen for island planting where pedestrian traffic is present should be trees that bear tiny fruits or few fruits.

*Phellodendron amurense* Rupr. Height 9–12 m. Hardy to −40°F. Amur cork tree.

Having originated in the fierce climatic extremes of the Amur River valley, this small, spreading tree easily endures poor, dry soil, reflected heat, and atmospheric pollution. Its lower branches must be pruned when the tree is young to prevent interference with passing traffic. The thick, cory bark of mature trees is an attractive feature. The foliage, which is free of pests and diseases, turns a clear yellow in the fall. Staminate (male) trees are preferable for urban settings, as pistillate (female) trees produce large crops of fruits.

*Platanus × acerifolia* (Ait.) Willd. Height 21–27 m. Hardy to −30°F. London plane tree.

This vigorous hybrid is the city tree par excellence, a standard against which others must be judged. Tolerant of drought, poor soil, reflected heat, and atmospheric pollution, it is easy to transplant and grows rapidly. The original clone, now often called the “Bloodgood strain” is resistant to anthracnose leaf disease, which defoliates our native sycamores during wet springs. The London plane tree has gone through several cycles of popularity and disapproval. Many years ago a few nurserymen grew the trees from seed that produced great variation in habit of growth and disease resistance, and this may be one cause for the disapproval. Another may be the plane tree's vulnerability to canker stain disease, a serious condition spread by pruning tools or other mechanical means. The severity of the disease once led the city of Philadelphia to enact ordinances that prohibited planting the tree. Still, where a large tree is needed for island planting, it is a first choice.

*Pyrus calleryana* Decne. Height 12–15 m. Hardy to −30°F. Callery pear.

The cultivation of the vigorous, thornless ‘Bradford’ pear by the U.S. Department of
Agriculture Plant Introduction Station at Beltsville, Maryland, transformed an unknown, thorny scrub tree into one of the most popular street trees. This tree has everything to recommend it: rapid growth, beautiful pure white flowers, and richly colored fall foliage. Like all pears, it grows well in compacted, poorly oxygenated soil. Brittle wood is its only weakness, and mature trees can literally collapse in a violent summer wind storm, as the parent tree did at Beltsville. The Pennsylvania highway department and others have removed it from their planting lists for that reason. However, for street or island plantings in more sheltered urban locations it is still an excellent choice. Several cultivars that are more wind firm and/or more cold hardy than 'Bradford' are now available in the nursery trade.

**Quercus macrocarpa** Michx. Height 18–24 m. Hardy to –50°F. Bur oak.

Many species of oaks make excellent shade trees under ordinary street conditions, but few thrive in constricted island plantings, especially where soil pH is high. Members of the black oak division of the family (pin, red, scarlet, willow, and black oaks) turn yellow from chlorosis under these circumstances and gradually die out. The bur oak is unique in that it grows well in alkaline soils, stands drought, heat, and cold and is tolerant of deicing salts. It is not so easy to transplant as the pin oak but is comparable in this regard to red and scarlet oaks. It grows slowly but becomes a tough, long-lived tree. Its native range extends farther west than that of any of the other eastern oaks, which means that it is naturally adapted to ecological conditions similar to those of island plantings.

**Sophora japonica** L. Height 15–18 m. Hardy to –30°F. Japanese pagoda tree.

This unusual summer-flowering tree has been in the nursery trade since the 19th century but only recently has become a popular street tree. It is one of the most variable of all species; a single seedlot can produce both dwarf weepers and tall, full-headed trees. Now improved clones with first-rate shade tree form are readily available. This species tolerates compacted soils (including the “brick yard” soils of Washington, D.C.), high pH, salt, drought, and polluted air. It is a conspicuous bloomer in August and retains its dark green leaves later in the fall than other deciduous trees. Like honeylocust it will not grow in highly acidic soils, however.

**Syringa reticulata** (Blume) Hara. Height 6–9 m. Hardy to –30°F. Japanese tree lilac.

This tough, hardy small tree is covered with huge panicles of white flowers in June, after the blooming season of most other flowering trees has passed. It withstands exposure and alkaline soils and is not troubled by mildew on the leaves or stem borers as are other lilacs. The lower branches must be pruned when young so that they will not interfere with pedestrian traffic. Several clones are now available, including one from Canada. These have been selected for their superior foliage, growth habit, and larger blossoms.

**Tilia cordata** Mill. Height 15–20 m. Hardy to –30°F. Small-leaved European linden.

Lindens in general grow well under city conditions, and the best clones of this species are especially reliable. Like those of the pagoda tree (*Sophora japonica*), populations of small-leaved lindens grown from seed are
extremely variable. Growth may be either rapid or slow; wood is sometimes weak; and leaves may be small and leathery or large and easily scorched. Grafted trees do not exhibit graft incompatibility and reproduce exactly the very best forms. Easy to transplant, fairly rapid in growth, and tolerant of many soils and climatic conditions, they are excellent subjects for urban islands. The flowers are not conspicuous, but their rich fragrance is a great rarity among shade trees.

_Tilia × euchlora_ C. Koch ‘Redmond’. Height 12–15 m. Hardy to −30°F. ‘Redmond’ linden.

Much controversy exists as to whether this tree is a Crimean or an American linden cultivar. It has the large leaves and resistance to spider-mite attacks characteristic of American lindens. A compact, upright tree that is native to Nebraska, it is invigorated to climatic extremes of heat, cold, and drought and thrives in urban locations.

_Ulmus × hollandica_ Mill. hybrids. Height 15–18 m. Hardy to −30°F. Dutch elm.

The Dutch elm disease, which was first identified in Holland, has destroyed a major portion of the splendid elm populations of Europe and North America during this century. In response to the crisis, the Dutch government selected and bred elms to produce forms that would be immune to the disease. Seven clones were distributed, some of which have demonstrated remarkable resistance to even the most virulent strains of the fungus. These have the upright, rectangular crowns of European elms rather than the wine-glass shape of American elms. Although vulnerable to elm-leaf beetle, they are exceptionally well adapted to urban
street conditions and grow well in narrow planting pits and poorly oxygenated soil.

*Zelkova serrata* (Thunb.) Mak. Height 15–18 m. Hardy to −20°F. Japanese zelkova. Not many decades ago this species was rarely encountered outside arboreta and botanical gardens. Seedling trees are very variable, and most have irregular, zig-zag habits of growth and small yellowish foliage. The original introductions came from the warmer regions of Japan and were not too cold hardy. It was not until the Dutch elm disease destroyed the American elm and the search began for replacement species, that zelkova began to receive serious attention. Hardier clones with excellent shade-tree shapes are now available and are being widely used on city streets. Tolerant of pollution, drought, and heat, they have shown remarkable vigor in downtown locations in Washington, D.C., and Baltimore, Maryland. They are not as cold hardy as most important shade trees but otherwise are excellent choices for island planting. Any tree with such a wide native distribution as zelkova must have hardy races in the colder parts of its range, and a serious attempt to find them would increase the uses of this excellent tree. Although artificial inoculations of *Zelkova serrata* with the Dutch elm fungus have demonstrated that this species is vulnerable to the disease, this factor can be ignored because the insect vectors of the disease do not feed on this tree.

**Shrubs**

Shrubs for urban islands should share the same characteristics as trees chosen for these sites. They must be tolerant of poor soil, drought, and exposure to wind and heat. Salt spray is just as damaging to shrubs as to trees in island plantings, and it is not surprising that several of the species listed below are also first choices for seashore planting. In addition, shrubs, like trees, are vulnerable to the problem of vandalism. The New York City Public Housing Authority has found that it is best to avoid shrubs with conspicuous flowers except for extremely vigorous growers such as forsythia. All of the shrubs listed below are on the approved list for the authority and have withstood the severest tests of time in very unfavorable inner-city conditions. They are relatively free from diseases and insect pests and can truly be termed low-maintenance shrubs. Shrubs that grow to be too tall for their location can be safely cut down to the ground and will resprout and grow more densely than ever. On level sites a well-sharpened brush mower can be used at a great savings in labor costs. Cutting back is best done in November or December so that the cut surfaces can dry out and seal themselves before the sap begins to run in the spring. Also, cutting off at this time will result in the most vigorous regrowth.

*Acanthopanax sieboldianus* Mak. Height 2–3 m. Hardy to −30°F. Five-leaf aralia. This dense, many-stemmed shrub is especially tolerant of poor, dry soil and atmospheric pollution. It is thorny and makes an excellent barrier planting. Other than its abundant disease-free foliage, it has no special beauty but is most useful for its vigor under adverse conditions.
Berberis thunbergii DC. Height 2 m. Hardy to −20°F. Japanese barberry.

Japanese barberry plants were once sold by the millions for low-growing hedges, but their use has declined as formal clipped hedges have lost popularity in home gardens. It is still useful as a barrier and tall ground cover, however, and will grow well in conditions of poor soil and neglect. The numerous, small thorns are needle sharp, a real deterrent to trespassers without being dangerous. The brilliant shades of scarlet foliage in the fall and the persistent red berries are very attractive. The redleaf form is colorful throughout the growing season.

Chaenomeles lagenaria (Loisel.) Koidz. Height 1–2 m. Hardy to −30°F. Flowering quince.

One of the most colorful early-flowering shrubs, the flowering quince resists vandalism because of its numerous prickly thorns. It is a popular substitute for the Kurume azaleas in cold areas where the latter are not winter hardy. There are numerous named clones with flowers ranging in color from pure white through various shades of pink and orange to deep crimson red. They vary in height and density, and the low, bushy forms are excellent for ground cover.

Deutzia gracilis Siebold & Zucc. Height 1 m. Hardy to −30°F. Slender deutzia.

This low, twiggy shrub has greatly increased in popularity in recent years for the purpose of mass plantings. It is covered with pure white flowers in May and has abundant pest-free foliage. It is also useful as a hedge but, being thornless, it should not be planted where it can be trampled by pedestrians. Several forms that are lower and more spreading are grown in Japan, but unfortunately these are not available in this country.

Elaeagnus umbellata Thunb. Height 3–4 m. Hardy to −40°F. Autumn olive.

The foliage of this species is not so showy as the pale silvery leaves of the Russian olive (Elaeagnus angustifolia). Yet it has the advantage of being better adapted to the Eastern States and other areas where summer humidity is normal. The extensive highway plantings of Russian olive in the East in the 1950s all have gradually succumbed to twig blight, while the disease-free autumn olive has become extensively naturalized in the same areas. Autumn olive is a superb tall shrub for roadway or seashore planting, withstanding salt, poor soil, and drought without setback. The silvery green foliage and pretty bronze-to-red fruits are decidedly ornamental. The U.S. Soil Conservation Service has introduced a strain grown from seed called ‘Cardinal’ with fruits that are a brighter red.

Forsythia × intermedia Zab. Height 2 m. Hardy to −20°F. Showy border forsythia.

Wherever it is winter hardy, this is one of the best shrubs for screening purposes. It is vigorous, pest free, tolerant of city conditions, and unaffected by deicing salts. Vandalism do break off branches in the blooming season (April), but the plant quickly recovers from the injury.

Three excellent new clones of the much hardier Forsythia ovata have been bred for...
the northern Plains States and Canada, where border forsythias will survive.

*Ligustrum obtusifolium var. regelianum* (Koehne) Rehd. Height 2 m. Hardy to -40°F. Regel privet.

This is the only hardy privet that is low growing, dense, and spreading, and exceptionally useful for mass planting. One of the toughest shrubs for city use, it is a mainstay for adverse sites. Almost 100 years of extensive planting in New York City and elsewhere have shown that it is one of the most reliable shrubs for city landscaping.


This handsome semievergreen shrub is often listed as hardy to -20°F, but it is better grown at minimum winter temperatures of -10°F and above. It has leathery foliage and deliciously fragrant flowers, which open in March in the south and in April further north. It withstands poor soil and polluted air and is free of pests and diseases. Young plants are sparsely branched but fill out with age to form an impenetrable screen.

*Myrica pensylvanica* Loisel. Height 2 m. Hardy to -40°F. Bayberry.

One of the three most appropriate shrubs for the seashore, bayberry has proved to be equally indispensable for roadways. It grows wild in the poorest, most sterile soils and withstands salt spray, heat, drought, and polluted air. It is semievergreen in the southern part of its range, and the foliage is pleasantly aromatic. The gray-white berries of female plants last far into the winter. This is a dense shrub, spreading gradually by underground runners.

*Potentilla fruticosa* L. Height 1 m. Hardy to -50°F. Bush cinquefoil.

This hardy, drought-resistant shrub is suitable for mass planting in full sun but does not thrive in shade. It is not spectacular in bloom, but the pretty yellow flowers are borne over a long period during the summer. It is especially useful where summers are dry, with low humidity. Many cultivars are available, varying in flower color, habit of growth, and tolerance for adverse conditions. ‘Katherine Dykes’ is among the best for ground-cover use.

*Prunus maritima* Marsh. 1–2 m. Hardy to -40°F. Beach plum.

This was once a rarely grown native shrub chosen by knowledgeable landscape architects for mass plantings in seashore gardens. It is now extensively used, not only for the traditional seaside uses, but also for roadway planting, because it is so tolerant of salt spray and poor, sterile soil. The white flowers are attractive in the spring, and the fall foliage is more colorful than that of many other plums. The dense branching habit renders it useful for barrier planting.

*Rosa rugosa* Thunb. Height 1 m. Hardy to -50°F. Rugosa rose.

Generally regarded as the most beautiful of all the wild rose species, this splendid shrub is unsurpassed for mass planting. It is a seashore plant in its native Japan and has become widely naturalized in this country on the East Coast. The red, pink, or white flowers are deliciously fragrant, and the
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Arrowwood (*Viburnum dentatum*) in flower.

handsome disease-free foliage turns orange and red in the fall. It thrives along the seashore and in adverse urban locations. Like other shrub roses, it benefits from being periodically pruned to ground level and grows best in full sun. Rugosa rose has the advantage of blooming throughout the summer, unlike most other wild roses.

*Rosa virginiana* Mill. Height 1 m. Hardy to −40°F. Virginia rose.

This species, the shining rose (*Rosa nitida*), and several other native species comprise a confusing group of very similar wild roses of doubtful identity. Whatever their taxonomic status, these plants are an exceptional group of shrubs for mass plantings in adverse locations. They are covered with fragrant pink flowers in June, and their glossy foliage turns scarlet in the fall. The red new stems and abundant red fruits are colorful throughout the winter. Easily transplanted, they withstand drought, salt spray, and exposure and are free from pests and foliar diseases.

*Symphoricarpos ×chenaultii* Rehd. ‘Hancock’. Height 45–60 cm. Hardy to −20°F. ‘Hancock’ coralberry.

This low, rapidly spreading shrub from Canada is an excellent ground cover in full
or partial sun. It has tiny, neat foliage and spreading branches that root wherever they touch the ground, forming a dense mat. Coralberry grows well in poor soil and is free of pests and diseases.

**Viburnum dentatum** L. Height 3–4 m. Hardy to −50°F. Arrowwood.

This splendid shrub is one of another cluster of species whose identity is doubtful. Although it inhabits wet, lowland areas in the wild, it is also drought tolerant and withstands salt spray and exposure. The foliage and stems are immune to the stem cankers and leaf spots that disfigure other hardy viburnums. The berries are an inconspicuous blue-black color, but the yellow and red fall color of the foliage is first rate.

**Viburnum prunifolium** L. Height 4–5 m. Hardy to −40°F. Black haw.

One of the tallest native viburnums, the black haw makes an excellent screening plant and can also be sheared to create a formal hedge. This is an upland species, injured to poor soil and drought. In autumn the smooth oval leaves initially turn pink, then red, and finally purple. The berries also change from green to pink and finally blue-black in the fall.

**Island Tree Planting**

Island beds for tree planting should be raised well above the level of the surrounding pavement. The runoff from the impermeable pavement can so concentrate rain and snow melt in a sunken island that death from root rot can occur. Although raised above grade level, the surface of the island also should be somewhat dished to retain rainwater (see figure 1). Plantings often fail when the soil is graded to an even crown so that water runs off instead of being absorbed. As noted earlier, the surface area for rainwater infiltration is very limited in island plantings, and because islands are surrounded by pavement, which carries off precipitation, the subsoil beneath is usually deficient in moisture. Thus, little capillary replenishment to the root zone can occur.

Because islands are small and their soil is often poor, too much peat or humus is frequently added to the beds. Many old backfill specifications called for up to a third or a half of the mix to be well-rotted manure or other forms of humus. Trees initially grow vigorously in such high-humus soils, but when the surrounding soil is clay, they begin to slow down and stagnate in a couple of growing seasons. Organic matter of any kind is gradually decomposed by soil bacteria and eventually disappears into the atmosphere as carbon dioxide. As the volume of humus in the backfill disappears, the tree settles deeper in the soil and roots become situated too deeply for proper growth. Arborists and landscape architects are now re-examining the old specifications for soil amendment. Unless the soil on the site is entirely unsuitable — a mixture of brickbats and rubble for example — they recommend adding fertilizer and enriching the existing soil with a minimum of humus, not more than 10 percent. Such minimal treatment avoids the interface problems that can occur when the backfill mix is very different in texture from the soil in which the planting pits were excavated. Since trees for island plantings have to be large enough in caliper to withstand vandalism, they are usually balled and burlapped rather than container-grown. These transplant with little difficulty and do not
Figure 1. Dished island surface  

Figure 2. Planted high  

Figure 3. Improved method  
Edges of basin placed over edges of ball

Figure 4. Crowned surface  

Figure 5. Planted too deep  

Figure 6. Traditional method
need high-humus backfills. If the existing
soil is a heavy clay and requires lightening
for proper air penetration, coarse sand, cal-
cined clay particles, or similar nonorganic
materials should be used.
Whenever trees are planted in newly
worked or loosened soil, they should be set
"high" in relation to the final grade level (see
figure 2). The ideal system is to place the ball
on an unbroken column or pedestal of undis-
turbed soil so that it cannot settle, though
such extra care is impractical in all but a few
planting situations. An alternative solution
is high planting, 5 cm above grade for the top
of a 60 cm ball, 8 cm for a 90 cm ball. It is far
better to err on the side of too shallow rather
than too deep planting. A famous example
was the red oak avenue leading to the Rut-
gers University stadium in New Jersey. The
land on the site was a very poor red-clay soil,
so generous amounts of rotted manure were
incorporated in the backfill. The trees all
lived and grew well for the first two growing
seasons, only to stagnate later on. Eventu-
ally all the trees were dug up again and reset
with the tops of the balls above grade, and
thereafter they grew beautifully. High plant-
ing is the best way to avoid these difficulties.
Most planting specifications for shade
trees recommend forming a shallow berm
around the edge of the planting pit to facili-
tate watering. Experience in California,
where water is scarce and expensive, has
shown that the basin is much more effective
if the edges are placed over the edge of the
ball (see figure 3). Particularly in sandy loca-
tions, this assures that the ball itself is well
watered during irrigation and that the mois-
ture does not slip down the side of the pit.
One detail that is often overlooked in is-
land planting, especially in parking lots, is to
ensure that trees and shrubs are planted far

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ers, Princeton, New Jersey
Design for Survival

The term “urban island” refers to a patch of plants and soil embedded in a matrix of pavement and buildings. Urban islands may be as small as a pit or pot for a single tree or as large as the center of a traffic rotary. They may be round or square, regular or irregular in shape, a compact patch or a linear strip. They may be part of a considered design or merely leftover space landscaped as an afterthought or colonized by weeds.

Urban islands are ubiquitous in American cities. They are to be found along streets and highways, in parking lots and plazas. They are highly visible to all who move into and through the city every day, and thus have a major effect upon how the city is perceived. At their best they can enhance a place or even represent a neighborhood, as Bloomsbury’s tree-filled squares characterize that district of London, for example, or as the Commonwealth Avenue Mall symbolizes Boston’s Back Bay. Unfortunately, in most American cities urban islands are sorry affairs. The empty tree pits and planters that litter sidewalks and plazas, the weed-filled traffic islands and median strips, and the dead and dying trees that lie along our streets are testaments to our failure to provide a viable habitat in these islands and, in a broader sense, are symbolic of our failure to sustain vital cities. If only urban islands were designed to enhance their surroundings and to thrive under the harsh conditions to which they are subjected, they could contribute to a more vital urban public realm.

Urban Islands: Stressful Habitats

City plants must contend with tremendous biological, physical, and chemical stresses: too much water or too little; temperatures too low or too high; polluted air, water, and soil; pests and diseases. All these urban stresses are exaggerated in islands. Many plants cannot survive at all; others survive in a dwarfed, distressed condition. But all urban islands are not equivalent in the stresses they pose; small pits and pots, for example, are far more hostile environments for most plants than larger strips or plots.

Pits and Pots

Most street trees eke out a marginal existence, their roots cramped between building and street foundations, threaded among water, gas, electric, and telephone lines, and encased in soil as dense and infertile as concrete. Their trunks are gouged by car fenders, bicycle chains, and even the stakes installed to protect them. Their branches are broken by passing buses. Leaves and bark are baked in the reflected heat from pavement and walls or condemned to perpetual shade cast by adjacent buildings. Roots may be parched or drowned; in either case their ability to de-
liver essential nutrients to the tree is drastically reduced.

The street trees that survive maintain a precarious balance between life and death. Incremental insult can spell the difference. Gusty winds on a street corner or at the base of a tall building increase the loss of precious water by evaporation. Salts from deicing compounds and dog urine alter the osmotic pressure of water in the surrounding soil so that water is sucked out of the tree roots. Leaks from gas mains poison plant roots, while air fouled by automobile exhaust and industrial emissions and heavily laden with dust can poison and suffocate the leaves of sensitive species. It is more surprising that street trees and plants in urban islands survive at all than that their life span is so short. The demise of the average street tree is due to a daily struggle for survival in which the tree weakens progressively year by year and finally succumbs to a blight or a drought that a healthy tree could easily survive.

Trees or shrubs in pots on a plaza may face even worse conditions than those in pits on the street. Many plazas are not built over soil but are actually roofs of basements or subways, and plaza trees are therefore often planted in pots, either sunken or raised. The depth of soil they are planted in is limited by the strength and size of the structure beneath the plaza. Rarely is sufficient soil provided to sustain large trees over a natural life span. A raised planter that is large enough for only a single tree is one of the worst environments for a plant, a fact tested to by the many empty concrete planters that line urban plazas. When the sides of a planter are exposed to air, the soil freezes and heats up rapidly, and tender roots are alternately burned and frozen in climates with pronounced seasonal changes. Plazas are also often located at the bases of tall buildings, where gusty winds dehydrate both tree and soil.

The problems posed by such hostile environments are often compounded by the installation of plant species that are poorly adapted to such conditions. Transplant a forest tree, for example, to a city street or plaza, and it must contend with conditions different in every respect from those in which it evolved: individual trees spaced far apart, with bark and the underside of leaves exposed to sun and reflected heat; paved surface; dense, infertile oxygen-deficient soil; and an uncertain water supply.

**Strips and Plots**

Strips of land along roads and highways, and plots large enough for several trees afford more hospitable conditions than isolated pits or pots. A small plaza in Philadelphia provides a dramatic demonstration of this point. Half of the plaza is at street level, with trees planted in tiny holes within impervious pavement. The other half contains a large, raised, concrete planter filled with many trees. Within a few years of installation, the trees planted in pavement were dead or dying, while trees planted at the same time in the open soil of the large planter were thriving. When planted in a group, trees protect one another from extremes of sun and wind. In addition, planters that are sufficiently large to accommodate many trees do not have the severe problems...
Design
Designing Urban Islands

The stressful conditions of urban islands could be overcome or at least ameliorated by regular maintenance: irrigation, fertilization, mulching, and pruning. Unfortunately, unless owned or adopted by an individual or located in a highly symbolic public place, urban islands seldom receive the maintenance they are designed to require for survival. The combination of stressful conditions and lack of maintenance in these environments makes careful design imperative. In the absence of maintenance, the most effective way to enhance the survival of plants in urban islands, and to improve their appearance, is careful attention to the design of landscaping, to the way it is installed, and to the selection and arrangement of plants. The following are guidelines for the design of urban islands.

Principle 1: The more the conditions of an urban island depart from a natural ecosystem, the more energy (maintenance) is required to sustain the plants.

Urban islands are miniecosystems. Ideally, they should be designed and managed as relatively "closed" systems, requiring minimal input of energy in the form of irrigation, fertilization, reseeding and replanting, and plant removal. The following recommendations will increase the likelihood that an urban island will function in this manner:

- Provide as large an area as possible. The larger the urban island, the more likely that it will be able to function as a relatively closed system that can sustain normal plant growth. A 1–2 m² planting hole, for example, may support a mature tree of only 6–8 m in height (Kozel et al. 1978). Healthy, mature growth can be achieved in urban islands if trees are planted in clusters, rather than spaced out along the sidewalk in pits. The plantings in Bloomsbury and Russell Squares in London and in Louisburg Square in Boston are excellent examples of this strategy. The aesthetic effect of a single cluster of large trees may also be greater than a larger number of much smaller trees lining the street. This strategy is especially well-suited to plazas built over basements, where planters must be used in order to provide sufficient soil depth for trees or shrubs. Pits for street trees can also be enlarged by replacing the strip of sidewalk between the trees with stone dust or permeable pavement, thereby connecting what would otherwise be tiny, isolated spaces.

- Provide as deep a soil as possible. A deep permeable, relatively homogeneous soil will provide a growing medium that promotes water drainage and storage and nutrient exchange.

- Maintain a ground surface that is permeable to air and water. The air and water exchange permitted by a permeable ground surface is essential to healthy plant growth. Ideally, the surface of the island should be unpaved and planted with shrubs or ground cover that will shade the soil surface, protecting it from water loss and buffering it from extremes of heat and cold. If a paved surface is absolutely necessary, it should be composed of a permeable material like stone dust, pea gravel, or bricks set in sand.

The deline of an urban island. Taken over 12 years, this series of photographs documents the fate of an award-winning landscape design whose impact relied on uniformity of plant species and arrangement, and which failed to take into account different soil and drainage conditions. Widespread disregard of urban soils accounts for poor survival rates of urban street trees and landscaping. Photographs by James C. Patterson; courtesy National Capital Region, National Park Service.
Three types of urban island on Pennsylvania Avenue in Washington, D.C.: raised pot, sunken pot, and grassy strip. The two rows of street trees were the same size when planted four years earlier. Sidewalk trees are now noticeably smaller than those in open soil, despite an elaborate system constructed to support them. Photographs by James C. Patterson; courtesy National Capital Region, National Park Service.

- Permit natural soil fertilization to occur. If leaves are allowed to remain on the soil surface, they will decompose and form a natural mulch and fertilizer.

**Principle 2: The more closely the urban-island habitat matches the natural habitat of the plants growing within it, the less energy is required to sustain the plants.**

Having adapted to the environment in which they evolved, plants have different needs for water, air, light, and nutrients. Two approaches are open to the designer of an urban island: to create a habitat that approximates the natural habitat of a desired species or to select species whose native environments are similar to that of the urban island.

- Approximate the native habitat of the plant species selected. Many trees planted in the city evolved in a forest environment: a humid, temperate climate where each tree is surrounded by other trees, protected from sun and wind. The surface of the forest’s soil is soft and spongy, as a result of the long-term accumulation of decomposed leaves. Tiny rootlets pack the upper few inches of the soil, the major feeding zone of the forest tree. To enhance the survival rate of forest trees in urban islands, they should be planted in clumps in an open soil with a soft, permeable surface and adequate water.

- Select plants whose native environment is similar to that of the urban island. It may not always be possible to amend the habitat to suit a forest tree, but not all trees are native to forests. Trees, shrubs, and other plants native to stressful envi-
environments, such as floodplains, old fields, and seacoasts, may survive with far less care in urban islands than forest trees. The repeated floods that floodplain trees must contend with prevent the accumulation of leaf mold and topsoil and saturate the earth, rendering it just as deficient in oxygen as compacted urban soil. It is therefore not surprising that floodplain trees like *Ailanthus altissima* flourish in the city. Old field trees, such as sumac and *Fraxinus* species, and seacoast species, such as *Rosa rugosa*, will thrive in urban islands. Matching the urban island habitat with analogs in “wilder” settings will yield plants that are likely to survive with minimal care.

**Principle 3:** Careful preparation of the planting area during installation will increase growth and survival rates, improve the appearance of the plants, and minimize maintenance problems.

“Plant a one-dollar tree in a ten-dollar hole” is an old maxim whose validity has been proved again and again. On major streets, or those with symbolic value, many cities are now spending close to ten times the value of the tree on preparation of the pit and the pavement around it. An elaborate system was devised, for example, for street trees on Pennsylvania Avenue in Washington, D.C. Existing soil was excavated to a depth of 81 cm in a circle of 5 m in diameter around each tree, amended with compost, and replaced. An irrigation ring 4 m in diameter was positioned under concrete sidewalks to promote irrigation, fertilization, and aeration. An underground drain connecting the trees carries away excess water, and a grate around the base of each tree helps to keep the soil from becoming compacted. The cost of the new pavement, soil, and drain around each tree exceeded $5,000 (Jewell 1981). Despite this elaborate system, the trees have not fared as well as those planted on an adjacent grassy strip.

A city can afford such expensive solutions only in a few streets. There are other, less expensive alternatives. The design of the pit, the composition of the soil, and the preparation of the soil surface are all important.

- Grade the bottom of tree pits to protect tree roots from water-logged soils. Although this can be accomplished in single-tree pits, the larger and deeper the hole the more efficiently and economically it can be drained.
- Amend the existing soil, rather than replace it. The contrast between compacted subsoil and new topsoil in a tree pit is a primary cause of the “tea-cup” effect, in which tree roots become flooded as a result of inadequate water drainage. Amending the excavated urban soil with organic matter and a coarse material, such as cinders or expanded shale, reduces the contrast between the soil of the tree pit and the adjacent soil, enhancing drainage and root growth.
- Cover the soil surface with several inches of mulch. A thick mulch will retard weed growth, prevent water loss from evaporation, and reduce soil compaction. Where an organic mulch is not feasible, an inorganic material, such as porous stone dust, will provide a walking surface under trees and still permit the access of air and water to tree roots.

**Principle 4:** No matter how carefully the foregoing principles are employed, individual plants in urban islands will vary in growth and survival rate.

Designs that rely on uniformity either of plant form or arrangement are especially vulnerable to such irregular growth. The following strategies address this problem:

- Overplant an urban island, so that if some plants die enough will remain to achieve the desired effect. Overplanting will also yield a greater aesthetic effect immediately after instal-
lation. Nature will eventually cull the weakest plants.

- Design the plant arrangement so that the loss of certain plants will not undermine the overall effect. This does not mean that one should not plant a uniform grid of trees, for example, but a bosque may be converted to a grove if several trees succumb.

These are general principles. The design of a specific urban island will depend upon such considerations as the location, size, and shape of the island, the degree of maintenance it will receive, and the agent who will maintain it. A design appropriate for a planter in front of city hall, for example, may not be appropriate for all islands in the city that must be maintained at public expense. Urban islands are too important a resource for a community in terms of esthetics, image, and quality of life for their design to be left to chance.

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Bibliography


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New Choices for Urban Islands

Gary L. Koller

Urban islands are meant to be oases of natural greenery that contrast with and visually soften the hard surfaces of urban landscapes. One wonders if the plants we now utilize are tough enough to survive benign neglect, harsh environmental conditions, and vandalism. Some plants are, but one sees many urban islands in which the plants are dead or dying. A plant that would flourish in one location might fail miserably in another, and it would be incautious therefore to recommend a plant for all situations. In any planting it is most important to observe the conditions of the site and choose plants that most readily adapt to that habitat.

It is my opinion that plants are often chosen because of ornamental criteria, such as showy flowers, brilliant autumn foliage colors, or evergreen foliage. What is ultimately more important is to select plants that are capable of thriving under existing site conditions. If the plant does nothing more than provide a green, leafy presence in the city, then it has performed well. The importance of flowers, fruit, and autumn color should be secondary, for what good is the most gorgeous flowering tree or shrub if it is barely surviving? I also believe that we should revive the use of tough plants with minor ornamental attributes that have been abandoned in favor of prettier plants that are often more exacting in their habitat requirements.

William Flemer III has identified and discussed many tough plants in his article in this issue. These plants have proved themselves through repeated successful applications in urban sites, and they should continue to be used. At the same time we must continue to seek little-known new plants that adapt to island habitats. What is needed is the widest possible array of plants to select from, so that we have species fitting every specialized habitat.

The plants listed below have been selected for toughness, longevity, and adaptability to a wide range of environments. All present the primary attribute of attractive foliage throughout the growing season. Most are little known and little used, and few are commercially available at present. All are hardy at the Arnold Arboretum and can be observed there. The list that follows is for nursery growers and landscape architects who wish to, dare to, and can afford to experiment with something different. Why not select one or two for evaluation and help extend knowledge about plants for urban islands?

**Trees**

*Asimina triloba* (L.) Dunal. Height 5–8 m. Hardy to −10°F. Pawpaw.

Plantings on many large islands in cities are often visually monotonous because of regularly spaced specimen trees. Thickets or col-
onies would increase interest and create the effect of an urban woodland.

The pawpaw is a native colonizing tree that spreads outwardly via rootsuckers. Because shoots arise next to and in the middle of nearby plantings, the pawpaw is best used alone in a mass planting, with a simple ground cover such as *Rhus aromatic* Ait. ‘Gro-Low’, *Symphoricarpus × chenaultii* Rehd. ‘Hancock’, *Arundinaria viridistriata* (Siebold ex André) Mak., *Aruncus dioicus* Walt., or *Xanthorhiza simplicissima* Marsh.

The pawpaw has a round-topped shape, and good specimens bear branches directly to the ground. The leaves are 15–30 cm long, light to medium green, and visually distinctive because of their pendent or drooping character. Autumn foliage is an attractive amber yellow. The fruit, which is edible, resembles a short, fat banana. It ripens to a purplish brown color and possesses a distinctive flavor and texture.

Although *Asimina* has few other habitat requirements, it prefers a soil that retains adequate moisture. It is somewhat difficult to transplant, and nursery-grown specimens dug for transplanting are slow to recover vigor and normal shoot elongation. Container-grown plants may respond more quickly. Once established, the plant is undemanding and long-lived.

Pawpaw has many potential uses. It would look handsome running along a ridge or on both sides of a path. It would also be effective as a leafy camouflage for the concrete slabs that serve as noise-reduction barriers along highways.

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*Chamaecyparis pisifera* (Siebold & Zucc.) Endl. Height 12–21 m. Hardy to –30°F. Sawara cypress.

*Chamaecyparis pisifera* is capable of remarkable growth under the most difficult conditions, surviving where many other plants fail. In many locations the common evergreens, such as white pine (*Pinus strobus* L.), Canada hemlock (*Tsuga canadensis* [L.] Carrière), Austrian pine (*Pinus nigra* Arnold), and Japanese black pine (*Pinus thunbergiana* Franco), are failing miserably. Their decline can be attributed to intolerance to drought, air pollution, environmental salts, construction damage, and insects or diseases.

Mature specimens of *Chamaecyparis pisifera* appear in many long-established inner-city landscapes. The trunks are tall and majestic, with a cinnamon brown to gray-brown bark. The trees have an openness of habit that permits a view through them, and their yellow-green foliage is attractive in the winter landscape. Frequently, mature plants possess a layered fullness of form that is absent in many pines, spruces, and firs.

Sawara cypresses are best planted in groves. In one such planting at the Arnold Arboretum, individual plants are spaced 6–8 m. apart. Today the outer branches touch, enclosing the space beneath the canopy.

Dwarf cultivars of *Chamaecyparis pisifera* have become more popular than the tree types, which are now infrequently grown in the nursery industry. Perhaps this is because the tree types were used inappropriately in the past. They were often planted beneath windows, next to doorways, and along driveways, where their quick, full growth overwhelmed the space. As a result, they...
were ineptly pruned, creating an ugly effect. *Chamaecyparis pisifera* is a plant of robust, vigorous growth. It is extremely tolerant of dry, nutritionally poor soils, as well as the sandy soils of coastal areas. It must be grown in full sun, as shade kills leaves and branches. Sawara cypress is exceptionally tolerant of winds and ocean spray. Long-established plantings are present on the islands of Martha’s Vineyard and Nantucket.

The cultivars of *Chamaecyparis pisifera* are numerous, and most are dwarf or compact evergreens. However, several significant tree forms are available, including ‘Plumosa’, which is dense and conical with ascending branches. Mature trees at the Arnold Arboretum planted in 1891 now stand 9-12 m tall. Winter foliage color is a brown-green, which some consider unattractive. This cultivar could be improved by the selection of individuals with shiny, dark green foliage that remains attractive year-round. ‘Squarrosa’ is one of the most distinctive evergreens for soft blue-grey foliage and rapid growth. Although the inner foliage turns brown and dies, it can be removed by fine pruning. This produces an attractive billowy effect, which is beautiful in combination with the foliage color and texture.

*Cornus macrophylla* Wallich. Height 8–11 m. Hardy to −10°F. Big-leaf dogwood.

Our native dogwood (*Cornus florida* L.) and the kousa dogwood (*C. kousa* Hance) continue to be planted on islands, with various degrees of success. Many fail because they have been planted too deeply. Drought stress, salt damage, reflected heat and sunlight, or mechanical damage to the stem or root system are other causes of failure.

One relatively unknown dogwood with horticultural promise is the big-leaf dogwood, which is native to China and Japan. Tom Dilatush, an observant nurseryman and plant collector from Robbinsville, New Jersey, tells me that he finds *Cornus macropylla* to be more drought tolerant than other arborescent dogwood species. He also says that it transplants more easily and recovers more quickly.

During early July large quantities of tiny creamy white flowers are borne on flat-topped terminal panicles and resemble those of red-osier dogwood (*Cornus sericea* L.). By early August clusters of tiny light green fruit appear against the dark green leaves. As the fruit ripens in September, the pedicels turn an attractive rose pink, while the fruit ripens to a blue-black color. Birds quickly strip the ripe fruit, but the pedicels remain for another 3–4 weeks. Autumn foliage color is unremarkable.

Big-leaf dogwood has a strong tendency to produce multiple trunks rising from near soil level, and in habit it resembles an overgrown shrubby dogwood. The mature tree has a rounded shape. One of the Arnold Arboretum’s trees has grown from seed received in 1951 and today has a spread of 14 m, with four stems rising from just above the soil level to 9 m high.

Another specimen thrives in rich, moist soil in full sun. It grew from cuttings in 1980 and was transplanted to the grounds in spring 1982. By August 1, 1984, the new season’s growth averaged 30 cm, and the plant was approximately 3 m tall.

*Corylus colurna* L. Height 9–15 m. Hardy to −20°F. Turkish filbert.

Turkish filbert is now rare in street or island plantings, but I am certain that it will be
more widely used once it becomes better known. Two factors offer promise for increased use. First, the filbert canopy is more open than that of most moderate-sized trees because of this tree’s wide-angle branch formation. Second, when the filbert becomes established, it adapts to arid conditions and exposed sites.

Foliage is a rich, dark green throughout summer and fall. Pendent staminate catkins are present in a reduced size throughout the winter but grow and enlarge to a length of 5 to 8 cm as the weather warms in spring. Late each summer a nutlike fruit appears, surrounded by a curiously fringed light green involucre. Although not showy, the fruit is visually interesting. Squirrels quickly carry away ripening seeds, so no litter remains. The light brown filbert bark is distinctive, with small scales that flake off, revealing patches of pale orange-brown.

I have observed long-established Turkish filberts at the Arnold Arboretum, Mt. Auburn Cemetery in Cambridge, Massachusetts, the Brooklyn Botanic Garden in New York, Temple University in Ambler, Pennsylvania, and Cornell University in Ithaca, New York. At all locations the trees displayed beauty of form, crisp foliage, and freedom from insect and disease pests. Corylus columna offers the promise of a completely new tree to widen species diversity in islands and other difficult urban locations.

Shrubs

Calycanthus floridus L. Height 2–3 m. Hardy to −15°F. Sweet shrub.

Outstanding foliage is this plant’s chief asset. The leaves remain lush, dark green, and in superb condition until autumn, when they turn to yellow or pale gold.

At the Arnold Arboretum we have lifted several old plantings, divided off clumps, and reestablished colonies at new planting sites. The bare-rooted transplants in some cases were slow in becoming established but eventually developed a physical density and luxuriant appearance possessed by few other plants. Sweet shrub is singularly appropriate for creating mass plantings in either sun or shade. To maintain the richness of the foliage, the plants require shearing to soil level every five to six years.

Flowers are purplish brown and not particularly eyecatching but have a delightful spicy fragrance. The fragrant character varies enormously among plants produced from seed. Some nurseries have selected and vegetatively reproduced forms with outstanding fragrance, while others continue to produce inferior lines. One would hope that nurseries would evaluate and then purge their line of propagation stock with poor fragrance.

Colutea × media Willd. Height 2 to 3 m. Hardy to −10°F. Bladder senna.

Bladder senna is overlooked as a medium-sized shrub capable of thriving in full sun on dry, gravelly, infertile soils. In fact, it will colonize sites too inhospitable for many plants and is therefore the most appropriate choice for restoring the banks of fresh highway cuts. It is also useful in planting islands and semiwild urban parklands.

Colutea × media is a hybrid of Colutea arborescens L. of southern Europe and C. orientalis Miller of Asia. At the Arnold Arboretum peak flowering occurs in mid-May, with scattered blossoms appearing through-
out the summer. Flowers are pea-shaped and usually butter yellow, but some have markings or tints of copper, pink, or reddish brown. Flowers are followed by large, thin-walled, inflated pods that may be lime green or richly tinted with pinks and bronze. The seed pods are highly ornamental from June through late July, when they begin to ripen and turn straw brown. The ornamental qualities of these inflated pods rival those of many flowering shrubs.

Bladder senna is generally rounded in habit. The foliage is sparse and the branching is open — some might say rangy and unkempt. The shrub is least attractive in late summer, when the seed pods turn brown and the leaves lose their color. It looks best when grown in a low ground cover, such as Symphoricarpos × chenaultii ‘Hancock’ or Aegopodium podagraria L. ‘Variegatum’.

*Diervilla sessilifolia* Buckl. Height 1–2 m. Hardy to −20°F. Southern bush honeysuckle.

*Diervilla* is an ideal tall, woody ground cover, for it forms dense, multistemmed thickets and is easily propagated and transplanted. At the Frelinghuysen Arboretum in Morristown, New Jersey, the staff maintains two large colonies in stock beds to provide plants for use in Morris County parks. When plants are needed, staff members cut back the tops and remove root clumps from the bed. After removal, the digging holes are backfilled and the area fertilized. The colony then renews itself from the root pieces remaining in the soil. Within a season or two, the bed is ready for removal of another crop. When I last visited the Frelinghuysen Arboretum in 1983, the mature bed stood approximately 1 to 2 m tall, perhaps 18 to 24 m across, and 8 to 9 m wide. The planting formed a dense, impenetrable barrier, which guided pedestrian traffic. The foliage was dark green and lush. Russell Myers, director of parks for the state of New Jersey, told me that he considers *Diervilla* one of the most reliable plants for mass and ground-cover plantings on the banks of highways. John Trexler, former horticulturist at the Frelinghuysen Arboretum, has noted that deer browse the foliage during late summer, a factor that must be considered in planting in rural situations.

I often walk along the Marginal Way in York Harbor, Maine, where *Diervilla lonicera* Mill. grows on the dry rocky soils of the cliffs, exposed to the winds and the salt spray from the Atlantic Ocean. This species is less handsome in leaf than *D. sessilifolia*, and it is said to be slightly less vigorous in growth. However, its tenacity under harsh environmental conditions is indicative of the vitality of the genus.

*Diervilla* can be cut to soil level each autumn, and snow and ice can be disposed of on the space occupied by the roots. Damage or harm to the planting itself is unlikely. Once well-established, the plants grow and thicken rapidly each spring. Flowers are borne on the wood of the new season and so are unaffected by the pruning. The flowers are yellow and appear in midsummer. Still later the purple-bronze foliage enhances the muted color spectrum of the autumn landscape.

*Hamamelis virginiana* L. Height 5–8 m. Hardy to −20°F. Virginia witch hazel.

During the months of October and November, the Virginia witch hazel blooms at the edges of woods and in clearings along streams in Massachusetts. Some of the flowers are obscured by withered leaves, but
overall the effect of the pale yellow to bright gold flowers is quite stunning.

According to Geraldine Weinstein, director of horticulture for the New York Department of Parks and Recreation, the Virginia witch hazel transplants easily and even without maintenance generally survives heat and drought after transplanting. Few shrubs cling so vigorously to life during the period immediately after transplanting, and few resume normal shoot elongation as quickly. This shrub is one of the most successful in Central Park, despite a high level of environmental stress.

At the Arnold Arboretum we have several witch hazels approaching their centennial year, and during a midsummer inspection they looked robust enough to last another 100 years. One plant, which stands alone near the Centre Street gate, is approximately 5 m tall and 12 m across. It forms a dense wall and is graced by branches that brush the ground at the tips. In another location three plants spaced approximately 3 m apart give the appearance of a single plant with a spread of 17 m. In a third location the witch hazel grows in a natural-looking thicket with native dogwood and Carolina silverbell. On all Arboretum plants the oldest leaves are a dark green; younger leaves are light green; and the youngest are green tinged with shades of purple or bronze. Autumn color is an attractive clear yellow. Because of its stature, Virginia witch hazel is suitable only for islands over 8 m in diameter.

Microbiota decussata Komar. Height 30–60 cm. Hardy to -25°F. Microbiota.

Microbiota, which has the appearance of a prostrate juniper, is a rapid grower. In three to four years it forms a dense mat 30–60 cm tall and spreading 1–2 m across. It has a superb emerald green summer color plus a surface texture resulting from pendent branch tips. Branches pile up on top of one another, and lower ones retain foliage only where they extend beyond the shading canopy. Plants grow well in full sun to moderate shade. In winter shade is necessary to prevent them from turning brown. Microbiota thrives in acid or alkaline soils and grows best in well-drained sites.

Better forms of this plant need to be developed for the winter landscape, and when seeds become available progeny testing ought to be performed. Once improvements are made, I am sure microbiota will become a substitute for junipers along the edges of islands. This plant is also suitable for interior planters in shopping malls; I am told that it has performed well in limited trials.

Rhodotypos scandens (Thunb.) Mak. Height 1–2 m. Hardy to -20°F. Jetbead.

Jetbead is a compact and rugged plant that looks attractive for many years with a minimum of maintenance. With its limited height and spread and dense crown, it forms an ideal background for taller and more leggy shrubs, such as beautybush (Kolkwitzia amabilis Graebn.) or lilac (Syringa vulgaris L.). One occasionally sees jetbead used as a clipped hedge, but it is at its finest when allowed to grow naturally and relatively informally with a layered or textured foliage surface. Many small white flowers appear among the leaves during mid-May to early June. Later, shiny black fruits, resembling small peas, occur in groups of three or four. The summer foliage is light green, and its attractiveness is enhanced by a strongly indented vein pattern and doubly serrate leaf margin.
Autumn color ranges from yellow-green to amber-yellow. I have been enchanted by the mellow color effect of a hedge in autumn at Cornell University.

Jetbead resists insects and diseases, tolerates drought and salt spray, and thrives in both moderate shade and full sun. It also transplants easily and reestablishes itself quickly. Plantings in inner-city locations thrive many years after installation.

Jetbead's ornamental characteristics could be improved by selection. I am unaware of any existing selections and would welcome news of any that are available. Most plantings in the United States represent vegetative propagations from limited parental materials. We need to make more introductions from the full range of this plant's native habitat. Desirable characteristics include more abundant and larger flowers and a more compact size when mature. I have requested that a fall 1984 National Arboretum expedition to Korea seek variants of Rhodotypos.

Although it could benefit from selection, this is presently a more dependable and durable plant than many shrubs that are now more commonly employed in the landscape.

**Rhus aromatica** Ait. ‘Gro-Low’. Height 37 cm. Hardy to −30°F. ‘Gro-Low’ fragrant sumac.

Fragrant sumac has already established its usefulness as a tall woody ground cover along highways, where one can see it growing on embankments and along the bases of bridge abutments. When grown from seed, Rhus aromatica can be quite variable in height, density, vigor, and area of spread. ‘Gro-Low’ fragrant sumac is a selection that was reproduced vegetatively and is therefore more predictable in its mature habit.

Because of its short stature, broad spread (1 to 2 m across), and adaptability to either full sun or moderate shade, this plant is an ideal substratum or ground cover. Its yellowish flowers, which appear in early spring, are inconspicuous. Its autumn foliage color, in shades of reddish purple to yellow-orange, is a more ornamental feature of this plant. This is an ideal species for islands with shallow, dry soils.

**Rhus chinensis** Mill. Height 5–6 m. Hardy to −10°F. Chinese sumac.

The landscapes of late August and early September are considerably enhanced by the rich golden yellow flowers of Koelreuteria paniculata ‘September’ and the creamy white flowers of Rhus chinensis, the two most showy flowering trees of this season. Chinese sumac produces large, open cone-shaped terminal panicles 20–25 cm tall. Flowers last 10–14 days and then give way to clusters of small bony fruit, which turn orange when mature. As flower and fruiting qualities vary significantly from seedling to seedling, breeders are attempting to develop improved selections. Dr. Elwin Orton, of Rutgers University, submitted one selection called ‘September Beauty’ to the Pennsylvania Horticultural Society to be tested and evaluated for the Styer Award. This award recognizes plants with exceptional ornamental characteristics.

The dark green leaves of Chinese sumac are handsome all summer long. The prominent marginal tooth pattern and the winged leaf-rachis are also attractive. Autumn color can be bright orange or scarlet or rather drab, depending on weather conditions.
Chinese sumac (Rhus chinensis). 

Chinese sumac is variable in growth and habit. With pruning, it can be maintained as a single-stemmed specimen tree. However, it tends to sucker from the root system, and as a result it is best used in multiple-plant colonies or thickets on large islands. Cutting the whole colony to the soil level every fourth or fifth year just before new growth begins will keep the colony lush and vigorous and in prime flowering condition.

At the Arnold Arboretum several Chinese sumacs grow in full sun and one in shade. The shaded specimen, which was received in 1952 and now stands 6 m tall, produces flowers but not so many as those in full sun. It also lacks significant autumn color. This sumac’s adaptability to nutritionally impoverished dry, sandy soils renders it an ideal plant for islands and parking areas at summer resorts, where its late-summer flowering would be especially appropriate. The plant does require well-drained soil, however.

Factors that hamper development of Rhus chinensis as a commercial landscape plant are the nursery industry’s view of native sumacs as having little ornamental value and the public misconception that these plants are poisonous. Although many plants have greater ornamental value, few match the Chinese sumac for late season bloom and for toughness in those difficult environments we call urban islands.

Sinarundinaria murielae (Gamble) Nakai. Height 1–3 m. Hardy to −10°F.

This bamboo, whose name has been the source of much confusion, was acquired by the Arnold Arboretum from the U. S. Department of Agriculture Plant Introduction Station in Glenn Dale, Maryland, in November 1960 (P.I. 262266). It rarely appeared outside botanical gardens until recently, when the landscape architectural team of Wolfgang Oehme and James A. van Sweden recognized its undeveloped potential and promoted its use.

When I arrived at the Arnold Arboretum, over eight years ago, a magnificent specimen grew in the shrub collection in Jamaica Plain, and another of equal merit grew in the perennial garden at the Case Estates in Weston, Massachusetts. Although these plants have since been removed as a source of propagating stock, I remember that they stood 2 m tall and spread in dense clumps (2–3 m across). They had a graceful arching habit and small and delicate foliage. Unfortunately, when the Arboretum’s long-established clumps were lifted as a source of divisions to increase the stock on hand, 98 percent of the young plants were lost.

Richard A. Simon, manager of Bluemount Nurseries, Inc., of Monkton, Maryland, has reported similar difficulties in trying to in-
crease this bamboo. Development of this plant on a commercial basis will be hamp- ered until better methods of propagation are discovered. However, once it has become established it clumps up rapidly and again becomes tough and dependable. At present we have a superb colony of four plants that were grown from divisions and planted in June 1981. The plants were spaced 1 m apart in a square pattern. By August 1984 the combined clumps appeared as one plant, which stands 2 m tall and spreads 3 m across. The planting is extremely dense, with upright central stems and arching outer canes. The plants often remain green until January, but by spring the persistent foliage is bleached to a tan color. I am told that in Washington, D.C., the plants are more reliably evergreen, but they do best with wind protection and shade to shield them from late afternoon sun. New growth, which begins late, arises from basal culms and branches. Once established Sinarundinaria murielae is a plant of distinctive habit and reliability, with minimal maintenance needs.

*Sorbaria sorbifolia* (A. Braun). Height 1–3 m. Hardy to −40°F. Ural false spirea.

On islands where a dense, multistemmed shrub is required, *Sorbaria* would be the first choice. This plant can spread to a much greater width than its mature height, and the habit varies considerably, from a low contoured mound in dry locations to a taller more blocky shape on fertile or well-watered sites. The plant's stoloniferous growth requires that one use it where it can be restrained by barriers such as walkways, walls, or curbs. *Sorbaria* is a superb selection where a natural look is called for, as it will fill in and unify a mixed shrub and tree border. It can also be used as an underplanting for a grove or group of trees. Landscape designers must exercise care in choosing companion plants, for *Sorbaria* will dominate smaller or slower-growing plants.

Close inspection reveals luxurious, light green leaves, which are pinnately compound. Individual leaflets are marked by the veins and bear bold serrations on the leaf margin, similar to those of European mountain ash (*Sorbus aucuparia*). Under optimal conditions the foliage remains crisp and attractive throughout the summer. When the plant lacks water, however, the leaves lose their freshness by late summer and turn yellowish brown. Pruning and fertilizing the plants in spring, as well as supplemental watering, will help to prevent this.

Terminal racemes of small creamy white flowers appear in late June to early July. The floral cluster can vary from short and slim to broad and bushy. The flowers resemble those of *Astilbe* but are much larger. Since flowers develop over several weeks, fruit and flowers are sometimes present together. The ripening fruit capsules are tan and brown and provide a discreet montage of color with the white flowers.

*Sorbaria sorbifolia* roots readily from cuttings and as a result is generally propagated vegetatively. This factor, combined with the fact that the plant is so infrequently grown, has meant that no selections or horticulturally improved forms are available. A plant selector might seek larger flowers, fuller racemes, or a more compressed flowering cycle in which all the floral clusters would appear at approximately the same time.

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*Flowers of Ural false spirea (Sorbaria sorbifolia).*
Forms that remain compact would also be desirable. *Sorbaria grandiflora* is a smaller shrub than *S. sorbiloba*, with a mature height of 1 m or less and larger flowers. According to the Plant Science Data Center, the Arnold Arboretum has the only representatives of this species in the United States. Our plants were obtained as seed from Domaine des Barres, Nogent-sur-Vernisson, Loiret, France, in April 1939. In late July they were 1 m tall, with full-bodied flowers.

*Sorbaria* is tolerant of salt spray and occupies the same habitats as *Rosa rugosa* Thunb., dry, rocky slopes facing the sea. Because of its size and spread, it is not suitable for islands smaller than 4 m in diameter. It can be used to create a mound or design contour on sites where budget limitations preclude moving soil to manipulate the grade.

*Spiraea × bumalda* ‘Gold Flame’. Height 1 m. Hardy to −30°F. ‘Gold Flame’ spirea.

Japanese and bumalda spirea are compact, hardy, long-lived, and troublefree. They also have the advantage of an early-to-midsomer flowering period. Spireas can be used en masse as a woody ground cover to unify plantings of larger shrubs such as rhododendron, forsythia, or winged euonymus. These taller shrubs are often planted to create the effect of a thicket but do not do so for many years. In the interim a mass planting of *Spiraea × bumalda* could be used to fill the empty spaces and unify the plantings. While they may ultimately become crowded out, spireas will cling to any and all niches that remain favorable for their growth. *Spiraea × bumalda* ‘Gold Flame’ is one of the best cultivars for mass plantings, for it intertwines with itself to form a continuous carpet. Used to unify a planting of *Taxus* or *Euonymus alata*, it would provide a more immediate finished look to the total planting.

The flowers are pinkish, and the green leaves are tinged with shades of reddish orange and gold in spring and summer. In fall, foliage exhibits a rich mosaic of colors.

*Tripterygium regelii* T. Sprague & Takeda. Height 5–8 m. Hardy to −20°F.

*Tripterygium* is a scandent shrub that exhibits all the toughness of its relative, bittersweet (*Celastrus scandens* L.). When it stands alone, its branches grow upward to approximately 2 m and then arch outward. Their length and weight pull the stems downward so that the outer branches arch to the ground, creating a skirtlike effect. Next to another plant, a trellis, or a chainlink fence, *Tripterygium* will twist about the support as a vine. It can be used to cover ugly fencing, for the vegetation will provide a leafy screen that can be managed by occasional shearing to control growth. One caution: *Tripterygium* should not be grown on supports near walkways, for branches that extend outward will interfere with pedestrian traffic. The variable growth habit of this plant presents some difficulty when *Tripterygium* is grown with other plantings, for it becomes entangled with and overgrows shrubs and small trees. It is most appropriate on islands with rocky outcroppings or landscape mounds that it could cascade over. It is also suitable for highway median strips and ideal as a means of masking the cast-concrete units known as Jersey barriers, which are increasingly seen along highways.

Dense terminal panicles of small creamy
Tripterygium regelii.

white flowers are this plant’s chief ornamental quality and reach their peak in late June or early July. The flowers are followed by three-angled, conspicuously winged fruits, which at first are lime green and then ripen to light brown.

Xanthorhiza simplicissima Marsh. Height 60–90 cm. Hardy to −30°F. Yellow-root.

Although yellow-root lacks the refinement of many cultivated plants, it is ideal for naturalistic groupings. It is extremely flexible in its habitat requirements, growing in full sun or moderate shade and in wet or dry soils.

At the Arnold Arboretum we collected seed from a planting at Garden in the Woods and grew a large seedling population to establish a mass planting along Willow Path. Four-year-old seedlings bloomed freely.

Mature plantings form a short thicket of stems that surround and face down neighboring plants. Flowering in yellow-root is rather insignificant, for blossoms are tiny, brown-purple, and appear before the foliage in late April. Casual observers can walk past a colony in full bloom and not notice the flowers. The foliage stays green later in the season than that of most deciduous plants and rarely colors before November, at the same time as or slightly after the oaks. Arboretum plantings turn a bright amber yellow, and a mass planting makes a strong visual impact, mainly because the color appears when other yellows have long since passed.

Yellow-root is ideal massed around taller shrubs, such as Calycanthus floridus L., Rhododendron vaseyi A. Gray, or R. calendulaceum Michx., Vaccinium corymbosum L., or Philadelphus spp. In marginally swampy soils it combines with Magnolia virginiana L., Clethra alnifolia L., and Ilex verticillata (L.) A. Gray.

Yellow-root must be mowed to the ground occasionally in order to maintain density. Otherwise, it thrives with little care or attention and is therefore a first choice for urban islands.

Herbaceous Perennials

Arundinaria viridistriata (Siebold ex Miq.) Mak. Height 1 m. Hardy to −15°F. Golden stripe bamboo.

This colorful bamboo has been growing at the Arnold Arboretum since the early 1900s and is noted for its exceptional hardiness,
Shrub yellow-root (*Xanthorrhiza simplicissima*). Its green-striped golden foliage is attractive throughout the summer. The foliage is especially attractive when back lit by the evening sun, which tends to intensify the color and gives the plant a golden glow. The leaves shimmer in the breeze. The plant is at its best in full sun. It grows successfully in shade, but the leaves turn to muted shades of gold or green.

*Arundinaria viridistriata* is extremely invasive and it must be contained. In my own garden it sends out underground stems that grow outward at the rate of 1 to 2 m each season. Perhaps this intrusive vigor is what is needed on island plantings, and what better containment exists than a traffic or parking island? This bamboo should be grown only in islands with granite or concrete curbs, as it may penetrate asphalt and colonize adjacent grass areas. Companion plants must be large shrubs or trees that rise above the bamboo and have a competitive advantage because of size, as this plant will dominate low or slow-growing neighbors.

The golden stripe bamboo is especially attractive when grown in front of a New England stone wall or when used in large masses. Successful plantings I have observed include a ground cover of *Arundinaria* crowned with the golden foliage of an individual or grove planting of *Chamaecyparis obtusa* (Siebold & Zucc.) Endl. ‘Crippsii’, which provides contrast in color, texture, and mass as well as permanence in the winter landscape. Another possibility is individual plants or drifts of *Miscanthus*.
Miscanthus sinensis 'Variegata' interplanted with a mass of the bamboo. The Miscanthus, with leaves striped white, exceeds the height of the bamboo by half a meter and provides a permanent Victorian bedding effect. Used alone, this bamboo will form a solid, dense stand capable of restraining all but the toughest woody weeds.

Once the bamboo is subjected to a killing frost, the foliage turns a tan color. Early winter ice, sleet, and snow often cause it to break or lodge over and become untidy. When this occurs, it can be mowed to the ground, creating space for the disposal of snow without fear of injury to permanent plantings. This seasonal mowing would also help to retard or eliminate the encroachment of woody plant invaders.

After transplanting, bare-root clumps require two to three years to resume normal growth, but this recovery time should be much shorter when container-grown nursery stock is used. In order to keep a landscape planting dense, it should be top dressed with a high nitrogen fertilizer at the beginning of each growing season.


Yellow archangel is a perennial that tolerates both dense shade and dry, impoverished soils. It blooms in early May on erect stems 46–60 cm tall. The flowers are small and bright yellow, typical of the mint family, and partially hidden by the leafy stems. After flowering, which generally lasts 2–3 weeks, trailing viny stems emerge and root vigorously where leaf nodes touch the soil. The stems eventually form a solid mat of branches, which can be used to soften the edges of islands.

The ovate leaves are green, with broad silvery markings over approximately ⅓ to ⅔ of the leaf surface. These silver markings are useful in helping to brighten shaded situations. The foliage is tough and remains green and in fair condition in Boston until November or December.

Pierre Bennerup of Sunny Border Nurseries in Kensington, Connecticut, grows yellow archangel beneath a colony of mature maple trees, and the perennial is both full and successful. It will grow in full sun, and I recently saw fully exposed plantings on Nantucket, Massachusetts. The leaves were yellowish, however, and lacked the crisp attractiveness I normally associate with the foliage of this plant.

Perennial companion plants that grow through a ground cover of Lamiastrum include common bleeding heart (Dicentra spectabilis [L.] Lem.), Solomon's seal (Polygonatum commutatum [Schult. f.] A. Dietr., bugbane (Cimicifuga racemosa [L.] Nutt.) turtle head (Chelone lyonii Pursh.), common peony (Paeonia lactiflora Pall.), and gas plant (Dictamnus albus L.).

The only special care yellow archangel requires is occasional pruning during summer to restrain growth. If planted in or near natural woodlands, it tends to become invasive and may overgrow native vegetation.

Miscanthus sinensis Anderss. Height 1–2 m. Hardy to -30°F. Eulalia grass, Chinese silver grass.

Decorative ornamental grasses are still rare in New England gardens. One lovely, hardy species is Miscanthus sinensis, which is available in several useful and distinctive
cultivars that vary in habit, height, leaf texture, and foliage colors. During October this plant bears showy fan-shaped panicles of gray to purplish flowers, and these mature to a tan color and remain throughout the winter. Although not invasive, it can seed itself into adjacent areas. An example of an escaped planting can be seen in a stretch of the Pennsylvania Turnpike several miles west of the Valley Forge interchange.

Miscanthus sinensis can be used either as a specimen plant or in mass plantings or hedges. It provides the same substance and permanent effect as a shrub. When Miscanthus becomes dormant in winter, the foliage turns to colors of tan and beige, and this combined with the foliage texture provides an ornamental effect as trees and shrubs lose their leaves. Winter storms tend to cause the tall stems to break and with time give the plant a progressively more disheveled appearance. When this happens, it should be pruned to just above soil level.

To thrive Miscanthus requires full sun, for in shade the stems are weak and often break. It adapts to many soils, however, from acid to alkaline and from quite dry to wet.

Worthy cultivars include 'Gracillimus', 'Variegatus', and 'Zebrinus'. 'Gracillimus' has leaves 1 to 2 m tall that are shiny, dark green, upright, and extremely thin, with a texture unlike those of any other Miscanthus species or cultivar. This cultivar forms clumps easily. 'Variegatus' is 1 to 2 m tall. Its foliage is variegated with white to cream-colored stripes running the length of the leaves. In habit it is fountainlike, with the outer leaves drooping downward. 'Zebrinus' is 2 m tall. Its leaves are green with horizontal bars of yellow. This plant is virtually identical to 'Strictus' but much fuller at the base, and as a result the stems and habit are more upright.

One cultivar formerly incorrectly identified as Miscanthus sacchariflorus (Maxim.) Hack. 'Gigantea' is now known as Miscanthus floridulus. It forms a massive clump and spreads by stolons, so its outward growth needs to be planned for or restrained. It is useful for accent or as a hedge or screen. Given a few years to establish itself, it has the capacity to form a dense solid wall for most of its full height, providing privacy that shrubs require many years to produce.

All of the Miscanthus mentioned here are tough, hardy, and long-lived and require little maintenance. Cutting back once each year is sufficient. They are generally well behaved in the landscape and with a little foresight and planning will not overwhelm their neighbors.

In York, Pennsylvania, and Baltimore, Maryland, I have seen Miscanthus used successfully in the parking lots of fast-food restaurants, where ease of maintenance is a high priority. The grass was mixed among trees and shrubs in narrow planting islands. A word of caution: care must be taken to avoid confusing Miscanthus with weeds early in the spring, when it is difficult to distinguish from invading grasses.

Petasites × hybrida. Mill. Height 1 m. Hardy to −25 °F. Butterbur.

Butterbur is a plant whose size and vigor often intimidate designers. It forms a massive colony with a bold tropical effect. Individual leaves are huge (60–90 cm wide) and architecturally distinctive because of the
Eulalia grass (*Miscanthus floridulus*)

way the petiole joins the center of the undersurface of the leaf.

Butterbur is in the daisy family, and the flowers are among the earliest to appear each spring. They occur in great numbers in rounded cones that rise only a few centimeters above the soil surface. A casual observer can mistake the greenish yellow flowers for early leaf growth. *Petasites japonicus* (Siebold & Zucc.) Maxim., a relative, is much more dramatic in flower, producing tall spikes of rose pink flowers later in the spring. Unfortunately, this species is not successful as a large-area ground cover, for individual stalks are widely scattered, and as a result the plant is not effective as a mass.

At the Arnold Arboretum both types grow at different sites between Willow Path and Goldsmith Brook and are the subject of much attention and inquiry from visitors.

*Petasites × hybrida* is rampant and spreads across even larger areas each season. Its growth is hastened by moist to wet soil and full sun to light shade. It tolerates full sun in dry soils, but without adequate moisture the leaves wilt during the heat of the day. Even with adequate moisture, the hottest summer days may cause foliage to wilt. Although invasive, this plant is easily contained by an in-ground soil barrier such as a curb.

Butterbur can be seen in a number of Massachusetts landscapes, for it was once used as a logo by the landscape architect Fletcher Steele. One of the finest remaining examples of Steele’s work is a public planting at Naumkeag in Stockbridge, Massachusetts.

The most elegant planting combination I know is at the Arnold Arboretum, where a vast patch of *Petasites* surrounds a lovely specimen of dawn redwood (*Metasequoia glyptostroboides* H. H. Hu & Cheng) with delicate fernlike foliage.

**Phalaris arundinacea.** L. var. *picta* L. Height 1–2 m. Hardy to −30°F. Ribbon grass.

Ribbon grass is an exceptionally decorative plant, with multiple cream-colored stripes that run longitudinally against a background of green. Dense, stoloniferous, and vigorous, it will quickly invade neighboring plantings unless restrained by a barrier. It is most useful as a ground cover planted under complementary shrubs and trees.

New growth on ribbon grass begins early in spring, and the plant reaches mature height quickly. The leaves remain in prime condition until midsummer. Thereafter, the heat and drought of New England summers cause the foliage to become yellow-brown, especially at the bases of the stems. Also, strong winds and heavy rains can break
the stems. At this point, the planting should be cut or mowed back to soil level, the area watered well, and a liquid fertilizer high in nitrogen applied. In three to four weeks the grass will recover, return to its normal height, and remain vigorous until frost kills the foliage.

The habitat requirements of ribbon grass are easily met. The plant is best grown in full sun; it will tolerate light shade but will not reach its full potential there.

The species grows wild at the Arnold Arboretum in wet or poorly drained soils. In my garden the variegated variety has grown for seven years in dry, sandy soil where it is baked by the summer sun and heat from an adjacent brick wall. Under the maintenance regimen discussed above, it remains lush and healthy.

I have found Phalaris to be a good companion for early spring bulbs such as narcissus and the large-flowered hybrid tulips. When first planted, the tulips exhibit the large blossoms illustrated in bulb catalogues, but over the years the flower size diminishes and the bulbs divide and increase, producing a multitude of smaller but more charming flowers scattered through a sea of striped grass. The leaves of both the narcissus and the tulips ripen off before I mow the grass in midsummer, so the bulbs are not disturbed.

Vines

Campsis radicans. (L.) Seem. ex Bur. Height 9–12 m. Hardy to −20°F. Trumpet vine.

Islands are often too small or narrow to allow trees and shrubs to grow successfully. For these confined spaces I propose a novel use of the trumpet vine. Upright supports, such as slender concrete columns, wood posts, or light standards could be installed individually or in groups as supports. Trumpet vine can be planted at the base of each support, and using rootlike holdfasts to cling, it will grow upward. As the vine reaches the top of each support, it will produce branches that spread outward, resembling the crown of a small tree. Rigid horizontal arms installed at the top of each column will increase the spread. Also, loops of heavy architectural chain, ropes, or cable strung between supports can be used to create a garland effect.

Trumpet vine flowers in July and August in colors of orange, scarlet, or yellow. The extra large orange-red flowers of Campsis ×tagliabuana (Vis.) Rehd. ‘Mme Galen’ provide a spectacular complement.

I have selected Campsis radicans over other vines because of its ease of culture even in difficult inner-city environments, quick recovery from transplanting or pruning, long life, and ability to recover from repeated attacks of vandalism.

Gary L. Koller is managing horticulturist at the Arnold Arboretum.
Imagine having one of the world authorities on woody landscape plants for a next-door neighbor, someone you could turn to without hesitation for recommendations about what to plant and advice on how to care for it. Now reach for a copy of Harrison Flint’s latest book, and you have that neighbor.

This comprehensive work covers approximately 1500 species of landscape plants, not including cultivars and varieties. Each species is illustrated with two line drawings, one of the young plant [between 5 and 10 years old] and another of the mature specimen [20 to 80 years]. These drawings portray the plants accurately and also are aesthetically pleasing. For scale, an object or person appears unobtrusively in the corner of each picture. The portraits of the plants at different stages of growth enable one to determine the best use of the plants in the landscape.

A high-quality black and white photograph also accompanies the descriptions of most species. Finally, a set of “adaptability bars” graphically describes each plant’s requirements for sunlight, wind, soil moisture, and pH. A seasonal-interest “clock” describes those times of year when the plant under discussion can make a contribution to the garden landscape.

As a result of this book’s outstanding graphics, the amount of text is greatly reduced in comparison to that of most similar works. Without reading a word, one can very quickly learn how a plant looks and what its growth requirements are. The text is devoted to describing, in nontechnical terms, the nature of the seasonal interest, any problems associated with the plant, and its maintenance requirements. The “Varieties and Cultivars” section under each entry generally contains a substantial amount of text.

Interestingly, Dr. Flint refrains from expressing his feelings about the plants. This is not a book to read for its engaging style; rather, it is a reference book to return to for solid information about how a particular plant will perform in a specific site.

While the book contains much information about nonhardy plants of zones 8 and 9, it is particularly strong in the area of plant hardiness. This is to be expected, as Dr. Flint has had years of both practical and academic experience at the Arnold Arboretum, the Cooperative Extension Service of the University of Vermont, and Purdue University, where he is now professor of horticulture.

My only criticism of the book’s organization is that under the entries for the main species a “Related Species” section often creates strange bedfellows. Zanthoxylum species, for example, are listed under the Evodia entry. However, the thorough index makes it possible to locate such plants. In a 30-page section at the back of the book, plants are grouped according to some 23 categories such as size, fall color, flowering time, and salt tolerance. The addition of a bibliography would have improved this book.
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The following two issues of Arnoldia are available from the Arnold Arboretum:

- **Street Trees for Home and Municipal Landscapes** (1979), 164 pages. $5.00.
- **Wild Plants in the City** (1974), 113 pages. $3.00.
An urban island in Arlington, Massachusetts, planted with ash (*Fraxinus* sp.) and juniper (*Juniperus* sp.). Photograph by Bruce Applebaum.
The Arnold Arboretum of Harvard University, a non-profit institution, is a center for international botanical research. The living collections are maintained as part of the Boston park system. The Arboretum is supported by income from its own endowment and by its members, the Friends of the Arnold Arboretum.