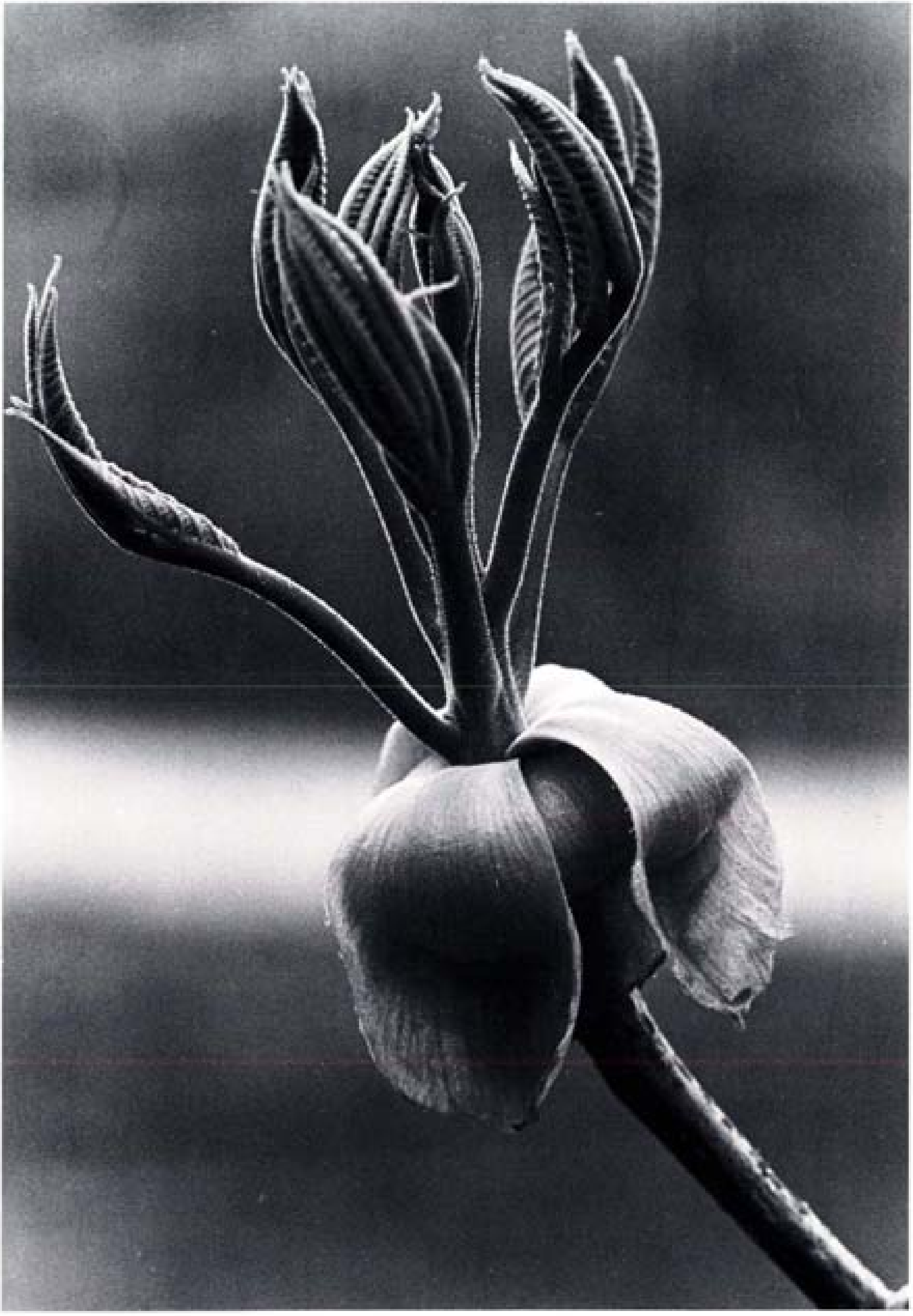

Spring 1991
arnoldia
The Magazine of the Arnold Arboretum



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Front cover: Spring comes to the Arnold Arboretum, *Magnolia acuminata* frames *Magnolia* x *soulangiana* 'Alexandrina' in full bloom. Photo by Peter Del Tredici.

Back cover: *Sinocalycanthus chinensis*. Painting by Mary Comber Miles.

Inside front cover: a hickory bud (*Carya* sp.) expanding in the spring. Photo by P. Chavany.

Inside back cover: *Rhus chinensis* in full bloom. Photo by Rácz and Debreczy.

Blanche Ames, from Oakes Ames, Jottings of a Harvard Botanist, *edited by Pauline Ames Plimpton. 1979. Harvard Botanical Museum.*

A Sino-American Sampler

Stephen A. Spongberg

Plants from the 1980 Sino-American Expedition are finding their way into the living collections of the Arnold Arboretum.

Ten years ago this spring, as the intensifying rays of the sun streamed through the Dana Greenhouses at the Arnold Arboretum to warm seed flats on the benches, there was great anticipation among the staff who carefully inspected the trays for germinating seedlings. Not since the halcyon days of E. H. Wilson earlier in this century had the greenhouse staff attempted to coax so many seeds from China to germinate and grow in the New England climate.

It was in the spring of 1981 that the rich harvest of seeds collected by the Sino-American Botanical Expedition to Western Hubei Province during the fall of 1980 began to germinate in the Arboretum's greenhouses. Specifically, the expedition spent six weeks during August and September of 1980 collecting in the Shennongjia Forest District of northwestern Hubei Province, in a high, mountainous region north of the Chang Jiang (Yangtze) River and on the border of Sichuan Province. Additional collections were made in the *Metasequoia* region of southwestern Hubei Province during October of that year. Many of the seedlings that resulted from these collections were destined to enter the Arboretum's nurseries adjacent to the greenhouse complex and, ultimately, to join their North American and other Asian cohorts on the grounds of the Arnold Arboretum, where they have added significantly to the diversity of the Arboretum's living collections.

The results of the 1980 Sino-American Botanical Expedition have been presented in a scientific report (Bartholomew et al., 1983), and a listing of the germplasm brought back to the United States was prepared shortly after the expedition had been completed (Dudley, 1982, 1983). In addition, a catalogue was published (Hebb, 1982) of the excess plant material distributed through the American Association of Botanical Gardens and Arboreta in the spring of 1982. While it has not been possible to trace the ultimate success or failure of all of the living plants that resulted from the expedition, it seems appropriate to focus briefly on the results of this ongoing experiment, which has tested the hardiness of many Asian taxa in various localities and has allowed botanists and horticulturists both here and abroad to assess the ornamental and landscape attributes of these Chinese species. Included in these introductions are some that represent the first of their kind to be cultivated in western gardens.

The following summary features a few of the plants that now grow at the Arnold Arboretum. Over 450 accessions of seeds and other propagules collected by the expedition were processed at the Dana Greenhouses, and as of this writing 103 accessions have been incorporated into the living collections. At first glance, this may seem like a low success rate, but a fair proportion of the collections failed to germinate at all, and many of the accessions that did germinate have proved not to be hardy. Finally, many of the slower-growing accessions, such as the hollies and rhododendrons, are still being grown in the Arboretum's nurseries and will be planted out in the collections in coming years. Consequently, the Arboretum's collections will continue to enlarge as additional material is added in the future, and we can look forward to more new Chinese plants in our already rich collections of woody Asian plants.

The ghost bramble, Rubus lasiostylus *var.* hubeiensis, *in winter. Photo by P. Del Tredici.*

The flowers of Sorbus yuana. *Photo by Rácz and Debreczy.*

Sorbus yuana

Originally thought to represent *Sorbus zahlbruckneri*, this simple-leaved mountain ash proved to represent a new species, which was subsequently named *Sorbus yuana* Spongberg. The specific epithet, *yuana*, was given to this species to honor Professor T. T. Yü, the leading Chinese plant taxonomist and student of the genus *Sorbus*, who was a staunch supporter of the 1980 Sino-American Expedition and of continued cooperation between Chinese and American botanists. *Sorbus yuana* has thus far proven hardy in the Arnold

The fruits of Sorbus yuana. *Photo by Rácz and Debreczy.*

Arboretum, and trees in the living collections (AA #1539-80 and #1894-80) are approaching fifteen feet (4.5 meters) in height. Closely related to *S. alnifolia,* the celebrated Korean mountain ash, *S. yuana* produces large corymbs of pure white flowers in spring and large, cherry-red, ovoid fruits in fall. Its beautiful dark green, alder-like leaves turn golden yellow in fall, and the species promises to be an outstanding ornamental tree.

The author with Sorbus hemsleyi. *Photo by I. Rácz.*

Sorbus hemsleyi

More a botanical curiosity than a promising ornamental, *Sorbus hemsleyi* is another of the simple-leaved mountain ashes collected by the 1980 Sino-American Expedition (AA #1771-80, #1878-80, and #1981-80). Originally discovered in Hubei Province by Augustine Henry toward the end of the nineteenth century, this species was described as new by Camillo Schneider and also, somewhat later, by Alfred Rehder as *S. xanthoneura.* It was not realized, however, that the two species were one and the same until the collections of the Sino-American Expedition were studied, and the seeds brought back by the expedition con-

The flowers of Sorbus hemsleyi. *Photo by Rácz and Debreczy.*

stitute its first introduction into western gardens and arboreta. Producing small corymbs of pale green flowers in spring, which are followed by small clusters of greenish-yellow fruits, *S. hemsleyi* is most notable for its bold, simple leaves. These are dark emerald green on the upper surfaces but covered with a white tomentum on the lower surfaces. As a consequence, the plants provide interest in the landscape, particularly when the leaves are put in motion by a slight breeze.

The leaves of Liquidambar acalycina. *Photo by Rácz and Debreczy.*

Liquidambar acalycina

To my mind one of the most exciting new introductions of the 1980 Sino-American Expedition is a plant that had only recently been described as constituting a new species by a Chinese taxonomist. We collected seeds of this plant, *Liquidambar acalycina,* from a venerable old tree growing by the roadside in the fabled Metasequoia Valley in a remote district of southwestern Hubei Province. At the time of collection, we assumed that the tree represented *Liquidambar formosana,* the common and widely distributed Chinese sweetgum. But on close examination of the voucher herbarium specimens, it became apparent that our collection represented *L. acalycina* Chang, a species first described as

The habit of Liquidambar acalycina. *Photo by Rácz and Debreczy.*

recently as 1959. Ours was undoubtedly its first introduction to western gardens, and in the Arnold Arboretum a small grove of trees grown from this seed lot (AA #1634-80) now occupies space close to the American sweetgums. Ironically, this new Chinese species is more closely related to our American sweetgum than it is to the common Chinese species, *L. formosana*. And unlike *L. formosana*, which—despite repeated attempts—has never been hardy in the Boston area, *L. acalycina* has withstood winters outside in the Arnold Arboretum since 1984.

Rhus chinensis *in full bloom. Photo by Rácz and Debreczy.*

Rhus chinensis

Chinese sumac, *Rhus chinensis*, was first cultivated in western gardens by Philip Miller in the Chelsea Physic Garden in London during the middle of the eighteenth century. And while we grow several accessions of this wide-ranging Asian shrub at the Arnold Arboretum, the plants that resulted from the Sino-American Expedition constitute our only current accession of this taxon from China. One plant (AA #475-80-C) has become well established along Meadow Road adjacent to the *Cotinus* collection, where it has grown into

The handsome foliage of Rhus chinensis. *Photo by Rácz and Debreczy.*

a large, multiple-stemmed shrub, already upwards of fifteen feet (4.5 meters) in height. In flower from late August into September, the ornamental value of this shrub centers on its large panicles of creamy-white flowers, which provide a rich source of nectar for foraging bees. Its compound leaves—each with a winged rachis and seven to thirteen leaflets—add interest to the plants in the late summer landscape, and particularly in fall when they turn a brilliant red.

Malus baccata

Among the several species of crabapples collected in the Shennongjia Forest District in Hubei Province, a number were introduced by seed collections, and a group of these proved difficult to determine based only on their fruiting voucher specimens. One collection in particular (SABE #1298, now grown as AA #1843-80) represented a small tree that was particularly attractive in fruit, the small but abundantly produced, fire-engine red pomes suspended on extremely long stalks. Plants from this gathering have now flowered in the Arnold Arboretum, and by using both flowering and fruiting material, we have been able to determine the plant's identity. It represents *Malus baccata*, the so-called Siberian crab, and its occurrence in western Hubei Province represents a considerable extension of its known range. Its unexpected occurrence far south of its usual range in northern Asia confused us when we attempted to identify it at the time of collection, and we thought it might represent a new species. It was only through recourse to the flowering material from the plants grown in the Arboretum that its correct identity has been ascertained. As can be seen in the accompanying photograph, the flowers, too, are produced on very long pedicels, and *en masse* transform each limb of the flowering tree into a beautiful bower of white.

Malus baccata *with exceptionally long petioles. Photo by Rácz and Debreczy.*

Sinowilsonia henryi
Another shrub now growing at the Arnold Arboretum for the first time since 1972 is of great historical significance, as reflected in its generic and specific botanical names. *Sinowilsonia henryi*, based on herbarium specimens collected in western Hubei Province by Augustine Henry and Ernest Henry Wilson, combines the names of these two famous collectors of Chinese plants. And its generic name, *Sinowilsonia*, refers to Wilson using the combining form *Sino*, which can be freely translated as "Chinese" Wilson, the name by which he was affectionately known by his botanical and horticultural colleagues.

This species was originally introduced into cultivation by Wilson in 1908, and to my knowledge all of the plants of the solitary species of this Hamamelidaceous genus known in western gardens up until 1980 were derived from this single introduction. At the Arnold Arboretum, plants from this introduction grew in various locations until the severe winter of 1934, when all succumbed to extremely low winter temperatures. An attempt to reestablish the plant in our collections was made in 1965 when young plants grown from seeds gathered from a plant at the Planting Fields Arboretum on Long Island were established in the Center Street beds. These, however, were no longer growing when that area was surveyed in 1972.

The most recent opportunity to establish this species in our collections resulted from the 1980 Sino-American Expedition, although only one seed germinated from those received at the Dana Greenhouses. This plant (AA #1970-80) has proven to be vigorous in growth and has been planted on the gentle slope above the east nursery near the greenhouse complex. It is hoped that it will continue to thrive in this protected location, and that it will eventually flower and fruit. While *Sinowilsonia* is not of great ornamental significance despite its close generic relationships to the witch hazel family, its historical associations alone dictate that it be included in the collections of the Arnold Arboretum.

Sinowilsonia henryi, *plate 2817 from* Hooker's Icones Plantarum, *vol. 29, 1906.*

Magnolia, Rubus, and Heptacodium
Several other introductions of the 1980 Sino-American Botanical Expedition have been featured in articles appearing in the pages of *Arnoldia*. These include *Magnolia zenii*, which first flowered at the Arnold Arboretum on March 30, 1988, and the so-called ghost bramble, *Rubus lasiostylus* var. *hubeiensis*, which I had the distinct privilege of describing as new with my Chinese colleagues, T. T. Yü and L. T. Lu of the Beijing Botanical Garden and the Institute of Botany, Academia Sinica in Beijing.

Another plant featured earlier in these pages is a shrub with a rather cumbersome common name, seven-son-flower. Originally introduced as *Heptacodium jasminoides*, its botanical moniker has been changed to *H. miconioides*, but despite the difficulties that incumber its nomenclature, it is a lovely late-summer flowering and fruiting member of the honeysuckle family that is a worthy addition to the Arboretum landscape.

Even as the plants mentioned above grow and mature at the Arnold Arboretum, and as additional accessions from the 1980 Sino-American Botanical Expedition are incorporated into the Arboretum's landscape, new plants from other parts of China continue to flow into the Arboretum greenhouses. Ours is an ongoing experiment, one that continues to broaden in scope, for botanical and horticultural science as well as for the enjoyment of all.

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Meadow Making—Caveat Emptor

David Longland

According to the popular press, planting a meadow is as easy as opening a can. Nothing could be further from the truth.

Over the last seven years, we at the New England Wild Flower Society have been confronted with a fair mix of public curiosity and disappointment about the "meadow myth," the popular perception that growing a field of wildflowers is cheaper and easier than growing a lawn. Having experimented with meadow installation and maintenance at Garden in the Woods since 1983, we are in a position to draw a few conclusions about materials, methods, and the variability of the actual meadow-making process. It is true that "wildflower" meadow gardens can be ecologically and aesthetically sound alternatives to manicured lawns, *if* it's done right.

"If" can be such a big little word, especially here, because this "if" is usually omitted, ignored, suppressed, or forgotten in too many promotions for creating a meadow. This particular "if" involves four essential conditions for the successful establishment of a wildflower meadow:

1. If you choose *appropriate perennial species* for the site. This means plants that are adaptable to present and future site conditions; plants that are unlikely to impact adversely on the ecological diversity and relationships of the organisms surrounding or within the area; and plants that have complementary ornamental traits like seasonal color, height of bloom, fruit, and foliage.
2. If you *prepare the site properly.* This involves taking into account, first, the competitiveness and resilience of surrounding native vegetation (deciding whether it needs to be cleared out completely, sequentially, or selectively, and leaving plenty of lead time for planting or seeding); second, the physical and chemical properties of the soil; third, the slope of the site and its potential for erosion; fourth, whether or not to use a cover crop to prepare or stabilize the soil.
3. If you use the best possible *combination of methods and schedules* to introduce and establish new plant species in the meadow area. Often an integrated approach produces the most cost-effective returns.
4. If you *expect that the process* of establishing a mature wildflower meadow will probably *take from three to five years,* depending on financial resources, the size of the site, climate, and unforeseen factors, such as seed viability.

A so-called mature meadow is by no means static, but is a continually evolving composition—a natural work of art. And herein lies much of the potential charm of the meadow, for plants will flourish, recede, and migrate over time, in response to one another as well as to myriad environmental conditions. This unpredictability, however, is also the reason for management, for without some maintenance regime, the meadow will eventually change into a different kind of plant community, such as a woodland or a shrubland.

Purple coneflower and wild bergamot in the "wildflower meadow" at Garden in the Woods, Framingham, Massachusetts.

Mowing

The unwanted invasion of trees and shrubs can best be prevented by mowing once a year in the late fall. Mowing can be done at one or more additional times during the growing season to favor or discourage the reproductive advance of certain aggressive species.

At Garden in the Woods in Framingham, Massachusetts, a meadow garden was first established as an experiment in 1984. The meadow is a quarter of an acre in extent, essentially a sunny hole in the woods. The site is slightly sloping—with a fairly rich, loamy soil. Some thirty-five species of *native* forbs and grasses were planted, and we have monitored their development for the last seven years. A few substantive conclusions can now be drawn:

1. The most aggressive of the planted species has been Canada anemone (*Anemone canadensis*). Other aggressive invaders came from surrounding areas and have included goatsbeard (*Aruncus dioicus*), Canada goldenrod (*Solidago canadensis*), and occasionally the notorious purple loosestrife (*Lythrum salicaria*). Plants such as these need to be removed every year.

2. The most desirable perennial species are those that can hold their own in competi-

tion with other species. So far the following species have perfomed best:

Blazing star (*Liatris pycnostachya*)
Purple coneflower (*Echinacea purpurea*)
Wild bergamot (*Monarda fistulosa*)
Turk's cap lily (*Lilium superbum*)
Canada lily (*Lilium canadense*)
Perennial coneflower (*Rudbeckia fulgida*)
New England aster (*Aster novae-angliae*)
Ironweed (*Vernonia noveboracensis*)
Cup plant (*Silphium perfoliatum*)
Little bluestem grass (*Schizachyrium scoparium*)
Northern dropseed grass (*Sporobolus heterolepia*)

In the upper, drier margin of the meadow area, the following species have performed best:

Butterfly weed (*Asclepias tuberosa*)
Native lupine (*Lupinus perennis*)
Blue false indigo (*Baptisia australis*)
Little bluestem grass (*Schizachyrium scoparium*)

All in all, establishing a meadow can be an entertaining ecological project, or a labor-intensive disappointment. It all depends on the big IF.

David Longland is Director of the New England Wild Flower Society.

Presenting *Sinocalycanthus chinensis*—Chinese Wax Shrub

Gerald B. Straley

Virtually unknown in the West, this promising new plant from China is causing a stir.

During my years as Curator of Collections at the University of British Columbia Botanical Garden, I have begun a number of files on plants in our garden that were of personal interest, especially those for which I could find little or no information in the standard references. My files included such plants as *Rehderodendron macrocarpum*, both *Kirengeshoma palmata and koreana*, *Dipteronia sinensis*, and *Sinocalycanthus chinensis*. The goal in the back of my mind was to write something eventually on some or all of these plants for North American horticultural audiences.

Sinocalycanthus (Calycanthaceae), the most recent addition to my list, has been unusual in that, since 1984 when I began the file, I have accumulated very little—only the original description and two brief notes. The first, written by J. C. Raulston in the North Carolina State University Arboretum *Newsletter*, discussed a plant he had received as a cutting from us that was flowering for the first time. The second, written in 1990 by Roy Lancaster, described a plant flowering in his garden—the first color photograph of the flower ever published. Since there is no mention of this shrub in any of the standard woody plant manuals, the present article is based largely on our experiences at UBC Botanical Garden with this choice and little-known shrub.

Recent Introduction into North America

First described in 1963 by W. C. Cheng and S. Y. Chang as *Calycanthus chinensis*, the species was moved by the same authors to a new monotypic genus, *Sinocalycanthus*, the following year. In the wild, the plant is known to survive on only a few wooded mountain slopes at 600 to 900 meters (2000 to 3000 feet) in Zhejiang Province in Eastern China.

Seed of the plant was distributed by Shanghai Botanical Garden in the early 1980s, following the end of the "Cultural Revolution," and most of the plants now growing in western gardens can be traced back to these introductions. While presently established in several public gardens and a few private gardens in England, Holland, Canada, and the United States, *Sinocalycanthus* is largely unknown in botanical and horticultural circles. To my knowledge, it is not yet grown commercially by any nurseries.

In 1980, the UBC Botanical Garden in Vancouver, Canada, received its first seeds, collected in the wild, from Shanghai Botanical Garden, labeled *Sinocalycanthus chinensis*. One seed germinated and the seedling, growing quickly, was planted out two years later in the Asian Garden, under the high shade of some nearby mature Western red cedars (*Thuja plicata*). In 1984, the plant, then about a meter tall and looking very much like the *Calycanthus* species, produced its first flower.

Sinocalycanthus chinensis *in flower at the University of British Columbia Asian Garden. Photographed in July, 1990, by the author.*

Since then it has grown rapidly and is now about 3.5 meters tall (11 feet)—and even a bit wider. Flowers appear at the ends of most branches for about a month beginning in late June.

Description

Sinocalycanthus chinensis is a vigorous deciduous shrub, very similar in general growth habit, branching pattern, and leaf and fruit characteristics to the endemic North American genus *Calycanthus*. Although it was described as 1 to 3 meters tall (3 to 10 feet) in the wild, our young cultivated material is already beyond that and shows no signs of slowing down. The bark and twigs are pale buff, with prominent lenticels. The dichotomous branches are relatively sparse and stiffly upright, with thick twigs, more or less flattened toward the ends. The foliage, and especially the dried twigs, are sweetly aromatic when scratched, like those of *Calycanthus*. Prominent, raised C-shaped leaf scars surround slightly sunken buds. The paired, opposite (sometimes sub-opposite) buds are equally vigorous on the lower horizontal branches, whereas on the upper branches, one developing shoot usually overtops the other. Young plants may grow 30 to 60 centimeters (12 to 25 inches) or more a year.

In Vancouver, leaves and shoots emerge around the first of May, after most other deciduous shrubs are fully leafed out. At this point flower buds are readily visible at the ends of the new lateral shoots. The young leaves, at first very shiny and bronze-colored, become a lustrous pale to mid-green as they mature. The leaves are larger than those of *Calycanthus*, the blades typically up to 16 centimeters long (6 inches) and 10 centimeters wide (4 inches), on short petioles 0.5 to 1 centimeter long (0.2 to 0.4 inches). On vigorous plants, the leaves can measure up to 25 centimeters long and 12 centimeters wide.

The leaves are broadly elliptic to obovate with cuspidate tips, and cuneate to obtuse bases. The upper surface varies from smooth to slightly rough-textured and may be irregularly puckered. On the lower surface, the veins are very prominent. Short, dark-brown hairs are scattered along the midrib and the main veins on the underside of the leaf. Leaves show moderately good yellow autumn color, even on the Pacific Coast where the autumn color of many plants is often relatively poor.

Flowers and Fruits

The unique characteristics that define the genus *Sinocalycanthus* are found on the flowers, which are produced singly at the ends of current-season growth, and appear in June or July in Vancouver. The large globular flower buds are purplish-green for some weeks before opening. Toward their base, large bud scales intergrade into four or five sepal-like tepals. Pale brown to yellowish-green, these tepals persist during flowering.

The flowers are held at right angles to the ends of branches or are drooping, much like those of *Magnolia sieboldii*. The open flowers, very different from those of *Calycanthus*, are either flattened or bowl-shaped, and much larger, from 6 to 10 centimeters wide (2 to 4 inches). Unfortunately lacking a scent, the flowers resemble at a distance those of a camellia or a magnolia.

Typical of the family, the flowers lack distinct sepals and petals, but reveal instead two distinct spirals of white tepals. The seven or eight large tepals (3 to 4 centimeters long by 2 to 3 centimeters wide) of the outer ring have inwardly curved tips and are nearly flat. These are pure white internally, often with a flush of pale pink on the outside, especially toward the tips. They have a thick, firm texture with prominent, raised veins.

The smaller staminoid-like tepals (1 to 1.5 centimeters long and about 1 centimeter wide) of the inner ring have an even harder, waxlike texture. These are creamy yellow at the tips, red-purple at the base internally, and white at the base externally. They are strongly curved inward, and largely conceal the stamens. The eighteen to twenty spirally arranged stamens are somewhat flattened and are borne on very short filaments. The anthers surround the protruding tips of several sericeous projections from inside the hypanthium. These partially conceal the fifteen or so delicate, slender stigmas.

The woody, brown fruits are virtually indistinguishable from those of *Calycanthus*. They have an elongated pear shape, with prominent tepal scars spiraling around the fruit and around the slender fingerlike, sericeous projections from the contracted mouth. Bright green through the summer, the fruits turn brown in the fall, remaining on the shrubs into winter until they slowly disintegrate. The seeds (technically *achenes*) resemble elongated beans of a shiny, cinnamon-brown color, with a longitudinal ridge. The plants appear to be self-compatible, producing a few fruits with viable seed.

Other Plants in Cultivation in the West

The Botanical Garden of the University of California at Berkeley also received seed from Shanghai Botanical Garden in 1980, and one of the resulting plants was distributed to the Strybing Arboretum in San Francisco. From the same Chinese source, Brooklyn Botanic Garden received seed in 1981; one plant flowered in 1985 but was subsequently stolen.

Sinocalycanthus chinensis: *a flowering branch in its natural orientation; a front view of the flower; a mature seed capsule; and a mature seed capsule in longitudinal section, with three ripe seeds. Drawings by the author.*

Fortunately, plants propagated from cuttings had been retained in the nursery, one of which, now planted out, is over 2 meters tall and 2 meters wide (6 feet), flowering and fruiting yearly.

P. G. Zwijnenburg of Boskoop, Holland, reports that the Boskoop Research Station has grown a plant since 1983; it first flowered in 1987. This plant grows in an unheated greenhouse where it has frozen several times to −10 degrees C.

The well-known plantsman Roy Lancaster reported that a plant flowered in 1989 in his garden in Hampshire, England; he had seen flowers for the first time in Vancouver the summer before.

In 1985, the UBC Botanical Garden gave cuttings from its plant to Dr. J. C. Raulston of the North Carolina State University Arboretum; his plant flowered in May 1987. In Raleigh, the shrub flowers a full month to six weeks earlier than in Vancouver. Propagations from the UBC plant, especially through the notable generosity of Raulston, have now resulted in young plants growing in a number of locations throughout North America. A plant on the campus of the University of Washington in Seattle was grown from seed received from Hangzhou Botanical Garden.

Cultivation and Propagation

Thus far *Sinocalycanthus* appears adaptable to a fairly wide range of cultural conditions. It has suffered no summer or winter damage in USDA Zone 8, in either full sun or partial shade. Its winter hardiness has not been fully tested as yet, but it should survive to at least USDA Zone 6. It is extremely vigorous in the acid soils, wet winters, and relatively cool, dry summers of the coastal Pacific Northwest. And it seems to tolerate equally well the hot, humid summers of the southeastern United States; however, it may grow best in light shade in the East.

Sinocalycanthus has no apparent serious insect or disease problems, although some flowers do blacken before fading, the cause of which, undetermined as yet, is most likely just the natural senescence of the flowers. The shrub is very late leafing out, at least in the typically cool spring weather of the Pacific Northwest. The angle at which many of the flowers are carried on the stem makes the shrub most showy when viewed from below, so young plants are less attractive than older plants whose flowers can be looked up into. The plants do not produce enough flowers to be showy from a great distance, and they are definitely best planted where the individual flowers may be inspected closely.

Softwood cuttings taken in June or July, treated with 0.4 percent IBA powder, rooted readily under mist. Even though only a few flowers produce fruit, the plant is self-compatible and viable seed is produced. A few seeds were germinated by Raulston after a three-month cold stratification period.

This attractive shrub deserves wider recognition and at this time shows great potential for temperate gardens. Its flowering time comes after many of the spring shrubs have finished blooming, making it a desirable addition. Obviously, it needs to be further tested for winter hardiness, for its tolerance to extended summer heat, and for its adaptability to neutral or alkaline soils. Its close relationship to *Calycanthus* makes the potential for hybridization a distinct possibility, one well worth pursuing.

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Urban Soil: Problems and Promise

Phillip J. Craul

Street trees die for many reasons, but the best place to start looking for causes is in the soil.

Recently, we have come to recognize the importance of trees in metropolitan areas not only for their ability to improve the quality of life but also for their ability to moderate the physical environment. Further, many authorities, such as Operation Global Releaf and the American Forestry Association, point out the need to plant more trees to offset the global warming trend of the "greenhouse effect." If we temporarily set aside the merits or limitations of the basic premise on which the warming forecasts are based, the success of the extensive tree-planting programs that have been proposed requires the application of sound tree-planting principles if they are to avoid some of the widespread failures of the past.

Unfortunately, much of the information on the techniques and specifications of tree planting and soil preparation, uncritically repeated for years, has proven to be unsatisfactory or downright wrong for many situations, and little has been done to correct these practices. In recent times we have made some progress in distributing the correct information, but much of this updated material, based upon the experience of a wide range of professionals, has failed to reach the attention of those who need it most—landscape architects, architects, foresters, arborists, horticulturists, and landscape contractors.

One of the most misunderstood, least-researched, and least-documented factors is the urban soil (Spirn, 1984). Plantings are made with little appreciation of or attention to the character of the material that lies beneath the surface. Elaborate and expensive designs are produced and installed only to have the plants succumb to some malady even before the grower's guarantee—usually two years—expires. As Cox stated in 1916:

> The problems which have to do with soil conditions are less simple of solution and yet it is upon the skill shown in solving them that the success or failure of the whole operation must depend. To secure correct soil conditions, it is necessary to provide for each and every tree as follows: (1) a sufficient amount of good soil; (2) sufficient moisture; (3) proper drainage; (4) proper aeration of the soil; (5) a supply of plant food.

Since 1916 the situation has not changed that much. We are still concerned with fulfilling the same growth requirements for the same reasons, and we still do not fully appreciate the complexities of the soil conditions presented by the urban environment (Walterscheidt, 1984).

A Description of Urban Soil

Urban soil may be defined as soil that has been disturbed or manipulated by human activity connected with construction and urbanization. It has one or more horizons or layers, at least 50 centimeters thick, comprised of material that has undergone one or more of the following actions associated with urban activities: mixing, compaction, pulverization, filling, scraping, and/or the addition of

Figure 1. The superficial layers of urban soil are often composed of small bits and pieces of miscellaneous construction materials. Photo by Peter Del Tredici.

synthetic contaminants or toxic substances at levels above those of natural soil (Figure 1) (Craul, 1985a, 1985b; Blume, 1986; Zemlyanitsky, 1963).

Because urban soils are always associated with human activities, their characteristics are determined by their previous construction history and by the degree of disturbance they have undergone. Therefore, urban soils typically show great variability in vertical profile, as well as horizontally across the landscape, due to the cut and fill, backfilling, and resurfacing that occur during the process of land shaping (Blume, 1986; Craul and Klein, 1980).

The manipulation and disturbance to urban soils by various construction and restoration activities cause compaction of at least the surface layer and, in many cases, the lower portions of the soil profile as well (Alberty et al., 1984). Compaction affects the soil (1) by reducing the ease of root penetration, (2) by decreasing the ready movement of water, and (3) by causing a reduction in its water-holding capacity. In addition, compaction reduces the movement of gases into and out of the soil, particularly the inflow of oxygen, which roots require to function properly, and the outflow of carbon dioxide, which must be removed (Hillel, 1980). By reducing effective soil depth, compaction forces roots to grow close to or on the soil surface (Gilman et al., 1987).

Elevated Temperatures and Soil Reaction

Most urban areas behave as "heat islands," as a result of the production of heat energy within the area through industrial, commercial, and residential processes and of the large amounts of heat that are stored and reflected off paved or otherwise covered areas, such as streets, highways, sidewalks, parking areas, building rooftops, and facades (Landsberg, 1981; Vittum, 1974). In addition, the large amount of covered land in cities means less open soil and less vegetation, which would ordinarily have a cooling effect. The net result of these factors is to raise not only the soil temperatures above those normally expected for the natural soils of the area (Halverson and Heisler, 1981), but also the air temperatures, thereby increasing the moisture stress on the urban vegetation and often leading to reduced vigor (Bassuk and Whitlow, 1985).

The soil reaction, otherwise known as pH, determines to a large extent the form and availability of nutrients. Soil reaction also affects the activity and diversity of the soil's microorganism populations on which many nutrient processes are dependent (Alexander, 1980). To complicate matters, much of the water in urban areas flows over synthetic materials such as asphalt, concrete, and masonry. As it moves, the water dissolves substances from these surfaces and also absorbs others from the deposition of air pollutants (Bryan, 1972; Halverson et al., 1982; Owe, 1981). These substances are carried into the soil and undergo reactions that tend to raise the soil pH. For some plants, this elevated pH increases vigor and may simplify the soil management for a given plant palette. For other species, particularly acid-loving species such as rhododendrons, the elevated soil pH may have detrimental effects, such as nutrient deficiencies and increased toxic-substance solubilities, making soil management a complex problem (Moore, 1974).

Interrupted Nutrient Cycling and Lack of Soil Microbes

Organic matter is periodically deposited on natural soils by trees and shrubs in the form of leaves and branches. These organic remains are decomposed by various soil-inhabiting organisms, and the nutrients and energy they contain are released for utilization by the organisms themselves and by the associated vegetation. In urban soils these cycles are interrupted by various factors: leaf litter is often swept up as trash, or very little litter falls on urban soils because of the low amount of biomass produced by the plants. As a result of the shortage of organic matter, the diversity and activity of soil microorganisms in urban soil are reduced below optimum levels.

Presence of Man-made Materials

Most urban soils contain various forms of man-made materials, such as wood, metal, glass, plastic, asphalt, and masonry. The materials have several effects on the soil and on the vegetation it may support. They can physically obstruct root penetration, water movement, and gaseous diffusion on the one hand, or they can have the opposite effect by creating large voids, which permit the excessive drainage of water through the profile.

In some cases, these man-made materials may, when decomposing, release products that are toxic to plants and soil organisms. The problems become particularly serious if the soils are contaminated by heavy metals, de-icing salts, herbicides, pesticides, and industrial wastes. Because of the complexity of the chemistry involved, mitigating such problems is complex.

Bare soil in urban areas is subject to wet and dry deposition of air pollutants, including various hydrocarbons, their esters and fatty acids, and other substances produced by burning fossil fuels. These oil-based substances coat the soil particles, thereby making them water

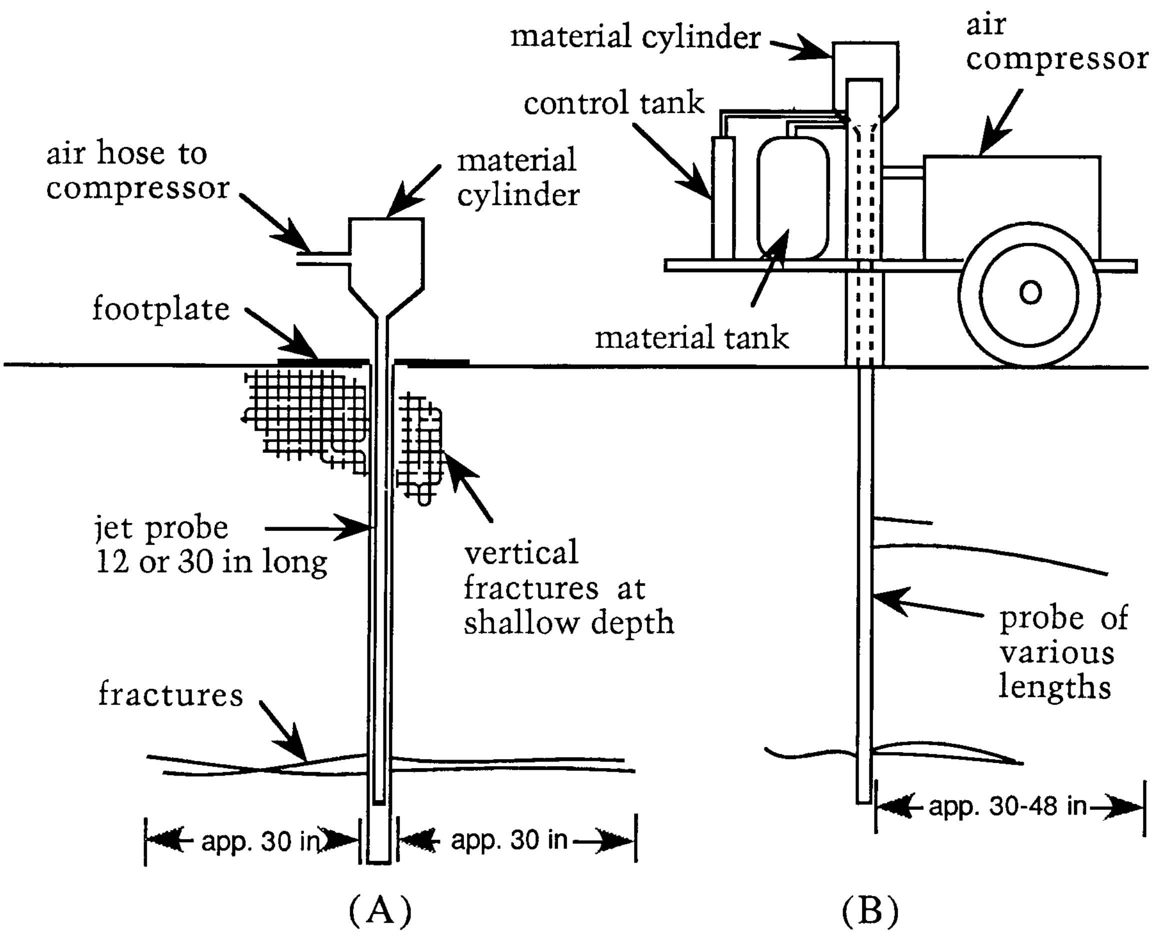

Figure 2. The "Growgun" and "Terralift" machines for reduction of deep soil compaction.

repellent (Jex et al., 1985). This phenomenon, coupled with crust formation due to compaction by foot traffic on the bare soil, greatly reduces or even prevents water infiltration, thus contributing to soil drought. Fortunately, these water-repellent crusts do not appear to form when the soil is covered by grass.

The Effects of Compaction

Compaction is one of the major problems degrading urban soils, and the condition can often be prevented by prior planning and careful management of maintenance operations (Patterson, 1976). It is caused by shear and stress forces applied to the soil by foot and vehicle traffic (Hillel, 1980). It is usually most severe on playing fields and other places where people concentrate. Soil may be compacted to considerable depths by vibration, or by traffic on the surface where that layer may have been exposed previously. It is very difficult to overcome deeply compacted conditions in most soils. Compaction is most severe when soil moisture is at some point between the plastic and liquid limits, which may occur any time there is heavy rain and the soil becomes thoroughly soaked but not saturated. Soil then remains wet for long periods and becomes quite hard when dry.

Compaction reduces the total pore space and the mean pore size of the soil. Water-holding capacity may be increased, but the movement of water through the soil is reduced because water moves more slowly through small pores. In addition, the connections between bundles of pores may have been destroyed in the compaction process, and the water must follow a tortuous pathway to drain away (Rose, 1966).

As mentioned, the pore space of a compacted soil is reduced, along with pore size. As a result, oxygen diffuses slowly into the soil, and carbon dioxide diffuses slowly out of the soil. The lack of oxygen at shallow depths has the same effect as a soil with a shallow rooting barrier. The reducing condition (the high pH) present in many urban soils also significantly affects the availability of nitrogen and other nutrients, as well as enhancing the presence of toxic forms of many substances. Poorly drained soils also exhibit greater impact from the presence of de-icing salts.

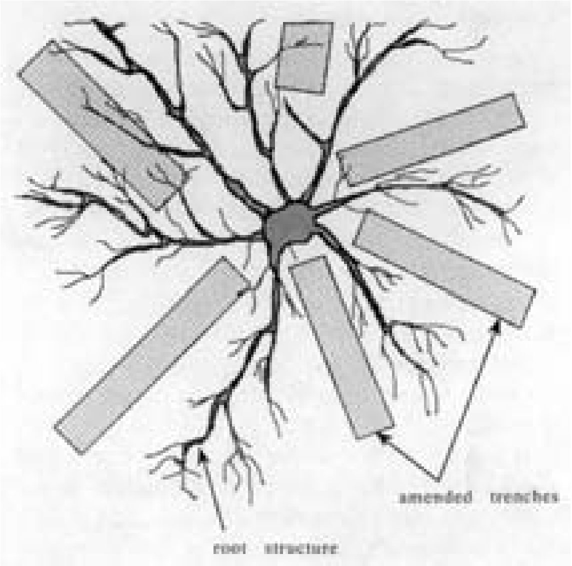

Figure 3. The trenching and backfill technique for loosening deep soil compaction around existing tree root systems (after Watson, 1990).

Plant roots will grow only where the soil conditions allow them to survive (Himelick, 1986; Perry, 1982; Reynolds, 1975). Roots extend themselves into soil by penetrating those pores that have a diameter greater than the minimum diameter of the root tip (no less than 0.01 mm). Root penetration is usually not a great problem in soils that have a large proportion of air-filled pores (macropores), most of which are at least 0.03 mm in diameter. Compacted soils generally have only a few, widely scattered macropores, significantly impeding root growth. In stony or gravelly soils, or soils with a large proportion of synthetic materials without large voids, the problem is more acute. A compacted layer below a layer of respread topsoil has the same effect as a shallow soil.

Correcting Compaction

The best measure against compaction is to prevent it. This may be accomplished in the careful design (and sequencing) of installation and maintenance operations. If the soil becomes compacted during construction, it is wise to loosen the soil by rototilling, disking, or loosening with a backhoe shovel before respreading topsoil. Then the topsoil should be respread simultaneously with the installation of the planting stock, beginning in the center or inside of the design and working outward to prevent compressing the newly placed topsoil.

It is difficult to use certain newly developed methods for ameliorating compaction under trees or other already established plants without significant damage to the root systems. Two machines recently tested "explode" air into the soil at depth; then the newly formed voids are filled with vermiculite or similar material. Studies have shown mixed results in loosening the subsoil (Smiley et al., 1990) (Figure 2). Watson describes a trenching and compost-backfilling method attributed to an old Chinese technique that appears to have merit (Figure 3). Turf areas are amenable to aeration techniques originally developed for golf courses and playing fields.

Improving Drainage

Both surface and subsurface drainage must be considered in any design. Surface drainage may carry needed water away from a planting or may carry excess water (often contaminated with de-icing salts, or other toxic substances) into a planting. The final design grade must provide for swales, berms, and terraces, such

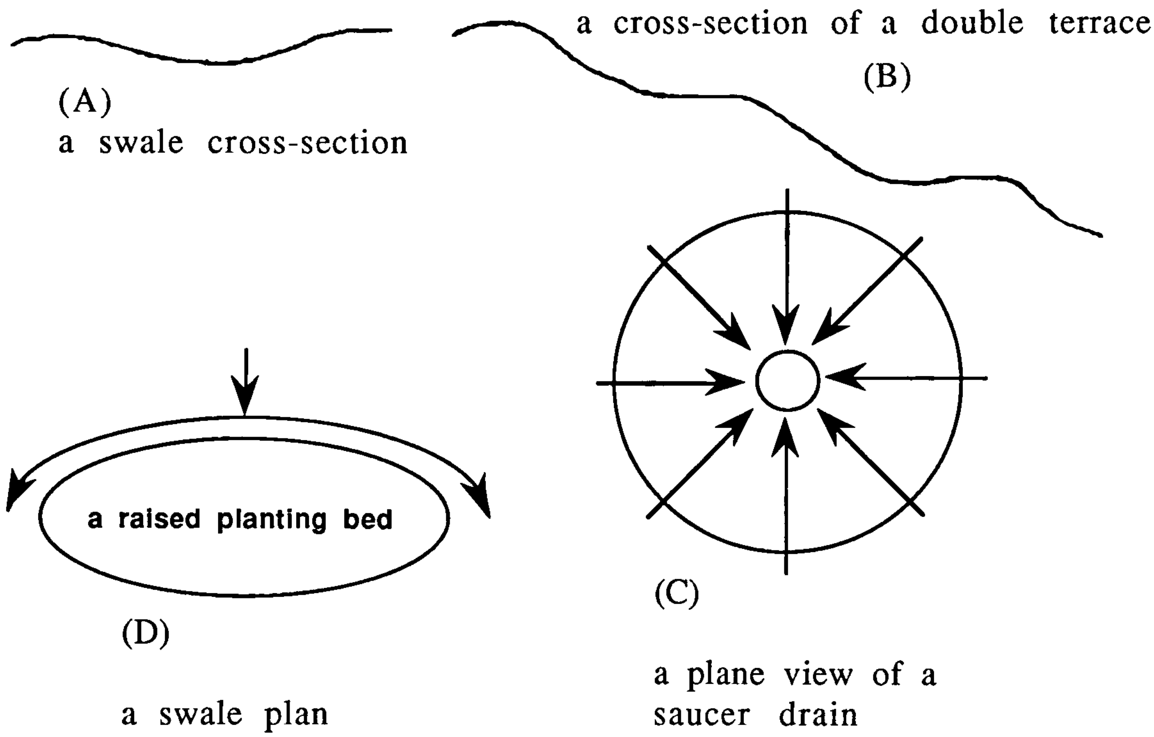

Figure 4. Several practices to control surface water drainage. (From P. J. Craul, Urban Soils in Landscape Design. *New York: Wiley, in press.)*

as those shown in Figure 4, to create the most favorable drainage pattern across the project by carrying water away from plants sensitive to excess water.

When drainage at a given site is impeded by soil compaction or by a high clay content or by a shallow impervious layer, berms are an appropriate solution. Care must be exercised in developing the soil specification for the berm. The soil should not be self-compacting, should remain friable when wet, should have a low erosion potential, and should have an adequate water-holding capacity for its volume.

Subsurface drainage or *underdrainage* design is required if the soil has limited natural drainage, unless the planting palette contains plants adapted to wet soils (Figure 5). Subsurface drainage design usually consists of tile or perforated plastic pipe laid on sloping grade at an appropriate depth to carry away excess water from the plant root systems (Figure 6). The drainage must be adequate to remove the amount of water contributed to the site by precipitation during the dormant season as well as any runoff water that infiltrates the profile. Agricultural engineers and agronomists have developed these techniques to a high degree, and many designs are appropriate for application to urban soils. All too often they are ignored.

If the planting is linear along a length of street, then the underdrainage can be continuous along the whole extent of the planting. Note in Figure 6 that the walls of the tree pit are flared outward to provide greater volume of loosened soil for lateral extension of the most important surface-feeding roots.

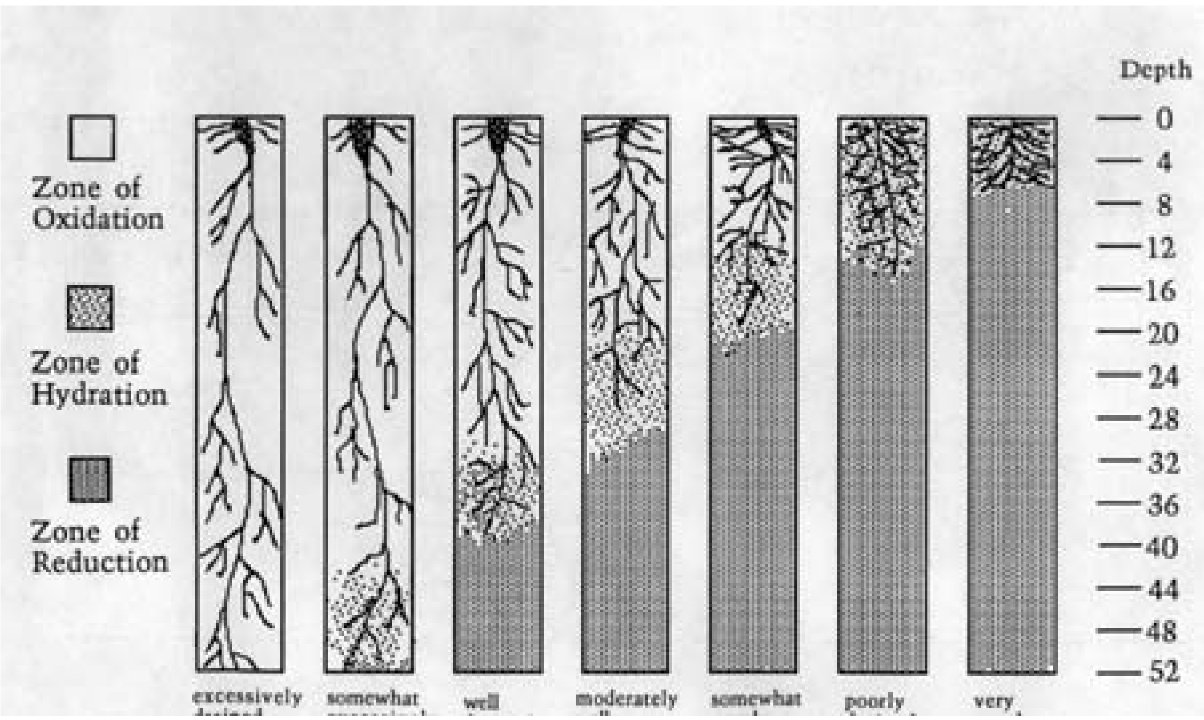

Figure 5. Soil drainage classes as used by the USDA Soil Conservation Service, National Soil Handbook.

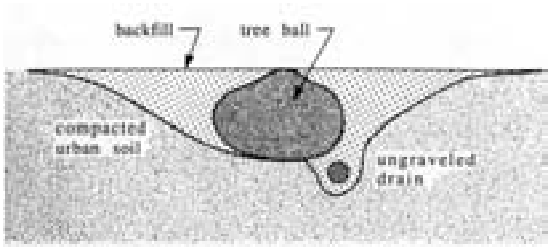

Figure 6. A typical application of underdrainage in an urban tree planting.

Appropriate Soil Rooting Volume

One of the major questions in urban tree planting in confined spaces is how much soil volume must be furnished for each tree. Because of design considerations, it is not simply a question of "the more the better." Most planting specifications follow the old dimensions of 4 feet by 4 feet, by about 2 feet deep (32 cubic feet). Many tree-planting pits in sidewalks and streetside situations are much smaller than these dimensions; the author has found some as small as 2 feet by 2 feet, by 3 feet deep (12 cubic feet), supporting very poor plant specimens. As far back as 1916, Cox recommended streetside tree pits with dimensions of 4 feet by 8 feet, by 2 feet deep (64 cubic feet). Kopinga (1985) found that 75 cubic feet was the minimum volume for adequate (but not optimum) growth of the American elm in the Netherlands.

Urban has examined the planting situations and tree-growth response of nearly 1500 trees in five major eastern cities of the United States. He shows that the healthiest and largest trees had about 600 cubic feet of soil

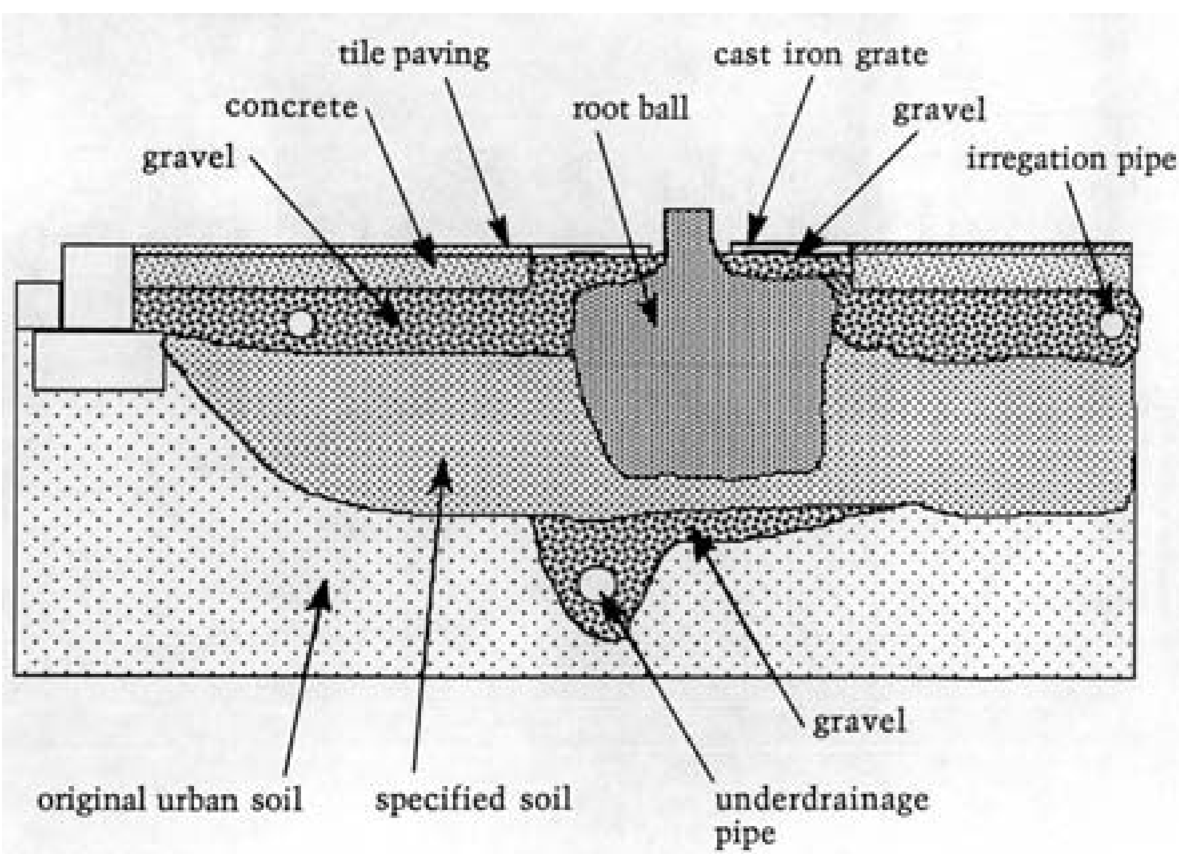

Figure 7. The Pennsylvania Avenue vaulted tree planting system.

available to them and that about 300 cubic feet was minimum for those trees with adequate vigor. It must be understood that trees planted in a favorable situation can be vigorous with much less space than 300 cubic feet. Obviously, open-planted trees do not suffer restricted rooting volume unless the surrounding soil is compacted.

Systems for Improved Drainage

Jewell (1981) reviewed various planting designs for sidewalk or paving-covered soil situations. A vault system that appears to be very successful is the one designed for Pennsylvania Avenue in Washington, D.C. (Figure 7). This design provides for aeration and irrigation of the soil under the sidewalk, encouraging the extension of roots into additional soil. The design shows a 14-foot-diameter irrigation ring over a soil that is 24 inches deep. The potential rooting volume is at least 307 cubic feet and may well be more. The specified soil extends from one tree site to the next, so that the tree roots may eventually share rooting space. The willow oaks (*Quercus phellos* L.) are growing well, and only a few have been lost since installation fifteen years ago. However, the design is expensive to construct.

Another technique for linear planting enhances rooting volume. In a design for Market Street, Philadelphia, Heidi Schustermann had long linear strips cut in the pavement and the soil excavated and replaced by specified backfill soil. Underdrainage was furnished for the entire length of the linear pit (Figure 8) and was connected with the storm-sewer system. The individual trees are now able to share rooting space, and the linear opening in the pavement allows the infiltration of more water than if the design were for individual tree pits.

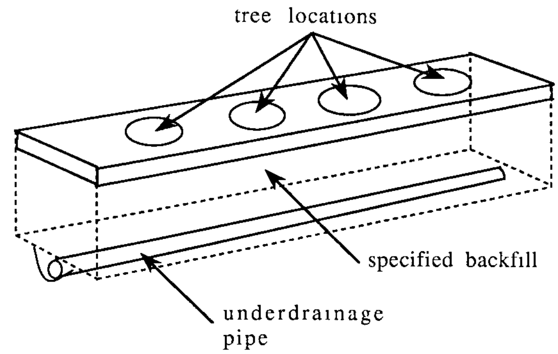

Figure 8. A linear streetside planting after a design by Heidi Schustermann.

Conclusion

The major problems of compaction, impeded drainage and aeration, and lack of adequate rooting volume, coupled with intermittent but severe heat-load stress, are present in most urban soil situations. Other urban soil characteristics include extreme variability in properties both vertically and spatially, elevated pH, presence of hydrophobic crusts, high soluble salt content, limited organic matter and organism population, interrupted nutrient cycling, and the presence of synthetic contaminants such as pesticides, heavy metals, building rubble, glass, and metal. Methods for the amelioration of compaction are available, but several are not applicable when plant root systems already exist. Careful planting design can overcome impeded drainage and poor aeration, and should also provide for adequate rooting volume appropriate for the situation.

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The Shy Yet Elegant Crabapple—'Blanche Ames'

Michael Yanny

The little-known *Malus* 'Blanche Ames' is both beautiful and unique.

In my travels throughout the United States and Canada, I have seen few trees that rival *Malus* 'Blanche Ames' for beauty and elegance. It has bloom qualities similar to the flowering cherries commonly seen in the eastern and western United States, and its graceful, slightly weeping form is reminiscent of the Japanese maples that I have always wanted to but cannot grow in the harsh Wisconsin climate. Yet even with its many superb attributes, few people know about 'Blanche Ames,' and very few nurseries grow and sell the tree.

The plant that was to become the future 'Blanche Ames' was selected by Dr. Karl Sax of the Arnold Arboretum from a group of open-pollinated seedlings of *Malus spectabilis* 'Riversii' that he had raised in 1939. Originally known as "Sax #6639," the tree was introduced into the Arboretum collections in 1947, but was not named 'Blanche Ames' by Dr. Sax until February 1955—to honor the noted botanical illustrator Blanche Ames, wife of the former Supervisor of the Arboretum, Dr. Oakes Ames.

As a young tree, 'Blanche Ames' is taller than its width, but with age, it broadens out to form a dome wider than its height. The original plant at the Arnold Arboretum, which was 15 feet tall (4.6 meters) at fifteen years of age, is now, at fifty years old, 23 feet tall and 31 feet wide (7 x 9.5 meters). By comparison, a 28-year-old specimen at Boerner Botanical Gardens in Hales Corners, Wisconsin, is about 25 feet tall and 25 feet wide (7.6 x 7.6 meters). In silhouette, the tree is very striking, with its purplish-brown limbs ascending upwards and outwards, like streams of water flowing from a fountain. In winter, the drooping maroon branchlets delicately mask the light gray trunks.

In southern Wisconsin, 'Blanche Ames' leafs out in early spring before most other woody plants, at about the same time as *Larix decidua*, in early to mid-April. About a month later, along with *Malus* 'Dorothea' and 'Profusion,' its crimson buds open to reveal white, semi-double flowers with a pink blush and a sweet scent. In full bloom 'Blanche Ames' creates a billowy, cloud-like impression. The individual flowers, about 1.3 inches in diameter (3.5 cm), are unique among crabapples: the approximately fifteen narrow strap-like petals, when open, reveal a center full of golden stamens. The fully opened flowers, which look something like *Rosa multiflora* blossoms, are exquisite when seen close up. The tree has been a consistent annual bloomer in the Milwaukee area, as well as in and around Boston.

The fruit of 'Blanche Ames,' while colorful, is not persistent enough to be considered a major attribute. The small, 0.3-inch-diameter (9 mm) crabapples color to a golden yellow by early September in Madison, Wisconsin. Within a month, the slightly elongated fruit changes to a cardinal red, though a small shaded portion of the fruit usually remains yellow. Late-October frosts soften up the tiny crabapples, turning them a garnet brown. By late November, most of the fruit is taken by birds, thus eliminating the need for any fruit

The original plant of 'Blanche Ames' in full bloom at the Arnold Arboretum. Photographed in 1987 by Peter Del Tredici.

clean-up. Fall color may vary from year to year: in Madison, Wisconsin, the foliage was an attractive orange-red in 1989, but in 1990 it was a disappointing yellow.

Disease Resistance

In any discussion of the ornamental potential of crabapple trees, disease resistance is of major importance. The response of 'Blanche Ames' to the three most serious crabapple diseases is as follows:

1. Powdery Mildew (*Podosphaera leucotricha*) is a foliar fungus disease that coats the new terminal growth of trees with a white powdery substance. The mildew causes leaves to become twisted, narrow, and cupped. It weakens terminal shoots, making them more prone to winter kill. This disease is a serious problem only in the hot, humid climates found in many parts of the southeastern United States. Unfortunately 'Blanche Ames' has not been evaluated to any extent under such conditions, and a meaningful disease rating cannot be given as yet.

2. Fireblight (*Erwinia amylovora*) is a bacterial disease and a major concern because of its ability to kill or severely deform susceptible *Malus* cultivars. The bacteria enter trees primarily through flowers, growing tips, and open wounds, transmitted by insects or by rainwater splash of the bacterial ooze. Once in the tree, the disease moves quickly through the vascular system. Symptoms of attack are a sudden browning or blackening of new vigorously growing shoots with a characteristic shepherd's crook bend at the tip.

Fireblight was reported on 'Blanche Ames' only twice in the twenty-seven years from

The flowers of 'Blanche Ames' are unique among crabapple trees. Photo by Michael Yanny.

1963 to 1990, and those infections were rated as mild. Ratings were done primarily in the Midwest, the East, and the Pacific Northwest; unfortunately, no trees have been evaluated in the Plains states where fireblight occurs with great regularity.

3. Apple Scab (*Venturia inaequalis*) is a fungus disease whose development is favored by wet, humid weather conditions. Symptoms include smoky gray spots on the leaves and brownish, corky spots on the fruit. Severely susceptible cultivars may be completely defoliated by mid-summer in many seasons. Mildly susceptible trees, on the other hand, show little evidence of the disease except for a few inconspicuous leaf spots.

'Blanche Ames' has had mixed reviews in terms of resistance to scab. Reports from the Pacific Northwest in 1985 indicate that 'Blanche Ames' is severely susceptible to scab and is therefore not a good tree for that climate. In the drier, less humid areas, such as the Plains and the Rocky Mountain states, apple scab is of little concern. Midwest reports from 1973 to 1990 show 'Blanche Ames' to be only mildly susceptible to scab. Reports from the East, based primarily on observations at the Arnold Arboretum, show 'Blanche Ames' to be only mildly susceptible to apple scab. However, on two occasions, in 1973 and again in 1979, severe scab was reported on single trees, indicating that continued evaluation is necessary.

Propagation and Cultivation

Propagation of 'Blanche Ames' has been done by chip-bud grafting onto seedling understock in late summer. Because 'Blanche Ames' stops

The winter habit of a forty-year-old specimen of 'Blanche Ames' growing at the Arnold Arboretum. Photo by Peter Del Tredici.

growing relatively late in the season, it should be one of the last ornamental crabapples to be budded. In Wisconsin good results have been achieved in mid-August. When budded on seedling understock, trees will send up sucker shoots from the stock. This can be an annual maintenance headache. For this reason, a non-suckering, clonal rootstock, such as ELMA 111, should be used. Another possible alternative may be the rooting of softwood cuttings, thus eliminating the understock altogether.

Like most ornamental crabapples, 'Blanche Ames' can be a tough, durable urban tree. The full extent of its hardiness, however, is unknown. Vigorously growing two-year-old trees planted in southeastern Wisconsin (USDA Zone 5a) showed some tip dieback on young branches, indicating the need for further hardiness testing in colder zones, as well as in the deep south.

'Blanche Ames,' with its many beautiful attributes, has numerous landscape uses. The tree can serve well as an accent or a focal point in the garden. Imagine 'Blanche Ames' in full flower in the distance, fronting a border stand of tall, dark-green Austrian pines (*Pinus nigra*). In this situation, the tree will stand out and give the border depth and dimension as well as multi-season interest. Another use might be as a specimen limbed up high enough to accommodate a garden bench; in time, its pendulous branchlets will make a wonderful private sitting area, the destination of a garden path. And finally, the graceful 'Blanche Ames' overhanging a pond will create spectacular reflections when in bloom. Indeed, there are many possibilities for this fine tree, and it seems unlikely that it will remain unknown much longer. But who knows? Obscurity may be the nature of the very elegant 'Blanche Ames.'

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BOOKS

Neil Jorgensen

Color in My Garden by Louise Beebe Wilder. Atlantic Monthly Press, 1990. Reprint of the 1918 edition. 316 pages. 24 color plates. Hardcover. $29.95.

They say that illiteracy is on the rise in America. A number of recent American gardening books tend to confirm this. The winning formula these days seems to be a lot of pretty pictures with a little filler text, mostly of garden platitudes, aimed at people with zero gardening experience. The use of large type in a number of these recent books suggests that their audiences are not only beginning gardeners but beginning readers!

Color in My Garden is just the opposite. Here we have a book that is mostly text—a book that demands its readers know the difference between a dahlia and a delphinium. But the most important difference is that *Color in My Garden* is a book of personal knowledge, knowledge that Louise Wilder gained by actually working in her garden.

Personal knowledge is what makes the writings of such garden luminaries as Gertrude Jekyll and Graham Stuart Thomas so valuable. So much of garden writing is a rehash—of other garden writing. Not only is her knowledge, gained as it was through her experience, more believable, but because Louise Wilder did her gardening near Suffren, New York, her experience is more useful to eastern American gardeners than that of Jekyll and Thomas, gardening as both did in the benign climate of southern England.

And she gives us much that remains useful today. She has an artist's eye for color and provides dozens of excellent perennial combinations. Like Jekyll, she recognizes the value of gray-foliaged plants to cool down hot colors. Writing of bare places in the perennial border, she correctly points out that the problem is not lack of flowers but lack of foliage. She also anticipated by seventy years the trendy use of ornamental grasses in the perennial gardens of today. There is so much more.

The chapter that most interested me, Color for the Shady Border, was unfortunately the second shortest in the book. This perhaps indicates how far shade gardening has come since 1918 (and maybe there is more on the subject in one of her other nine books).

The sheer amount of knowledge that Louise Wilder shares cannot be absorbed in one reading. *Color in My Garden* is a book to be dipped into time and again. It is the sort of book that gardeners—especially perennial gardeners—should own. The twenty-four color plates, keyed to a plan of her garden, show better than words what Louise Wilder was up to.

You've heard the good news; now for the bad news. On reflection, the bad news might be good news. Let me explain. *Color in My Garden* is a period piece. What modern readers might consider to be the book's shortcomings actually gives us some understanding of the gardening life seventy years ago. In those days, hostas were funkias, day lilies came only in orange and yellow, and hardly anyone had even heard of astilbes—false goatsbeards they were called. Between the lines, *Color in My Garden* is a nostalgic glimpse of a long-vanished era, of manicured formal gardens, of lattices and arbors and fountains, of garden houses where ladies probably drank tea following an afternoon stroll through the flowers—an era brought to an end by the Depression, World War II, and the changing lifestyle of the affluent. The misty color illustrations further help set this mood of times gone by.

Alas, the writing is of an earlier era, too. Typical of some garden writers of that time, Louise Wilder's style, in places at least, is excessively flowery. There is much too much of the "fairy flax" and the "dancing with daffodils" for my taste. But on balance, a wave of biliousness every now and then, occasioned by such gush as "the rarest embodiment of all that is delightsome, careless, touchingly fugitive," is more than compensated for by the depth and breadth of the solid information that Louise Wilder gives us when she's back on earth.

If you are *serious* about perennial gardening and can overlook the florid passages, you will find *Color in My Garden* both an inspiration and a practical guide.

Arnold Arboretum Weather Station Data — 1990

	Avg. Max. Temp. (°F)	Avg. Min. Temp. (°F)	Avg. Temp. (°F)	Max. Temp. (°F)	Min. Temp. (°F)	Precipi- tation (in.)	Snow- fall (in.)
JAN	36	18	27	62	13	3.52	7
FEB	43	20	32	65	0	3.84	17
MAR	51	29	40	80	7	1.33	4
APRIL	56	37	47	94	18	5.78	1
MAY	66	45	46	82	38	7.61	—
JUNE	78	55	67	88	44	0.83	—
JULY	83	63	73	94	52	4.62	—
AUG	82	64	73	96	54	5.95	—
SEPT	75	51	63	89	37	1.74	—
OCT	68	45	57	86	28	7.18	—
NOV	55	36	46	77	25	2.09	—
DEC	47	28	38	65	16	3.81	—

Average Maximum Temperature	62°F
Average Minimum Temperature	41°F
Average Temperature	51°F
Total Precipitation	48.3 inches
Total Snowfall	29 inches
Warmest Temperature	96° on August 5
Coldest Temperature	0° on February 26
Date of Last Spring Frost	28° on April 19
Date of First Fall Frost	32° on October 20
Growing Season	193 days

Note: According to the state climatologist, R. Lautzenheiser, 1990 was the third warmest year in the 120 years of record keeping by the National Weather Service. The fall was particularly mild, with October being the ninth warmest on record, November the seventh warmest, and December the warmest ever. Precipitation was 2.7 inches above normal and snowfall was 11.1 inches below normal.

NEWS

FROM THE ARNOLD ARBORETUM

May 19 is Lilac Sunday

But don't wait for the lilacs! Spring is already unfolding on the grounds of the Arnold Arboretum and in your own backyard. Have you spotted the bright yellow or rosy-orange of *Hamamelis* sp., Witch Hazel along your daily route of travel? Now is the time to hunt through wetland areas to find the purple-hooded skunk cabbage pushing through the frozen earth by creating its own heat. You can monitor spring's progress by observing the rapidly changing blush of color as the tender young leaf buds of katsura and willow and the inconspicuous flowers of maple respond to the beckoning call of sun and warmth. Don't miss the daily events of spring; take time to see the beauty as you drive, walk; and work.

Then join us on the grounds of the Arnold Arboretum for splashes of color provided by our collections of forsythia (mid April), magnolia and daffodils (late April), cherries and crabapples (early May), lilacs, azaleas, and the Dove Tree (mid May).

On Lilac Sunday the grounds of the Arnold Arboretum will be open for pedestrians only, with handicapped parking available from 11 am to 4 pm. Lemonade and food will be available on the grounds and a shuttle bus will take visitors from the Visitor Center to the lilac collection while Morris dancers and other entertainers perform for the crowds.

Flower Show Awards

This year at the Massachusetts Horticultural Society's Spring Flower Show, the Arnold Arboretum saluted the intrepid plant hunters whose scientific curiosity and love of beauty continue to embroider a colorful theme in the changing pattern of our gardens.

The Arboretum's award-winning exhibit presented a sampler of exotic plants, all originally discovered and brought back from the Orient, which are now striking year-round features in many New England gardens. Gold, blue and green species of *Chamaecyparis* formed a colorful framework for the elegance of tree peonies, the feathery spikes of astilbe, and the delicate texture and iridescent fronds of Japanese painted ferns. In the foreground, varieties of perennial hostas with their blue, green and gold foliage echoed the dramatic appearance of the false cypresses.

The Massachusetts Horticultural Society honored the exhibit with a Silver Medal and a Blue Ribbon for overall excellence, the Emily Seaber Award for design of a naturalistic garden, and an Educational Certificate.

The Arnold Arboretum would like to thank its many good friends in the landscape industry who made this year's exhibit possible. Capizzi and Co. of Acton hand-dug, balled and moved the large *Chamaecyparis* — the focal point of the exhibit. Kurt Tramposch of Weir Meadow Nursery lent his spectacular hostas, astilbes and ferns (they were of course forced in the Arnold Arboretum Dana Greenhouses), and Allen Haskell of New Bedford lent tree peonies and bamboos. We thank them for their generous support of our activities.

POST OFFICE SQUARE

Trees on Permanent Loan

Architect's model of pedestrian entrance to the underground parking garage and cafe in the new park at Post Office Square

"Sounds like an oxymoron to me!"

I was referring to the suggestion in a letter from Bob Weinberg that we put a part of our collection on "permanent loan" to a magnificent island of green soon to appear in the heart of the financial district of Boston. Bob is president of the Friends of Post Office Square, the folks whose vision has led to the development of this new city park placed above an underground garage just across the street from the Meridien Hotel.

Bob embarked on his hunt for "living art" from the Arboretum at the request of Norman Leventhal, chairman of the Friends (and of the neighboring Beacon Companies). Earlier that week Norman and I had met at a cocktail party. I, being a new director, suggested somewhat innocently that the Arnold Arboretum might be able to help with the Post Office Square project. "How about loaning us some trees," he quipped.

Tree moving equipment circa 1853. Illustration from The Tree Lifter, *by Colonel George Greenwood.*

A week later, as I rolled Bob's oxymoron over in my mind, it began to take on a nice ring. Each year we deaccession a number of trees that no longer meet the criteria of our scientific collections. They may be of undocumented origin or of questionable parentage. Or they may be unnecessary duplicates occupying needed space. Although falling short of our scientific standards, they may still be exceptional trees, truly works of art.

Suppressing my first impulse to sell the trees to Post Office Square, I saw emerging an interesting collaboration, a return, as it were, on the original investment by the City of Boston that enabled Professor Sargent and Frederick Law Olmsted to construct the Arboretum. In a sense, by "permanently loaning" the trees, we would be extending a piece of the Arboretum into the city.

"You have a deal," I said to Bob over the phone. "Now about your life insurance coverage for trees...."

Post Office Square Park has been beautifully designed by the Halvorson Company with an exceptionally rich palette of plants, providing a magnificent setting for our six spectacular specimens. Together Craig Halvorson and Gary Koller, our Assistant Director for Horticulture, chose appropriate trees that would otherwise be removed from our collections. Meanwhile Bob Weinberg and I worked over the formal language of a Cooperative Agreement for the Permanent Loan. Following the digging, transport, and planting of these trees this month, we shall assemble on April 7th at Post Office Square for a dedication ceremony symbolic of our 119- year collaboration with the City of Boston.

ART IN THE PARK

Trees on Loan

Western Arborvitae, Thuja plicata

Picea abies-This Norway Spruce is a duplicate in our collection. Standing nearly 40 feet tall, this tree displays a particularly upright and narrow form.

Thuja occidentalis-An American Arborvitae or Eastern White Cedar, now reaching 35 feet in height, it was originally described as the dwarf cultivar 'filiformis', and does not conform to the published description.

Quercus rubra '-Though the mother of this 25 year old hybrid grown from seed is variety 'maxima', the father is unknown and probably not a Red Oak.

Thuja plicata-Two magnificent Western or Giant Arborvitae that could reach 200 feet in their native Pacific Northwest. Neither tree conforms to our accession policy of growing trees from documented wild sources.

Downy Birch, Betula pubescens

Betula pubescens- This Downy Birch, grown from seed collected in Poland in 1964, came to the Arboretum under an assumed name that clearly is not correct.

Members' Plant Dividend

Forsythia x intermedia 'Gold Leaf'

At the end of March, dozens of volunteers gathered to package and mail dormant bare rooted seedlings of this unique yellow-leaved forsythia. A benefit of membership, the plants are mailed to all Friends unless they have notified us that they do not wish to receive this benefit.

Forsythia x intermedia 'Gold Leaf' provides season-long color in shaded gardens by following its large yellow flowers with bright lime-green leaves. On cloudy days and at twilight, the lime-green foliage catches the low levels of light and virtually glows.

The first specimen was sent to the Arnold Arboretum by Mr. Robert Walters of Decatur, Illinois, who discovered that a single yellow-leaved branch of an old hedge had taken root where the branch rested on the ground. After studying the plant's hardiness and stability of color, the Arnold Arboretum introduced 'Gold Leaf' to the nursery trade in the 1980's.

For additional information on this plant, see the information brochure enclosed with your plant dividend or call the Membership Department, (617) 524-1718, for a copy.

Tree Cheers for Kids Poetry Contest

In honor of Arbor Day, the Children's Program is again inviting Boston area school children to write poems that celebrate the importance of trees in our environment. Last year over 3400 third- through sixth-grade students, representing forty-one school districts, took part in this contest.

Children who submit a poem will receive a certificate of merit appointing them "Bard of the Arnold Arboretum of Harvard University." Five authors will be chosen "Poets Laureate" and will be awarded certificates and special gifts by an Arnold Arboretum representative who will visit the winners' classrooms. All poems will be displayed in the Hunnewell Visitor Center beginning April 22.

In its fifth year, the Tree Cheers for Kids poetry contest is designed to encourage children to explore their own connection with the natural world, to observe the environment they live in, and express their ideas and feelings in writing.

1990 poetry contest participants planting a tree to celebrate Arbor Day

Prelude to Spring

Treat your group to a spectacular photographic glimpse of the first signs of spring: lush new leaves unfolding in the morning dew, purple-hooded skunk cabbage, sticky new leaf buds, fuzzy catkins, Dutchman's Breeches, Jack in the Pulpits, magnolias, maple flowers, toads, turtles, dragon flies, and many more local flora and fauna.

Al Bussewitz guides you through this delightful and educational look at the wonders of nature by using quotes from Thoreau and his own poetic commentary.

A thirty-minute slide show with synchronized narrative tape, "Prelude to Spring," is available for a rental fee of $25. *Call Jim Gorman at (617)524-1718 for more information.*

Bookstore New Arrivals

The Prairie Garden: 70 Native Plants You Can Grow in Town or Country, by J. Robert Smith with Beatrice S. Smith, $9.95. This is a hard to find classic.

Collecting, Processing and Germinating Seeds of Wildland Plants, by James A. Young and Cheryl G. Young, $24.95. A new book on this timely subject.

Perennial Garden Plants or The Modern Florilegium, by Graham Stuart Thomas, $39.95. The new 3rd edition.

Members receive a 10% discount in the bookstore. Stop by or call for mail order information, (617) 524-5383, daily 10 am to 4 pm.

SINOCALYCANTHUS CHINENSIS