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# Bulletin No. 21: Energy Conservation on the Home Grounds: The Role of Naturalistic Landscaping

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# ENERGY CONSERVATION ON THE HOME GROUNDS

## THE ROLE OF NATURALISTIC LANDSCAPING

NATURALISTICALLY LANDSCAPED AREA IN THE CONNECTICUT ARBORETUM

THE CONNECTICUT ARBORETUM
CONNECTICUT COLLEGE

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Cover Photo: Naturalistic Landscape Demonstration area, 1967. W. A. Niering

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## THE ROLE OF NATURALISTIC LANDSCAPING

*Edited by*

**William A. Niering**

and

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CONNECTICUT ARBORETUM JULY 1975

# FOREWORD

As we enter a new era of environmental awareness concerned with the need to conserve energy and essential resources, it would seem appropriate for the home owner to examine critically his practices with respect to the care and maintenance of his home grounds. Across our nation approximately five million acres of lawn, ranging in size from a few square feet to an acre or more, are mowed frequently and meticulously manicured. It is estimated that Americans spend three billion dollars annually in lawn maintenance. We use three million tons of fertilizers on our home lawns, cemeteries, and golf courses across the nation, while millions of people are suffering from malnutrition in the underdeveloped countries due in part to shortages of commercial fertilizers for crop production.

These extensive man-made mini-monocultures have today become a luxury that affluent countries are beginning to question in light of more urgent priorities. The collective impact of eliminating commercial fertilizers on lawns of the United States would amount to an annual saving larger than the quantity used on all the agricultural land of India! It should also be recognized that the production of fertilizers is a high energy-consuming process. In fact, thirty-eight Senators submitted in 1974 a resolution to the President recommending that fertilizer use be abated on home lawns, so that this vital resource may become available for food production, especially by underdeveloped countries. One pound of fertilizer can produce ten pounds of food in an underdeveloped country.

As one examines more closely the environmental problems associated with intensive lawn care, other issues emerge. Power mowers are most commonly used. Fossil fuel is consumed and noise pollution results. When self-propelled or riding mowers are used, there is an additional resource usage in the construction of the mower, as well as additional energy consumption. The popularity of a riding mower, stimulated by Madison Avenue techniques, has made it almost a status symbol among home owners. This is not to infer that power mowing equipment is not needed in certain situations. However, in many cases it is not essential and the health and vigor of the family might well be enhanced if a hand-operated mower were utilized.

This bulletin addresses the issue of decreasing the size of the lawn by utilizing low-maintenance naturalistic plantings. Ecologically sound energy-saving techniques are presented which will be useful in suburban and semi-rural settings.

I wish to acknowledge the continuous and dedicated assistance of Mrs. Nancy Olmstead in typing & editing this bulletin.

William A. Niering

Director

# THE LAWN

WARREN G. KENFIELD*

*I really like Lawns. They have the pure clean simplicity of a freshly painted floor, or a bolt of mono-colored cloth. I like them as I like sheathing evening gowns on other men's women, beautiful to look at, but horribly expensive to support. The economic theory of "cost vs. benefits" is apropos. I prefer a bed of moss, the subtle satisfaction of a stretch of periwinkle, or the inviting expanses of an unmowed grassland rippling in the breeze.*

*The Lawn is one of the most interesting sociological and psychological phenomena of our times. It is a sort of living fossil, having evolved several thousand years ago in the history of our Western European culture. Not a fossil in the sense of the coelacanth, which fish, until found recently off the African coast, had been considered extinct for 70 million years. It is still very much at home in those waters. Lawns, to the contrary, are kept alive only by an exorbitant amount of nursing and babying, otherwise they would disappear, to become as extinct as the dodo:*

*The Lawn arose early in our cultural history, certainly before the days of gardeners and landscape architects. When we first domesticated cattle, goats and sheep, we kept them fenced and tethered close to the hearth. This action was to protect them from marauding animals, especially human neighbors. (The custom of fencing still persists, for tho we have made the former animals extinct, the latter still exist.)*

*Vegetationally, the practice was a logical and esthetic coincidence. The hooves of the animals compacted the soil to walkable firmness. By their excretions, a high fertility-level was maintained. By trampling, only grasses survived. By grazing, a close-cropped sward was maintained. The result: a Lawn, a beautiful expanse of emerald green.*

*Times have changed. The original top-soil has been exchanged for "fill", called top-soil by the man who sells it to you. The tethered front-yard cow has vanished, replaced by chemical fertilizers and herbicides (quite fine in their limited way) and by mechanical monsters (that keep the repair man busy, even when Junior does not pour water in the gas tank). The Lawn? A living fossil in a modern human zoo.*

* *The Wild Gardener in the Wild Landscape, The Art of Naturalistic Landscaping.* Hafner Publishing Co., New York and London, 1966.

## GETTING A MORNING'S SLEEP — FREE OF NOISE

One Friday evening a homeowner in a densely populated Washington suburb stopped in at several of his neighbors to borrow their power lawnmowers. By the time he had collected the third mower the owner asked, "What are you planning to do with all the mowers?" His reply, "I am planning to get a good morning's sleep!"

# CASE HISTORIES

RICHARD H. GOODWIN, SALLY L. TAYLOR
BETTY F. THOMSON, *and* WILLIAM A. NIERING

## CASE I: REDUCING THE LAWN

This case history will illustrate what can be done on less than an acre where lawn dominated the front and rear of the house when acquired by the owner a decade ago. First, the front walk leading straight from the street to the front door was removed and replaced by an s-shaped brick walk leading from the driveway to the front door along the foundation planting.

In order to screen out the street, hemlock, white pine, and red cedar were planted with Japanese barberry along the road (Fig. 1). The barberry, red cedar, and white pine were dug out of old fields and the hemlock was salvaged where a highway was planned. Attractive accent trees such as white birch, Blue Atlas cedar, Cryptomeria, purple beech, flowering dogwood, red-stemmed dogwood, azaleas, and viburnums were set in front of this evergreen backdrop. The kitchen and bedroom windows look out into this outdoor "living room" of greenery. A view from the driveway into this semi-private front lawn can be seen in Fig. 2. The lawn space remaining is just adequate for a badminton game and provides the house with protection from a possible grass fire.

Over a 10-year period this planting and the growth of the foundation planting have reduced the front lawn by two thirds and serve as a setting for annual and perennial flower plantings. Thus a relatively private outdoor living area has been created in the front of the house, with attractive views from all rooms. Spring flowering crocus have been set within the lawn. Daffodils in flower beds are followed by summer annuals and perennials that surround the small green carpet of lawn that persists. About half of the remaining front lawn has been allowed to revert to wild grasses and mosses where the fragrant wild rose lends a lovely pink each season.

Along the north and south ends of the property white pines form a mini-pine stand and provide a screen from adjacent houses. The back lawn was originally a back breaker, a 100 x 150 ft continuum requiring mowing weekly. Today a tree-shrub border encloses the property on three sides, a continuously expanding vegetable garden has taken a considerable area, and the remainder of the lawn farther from the house has been allowed to revert to natural grassland. Trails wind through the area to the garden and shrub-tree borders. The grassland after seven years is primarily dominated by perennial grasses and colorful summer wild flowers. Daisies, yellow hawkweed, wild carrot, asters, and goldenrod all add their natural splashes of color. Several small clumps of blue iris and blazing star have been planted and add a further accent of blue or purple during the summer (Fig. 3). The diversity of grasses is especially beautiful in early summer.

Maintaining the grassland against the invasion of woody species has been a minor maintenance problem which involves the periodic pulling of wild black cherry seedlings whenever visible above the grassland.

As in the front, only a narrow strip of lawn persists between the foundation plantings and the natural grassland. Weeping cherries and gray birch serve as accent specimens. A small putting green set within the narrow mowed belt provides many hours of recreation for the family.

*Fig. 1. Street planting: shadbush (left) and white pine (right) on either side of driveway entrance. The low evergreens are Pfitzer junipers. The pine is flanked to the left by red cedars, to the right by hemlock (Fall, 1974).*

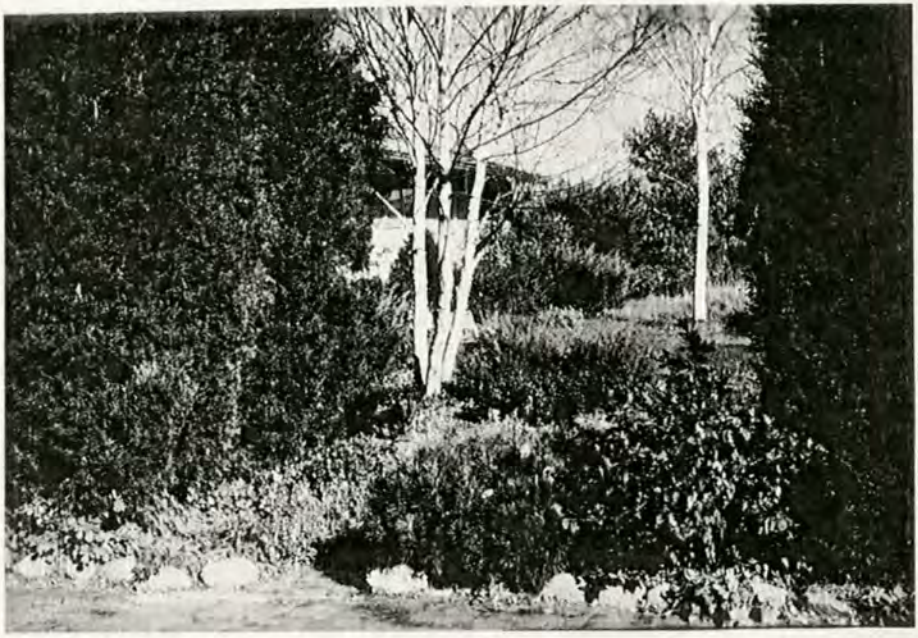


*Fig. 2. View from driveway toward the mini-front lawn which occupies the space between the roadside planting (Fig. 1) and the foundation planting. Wild, unmowed grass lies beyond the single-stemmed white birch. Evergreens in the foreground are red cedars (Fall, 1974).*

*Fig. 3. The back "lawn" mostly converted to a wild grassland. Orchard grass is in foreground with several clumps of hardy iris (one clump center foreground, others beyond). Near the house pitch pine (left), gray birch, mountain laurel (flowering), red cedars, blue spruce, and weeping cherry have been set within or around a narrow strip of lawn (June, 1974).*

*Fig. 4. Winter aspect with naturalistic little bluestem grassland (foreground) surrounding the narrow strip of lawn next to the house.*

# SOME ATTRACTIVE PLANTS REQUIRING MINIMAL MAINTENANCE

Most of the following plants are native to the northeasten United States; those introduced are so indicated. All, including the exotics, are extremely hardy and free of insect pests that frequently plague many of the ornamental plants. All have usefulness in naturalistic landscaping or in decreasing the size of one's lawn. Some of their attributes are indicated. Additional information for those marked with an asterisk can be found in Dr. Elger's article.

## FERNS

*__Hay-scented fern__ *(Dennstaedtia punctilobula)*: Attractive, delicate, yellow-green fern, tolerant of dry, sunny openings.

__Sensitive fern__ *(Onoclea sensibilis)*: Typical of wet spots. After the first frost the interesting brown bead-like stalks of the fertile fronds stand out strikingly.

__Cinnamon fern__ *(Osmunda cinnamomea)*: Characteristic of wet, swampy areas. A large fern found in clumps with tan cinnamon-like fuzz on the fronds. Fertile frond is a separate tan-colored stalk providing spores.

__Interrupted fern__ *(Osmunda claytoniana)*: Similar in habitat and general appearance to the cinnamon fern except for a distinctive interruption in the frond by several spore-bearing leaflets.

*__New York fern__ *(Dryopteris noveboracensis)*: A small, light green fern loving moist situations, with fronds that taper to a point at both ends.

## GRASSES

__Red top__ *(Agrostis alba)*: A fine, delicate, perennial grass of great beauty, found in open fields. Native of Europe.

__Little bluestem__ *(Andropogon scoparius)*: Late summer maturing, tussock-forming grass with striking yellowish-tan winter tones (Fig. 4). Typical of dry fields. Periodic burning increases vigor and beauty as shown from Arboretum research on prescribed burning. Fire breaks are needed where there are sizeable stands, since it is a fire type.

__Sweet vernal grass__ *(Anthoxanthum odoratum)*: Spring flowering, sweet-smelling grass of old fields. Native of Eurasia.

__Pennsylvania sedge__ *(Carex pensylvanica)*: Low growing, 3-ranked, yellow-green grass-like tufts of leaves. May develop in open, dry woods, especially on dry, sunny slopes or in fields.

__Hair grass__ *(Deschampsia flexuosa)*: Hair-like grass with fine, delicate flowering clusters of great beauty. Typical of dry, sunny openings.

## EVERGREEN GROUND COVERS

*__Pachysandra__ *(Pachysandra terminalis)*: Ideal ground cover; self-sustaining, as shown in Fig. 5. Japan.

*__Myrtle, Periwinkle__ *(Vinca minor)*: Creeping, dark green plant with attractive blue flowers. Ideal substitute for grass, especially in shady spots. Europe.

Over the years the back lawn has been reduced to a fifth of its original size. Therefore, as a result of plantings and of allowing portions of the lawn to revert, a hand mower is now adequate. Over most of the property a self-maintaining set of landscapes with great diversity and relatively low maintenance has been created.

## CASE II: A HOUSE IN THE WOODS

In Waterford, Connecticut, a contemporary, cedar-sided house was constructed in 1969 in a woodland consisting of young black oak, black birch, hickory, and red maple, with an understory of dogwood and mountain laurel. Here the owners, in order to reduce their feeling of claustrophobia, have gradually pushed back the forest border. Sloping banks adjacent to the house site have been planted with native rhododendron, bearberry, juniper, and bayberry, and were heavily mulched with wood chips to eliminate weeding chores. The deciduous woodland has been judiciously thinned and underplanted with evergreen mountain laurel for accent. The trees remaining in the area around the house have been high-pruned to make light more available to understory plantings of native azaleas and to improve air circulation in summer. Tall unsightly dogwoods, which grew up in a crowded early forest, have been removed, and smaller specimens have been allowed to assume their natural shape within the openings.

The forest floor initially had maple-leaved viburnum, low blueberry, poison ivy, and several species of attractive ferns (Christmas, New York, grape), as well as small oak and dogwood seedlings. The poison ivy has been selectively eliminated with herbicides. Rough mowing twice a season with a sicklebar, the first after the English bluebells and wild geraniums have flowered, has promoted some grass cover and moss mats. This type of management has converted the forest to an intermediate state of open clearings with scattered large trees, clusters of native deciduous azaleas and laurel, and clumps of fern. Unwanted weedy species have been eliminated by mowing before they have gone to seed; and it is surprisingly easy to dodge the fern clumps and seedlings one wishes to preserve. Oak and dogwood saplings have been saved. It is hoped that these will eventually replace the shallow-rooted maples. A planting of hemlocks around the periphery of the property will, in time, give privacy from traffic along the road.

One small lawn area located over the septic system has been bounded in part by a planting of daylilies and in part by a well-defined woodland garden—features that bring to an end the temptation to embellish the remaining five acres of woodland, which thrive on neglect. This woodland is traversed by a path which has been embellished with native wildflowers. One trip a season with pruners in hand keeps this trail in fine shape.

## CASE III: EXPLOITING ROCKS AND SHADE

Another home site in Waterford, Connecticut, was characterized by an abundance of attractive rocks, both bedrock and boulders, steep slopes, and a dearth of soil. The existing vegetation was young woodland, with some sizeable trees and many smaller ones, as well as native shrubs. The long range objective here was a fairly natural look with minimal maintenance. Rocks and shade dictate the details. Grass has been limited to a few relatively sunny areas that have a certain amount of foot traffic, a strip along the road, and an area around the deck.

*A woodland naturalistic setting, where removal of undergrowth gives a beautiful, open, minimal-maintenance landscape. Further embellishment with evergreen shrubs could be used to advantage.*

Two enterprises are special on this place. One is encouraging moss wherever it can be coaxed to grow. Where the grass beyond the lawn thins out in the shade, a mossy carpet is now developing nicely. In the early stages this takes a certain amount of weeding; but what is more pleasant on a hot summer afternoon than sitting in a shady glade editing a soft, mossy carpet?

The other special activity is the exploitation of exposed rocks. One sloping expanse of bedrock provides most of the walkway to the cellar door. Another broad knob serves to delimit the edge of the rear lawn. Most of the boulders are lying just where the glacier dropped them, but they have been supplemented by those that came out of the cellarhole. The only artifice about these rocks is the construction of planting pockets among them. These pockets were made out of firewood logs cut during the thinning of the woods on the place and supplemented with some of the more portable rocks. The "soil" is essentially oak leaves in various stages of decomposition.

The local woods are dominated by oaks, and the annual production of leaves is truly formidable. But the "planters" plus an endless number of less organized nooks and crannies can absorb an astonishing bulk of leaves when these are firmly pushed and poked in with trowel, stick, or fingers. The rest of the annual bounty filters in among shrubs and groundcovers or is simply left on the floor of the woods.

Shrubs on the place are mostly laurel, azaleas and their kin, planted small so they can find their own root runs. As these grow and the annual game of "musical bushes" ends, much of the lot will need nothing but judicious neglect. The slope of fill that had to be built to cover the waterline (since there was nothing to dig a trench in) is covered with periwinkle, which absorbs its share of autumn leaves and should soon be able to smother its own weeds and look after itself. As the plantings around the lawn develop and are allowed to expand, the grassy area will decrease to a minimum. Already it needs only a weekly going-over with a push-it-yourself mower.

## CASE IV: PRESERVING THE PASTURE

A modern house, framed in salt-box style, was sited in a ledgy pasture behind a massive lilac hedge and an old stone wall in a rural section of East Haddam, Connecticut. The builder very cooperatively managed to avoid disturbing most of the immediate surroundings of the site during excavation and construction. A six foot wide strip of stepping stones and grass along the front of the house leads to the doorstep. Beyond this lies a narrow slope of rocks and pasture that has maintained itself in this condition for the past fifty years. The lawn is limited to the six-foot strip and a small terrace to the west of the house—a maximum of 900 square feet. The grassland has not been touched for six years, since the completion of the house, except for the removal of some Japanese honeysuckle and poison ivy. Over 35 species of wildflowers (weeds?) have been enjoyed in this natural border.

## CASE V: FIFTY YEARS IN THE SHADE

A side yard in Brookline, Massachusetts, heavily shaded by oaks, was planted to Pachysandra in the early 1920s. After over fifty years of neglect this attractive evergreen ground cover still embellishes some 2000 square feet of space (Fig. 5). An added feature in favor of this planting has been its ability to absorb all the annual leaf fall from the oak trees. Indeed, the vigor of Pachysandra is enhanced by these leaves, which shake down between the upright shoots and are soon recycled into black mulch—No raking, no fires, no plastic bags, and no fertilizer! This has been an exhibit of wide acclaim.

*Fig. 5. A portion of a bed of Pachysandra ground cover that has been untouched for fifty years.*

## CASE VI: THE ULTIMATE IN LAISSEZ-FAIRE.

Part way down a suburban street in Falls Church, Virginia, lined with houses that are fronted with conventional lawns, may be found a fairly mature woodlot, with trees practically to the curb. Along its edge a narrow drive leads back through the forest where one can discern the dwelling. Here the family lives at peace with the environment, if not with the neighbors; and the grounds become increasingly distinguished with age despite the frequent absences of the proprietor, who is one of the country's most knowledgeable and travelled botanists.

## EXCESS USE OF NITROGEN — UNBALANCING NITROGEN CYCLE

From "Threats to the Integrity of the Nitrogen Cycle: Nitrogen Compounds in Soil, Water, Atmosphere and Precipitation," by Barry Commoner. In *Global Effects of Environmental Pollution*. S. F. Singer, ed. Springer Verlag New York, Inc., New York. 1970. pp. 70-71, 90-91.

"The natural nitrogen cycle in the U.S. has been stressed by the growth of urban population in the last generation. . . . The nitrogen cycle is very vulnerable to human intervention. In the U.S., the overall annual nutritional turnover of nitrogen amounts to about 7 or 8 million tons. At the present time technology and agriculture introduce into this cycle about 7 million tons of nitrogen compounds from chemical fertilizers, and about 2-3 million tons of nitrogen compounds generated by automobile exhausts and power plants. . . . In the United States, during the last 25 years, the annual consumption of inorganic nitrogen fertilizer has increased about 14-fold and automobile activity has increased about three-fold. . . .

"In heavily farmed areas, nitrate due to fertilizer makes a major contribution to the inorganic nitrogen content of surface waters, and in many places is responsible for water pollution through eutrophic stimulation of algal growth. This process is now a serious source of environmental pollution. In heavily farmed areas, the nitrate level of surface waters and wells often exceeds the public health standards for acceptable potable water, resulting in a risk to human health from methemoglobinemia. Some vegetable products in the United States and Canada, including certain baby foods, with a significant frequency, exceed nitrate levels recommended for infant feeding by pediatricians. European studies indicate that excess nitrate levels in such products are usually the result of intensive use of nitrogen fertilizer. The inorganic nitrogen content of precipitation has increased noticeably in the last 25-30 years due to nitrogen oxides released from the soil and produced by automobiles and other combustion processes. . . .

"In sum, we have in the United States, thrown the nitrogen cycle seriously out of balance. As a result, the oxidized forms of nitrogen, which are in nature maintained at low, steady-state concentrations in air, water, plants and animals have been elevated to levels which threaten the integrity of major processes in the ecosystem and vital biological processes in animals and man. The present stress on the nitrogen cycle has already produced important environmental hazards and carries the risk of equally serious medical hazards. Clearly, corrective measures are urgent."

# NATURALISTIC LANDSCAPING IN THE CONNECTICUT ARBORETUM

WILLIAM A. NIERING

If one has a half acre or more of land which is in an old field or thicket phase of development as a result of abandonment from agriculture, one is in an excellent position to initiate a project in naturalistic landscaping. Such a situation presents the opportunity of learning some of the more interesting wild plants around your home and there to begin creatively to accentuate the most attractive species and to eliminate selectively those that will not enhance your semi-wild landscape. This operation is in lieu of creating more lawn or of letting the area develop into a forest, although the latter alternative will result in a self-maintaining type in the northeastern United States and is thus recommended as another way of producing a naturalistic setting, as shown on pages 14 and 15.

By selectively eliminating certain species of trees you can preserve many lovely shrubs, low-growing trees, grasses, and other showy broad-leaved plants that would normally be shaded out by the competition of forest trees. You will also encourage the songbirds and other wildlife typical of a habitat where scattered shrubs and grasses intermix. You will be creating the so-called "edge effect", long recognized as a habitat rich in wildlife. And you will also be surprised at how little work is needed in maintenance once the initial tree growth has been eliminated.

With increased caution being exercised in the use of weed killers, some home owners may be reluctant to use herbicides. If one does not wish to use weed killers it is possible to cut unwanted woody growth periodically, but most species (except evergreens) will resurge, necessitating continued maintenance. Another technique which Dr. Frank Egler has found especially satisfactory is girdling. This involves the removal of a complete section of bark around the tree with an axe during any season, or literally pulling off sizeable sections of bark in the spring when the tree is actively growing. Such trees can be left standing to die in place. If herbicides are employed, they should be selectively applied as outlined in Arboretum Bulletin No. 14.[1] However, the use of herbicides in selective basal or stump applications is highly effective. Stem-foliar techniques are not advised. For further information on maintenance the reference by Kenfield[2] is recommended.

A brief review of our naturalistic landscaping project, which has been underway for over two decades at the Connecticut Arboretum, will serve to illustrate the potential of this technique on your home grounds. In 1953 we selected a half acre within an abandoned orchard that was rapidly reverting to forest. By selectively removing the less attractive trees, especially wild cherry, and leaving the more attractive shrubs, a beautiful semi-open naturalistic landscape has been created. Within a matrix of wild grasses and goldenrods are scattered shrubs of highbush blueberry, viburnums, huckleberries, gray birches, red cedars, and flowering dogwood. Depending upon your site, butterfly weed, black-eyed Susans, daisies, asters, ferns, and other beautiful old-field species can be preserved by this technique. The diversity of interesting plants that can be present and preserved is outlined on pages 22 to 26.

*Students working in one of the Arboretum's naturalistically landscaped areas. The open grassy area is separated from the trail by a border of goldenrod. In the foreground a sourwood has been planted for an accent. A step-like progression of shrubs and trees is in the background. The darker columnar tree is a red cedar.*

The autumnal aspects of our Arboretum area are especially striking, as revealed on the front cover of this bulletin. Highbush blueberry and huckleberry lend their distinctive reddish tones and hold their leaves late into the fall. On the tall columnar red cedar, Virginia creeper adds a spark of red within the dark green. In winter the evergreen cedars and the spreading trunks of gray birch lend a striking contrast to the tans of dried grasses. In spring the flowering dogwood bursts forth in a cloud of white. This is the potential in store for you.

A basic reconnaissance is your first step. A tree and shrub identification guide may be helpful in enabling you to compare your species list with ours. Then begin to eliminate certain trees, to open up vistas and to plan accent points along your trails. You may even wish to introduce certain species that you especially like such as the blue iris (*Iris sibirica*) planted in the old field around the home (page 7). You will be amazed at the beauty you can create on your home grounds. Wildlife will be attracted and future maintenance will be minimal. Two decades of experience at the Connecticut Arboretum have demonstrated that such a setting can be beautiful and environmentally sound.

[1]Niering, William A. and Richard H. Goodwin. 1963. Creating New Landscapes with Herbicides. Conn. Arboretum Bull. No. 14, Connecticut College, New London, Conn.

[2]Kenfield, Warren G. 1966. *The Wild Gardener in the Wild Landscape, The Art of Naturalistic Landscaping*. Hafner Publishing Co., New York and London.

*The sloping thicket selected for naturalistic landscaping on the Matthies Tract of the Connecticut Arboretum. The first of a sequence of four views. Sumac and wild black cherry with mixed grasses in foreground. Note the red cedar and gray birch (Photo 1953).*

*The naturalistically landscaped demonstration area five years after its establishment. The more attractive columnar red cedar and gray birch have been accented in a relatively open matrix of grass and scattered shrubs. The two planted white pines in the foreground were subsequently removed (Photo 1958).*

*The naturalistically landscaped demonstration area ten years after establishment. Flowering dogwood has been highlighted. The red cedar to the right is the same one visible in the 1953 photograph. A flowering highbush blueberry is the lighter shrub in front of the cedar. Little bluestem grassland dominates in the foreground (Photo Spring, 1964).*

*1967. The naturalistically landscaped area after nearly 15 years of management. The aspect is still relatively open. Notice the increased development of the red cedar and gray birch visible in the 1953 photograph. Grasses and goldenrod are in the foreground; low clonal huckleberry and tall highbush blueberry; beyond, cedars and birches. Currently the area appears the same and requires little maintenance (Photo 1967).*

# THE HOME LAWN: BOTANICAL ABSURDITY

FRANK E. EGLER, *Aton Forest, Norfolk, Connecticut*

I am a botanist, with my heart as well as my mind rooted in my profession. I believe that I enjoy the beauties of a well-kept lawn (somebody else's lawn) fully as much as the proudest home owner or landscape engineer. The expanse of smooth continuous green is truly a thing of beauty, especially as a setting for marginal flower beds and shrub borders, as a frame for a home of stunning architecture.

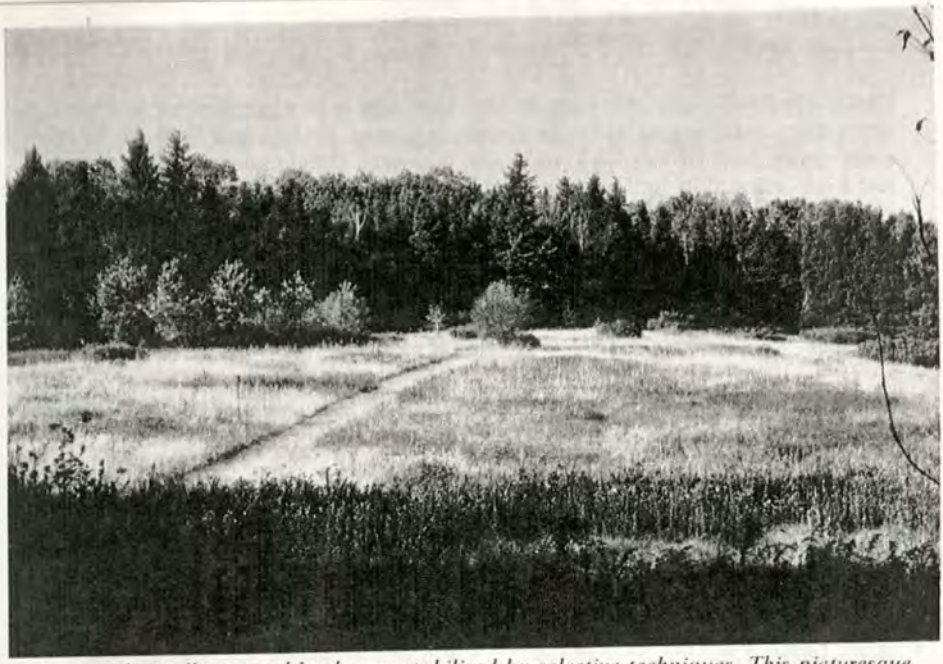
I am a botanist, and yet I feel that the subject, not only as one involving energy conservation, but also as being a superb example of a way of life that reached its peak in the Age of Affluence, now ending[1], is well worth the consideration being paid to it in this bulletin. Lawns, in their way, bear much in common with another flair of Americans for conspicuous consumption, our burgeoning predilection for animal pets in the home.[2] Indeed, the two are often ecologically related, as when the neighbor's dog decides your prize shrub is more attractive than a fire hydrant. In these broader aspects, the problem of the lawn is also asking for the opinions and judgments of the psychologists, sociologists, anthropologists, and economists, as well as satirists and cynics. Botanists alone cannot solve the problem.

There is nothing new in the idea that the home owner can minimize or dispense with that tremendously energy-consuming luxury, the lawn. I need only mention the names of two widely known and respected conservationists who years ago gave up the idea, on the principle that other ecological approaches actually had many advantages. They are the despair, or envy, of their neighbors. Richard H. Pough is surrounded by be-lawned houses on a fine quiet street in Pelham, N.Y. When I last saw his home, there was not even a weed-grass to be pulled out. Mrs. Ruth Scott, the conservationist of the Pittsburgh region, serves on several national boards of governors, has never succumbed to the lawns of her neighbors across the road and down the hill. With trees warmly overshadowing her house, the leaves fall and blow where they will, while woodland herbs grow prolifically, and the birds neverendingly scratch for grubs. My own home is no proper example: I live on a Natural Area, at the edge of a 5-acre seminatural clearing.

* * * *

As a professional plant ecologist, it is my contention that much of the lawn area of the average American home can be converted most advantageously to various plant-communities. These other plant-communities will require no fertilization (even if the land is sterile subsoil), essentially no weeding (and thus no spraying, even though I have no objection to the "scalpel use" of certain herbicides, as drugs are used in hospitals), no mowing (with capital-expensive, maintenance-requiring, gas-guzzling, exercise-eliminating monsters). Furthermore, there are true advantages to this way of life. Wild and naturalized flowers can bloom untended, as I have learned from that maverick Kenfield[3]. Bird food and cover can be enhanced (unless your sole interest is robins). Flowering and fruiting shrubs can supply both you and the birds. Even the sugar maples can supplement the cartel-cornered sugar supply of 1975.

What are these plants which I recommend? They are plants which I have been observing and studying for many years, some of which go back to 1927. I am scientifically interested in their establishment, their spread, their stability (resistance to invasion by unwanted "weeds"), their values of all kinds, as opposed



*A naturalistically created landscape stabilized by selective techniques. This picturesque hillside is located in northwestern Connecticut. It was last mowed in 1944. Notice the essentially self-maintaining aspect, including low blueberry and mixed grass-forb cover. Since the initial tree growth was removed by herbicides and physical methods, re-invasion has been minimal over the last three decades (Oct. 1974).*

to the effort that has to go into them—I am basically a lazy individual. What follows is a species-by-species discussion, arranged according to the sequence in Gleason's "Britton and Brown Illustrated Flora" of the Northeast. The information is essentially a Progress Report upon continuing scientific work at a field research area in the Berkshires.

The material below is not intended for those people who are compulsive gardeners, who must forever plant, transplant, dig up, replace, spray, prune and fertilize, as would a loving mother with mentally deficient children, or their equivalents as house plants. I am not writing as a gardener or horticulturist. The approach is that of a phyto-sociologist, who aims to establish certain simple plant-communities, which thereafter will become relatively self-sufficient and care-lessly self-maintaining. The scientific knowledge is available. The home owner, if he wants to have the leisure time to relax and enjoy the vegetation and the birds around his home, must have the strength of the proper convictions —against all the blandishments from Madison Avenue, from people who are determined to sell him lawns, more lawns, and all the accoutrements thereof, a lucrative industry of superfluous affluence.

* * * *

**Hay-scented fern** *(Dennstaedtia punctilobula).* A spreading stoloniferous plant that is extremely resistant to any invading woody plants. It forms a knee-high solid cover, with fronds that are aligned to the sunlight in a truly beautiful pattern.

**Tapering fern** *(Thelypteris noveboracensis).* This species will do better in the more shady or moist locations. It is slightly lower than the preceding, and with an attractive difference in texture and color.

**Pasture juniper** *(Juniperus communis).* Our native pasture juniper is an extraordinarily variable species. Individuals vary, even in the same field, from being erect, open, and 10 feet high, to dense, compact individuals no more than two feet high (even after half a century). If—a big if—you can get low, slowly growing individuals, you will find them most desirable for a ground cover. The birds think they are excellent nesting spots. If you are allergic to scratches from their needles (the reaction rarely lasts more than an hour), stay away.

**Grasses** *(Gramineae).* You may first decide to allow some of your grasses to grow up, and go to seed. They are decidedly beautiful plants, in endless nuances of color through the season. Don't worry about crab grass (it was abundant only because of all the effort you put into your lawn). Pure stands of grass rarely last more than a decade or two. Heavy forbs (broad-leaved herbs) come in; and if you manage to keep them out, trees will seed in. The only possible exceptions in the Northeast are a couple of heavy Panicums, which are hardly desirable.

**Orange Daylily** *(Hermerocallis fulva* clone *Europa).* This is a most amazing and most beautiful plant (unless you are one of those for whom the common cannot be beautiful). Once established, it forms an extremely dense and stable cover. The dried flowers are a Chinese delicacy; the flower buds, an excellent green vegetable; even the root tubers are edible. A double-flowered form is huskier, and provides more food.

**Lemon Daylily** *(Hemerocallis flava).* The fragrance of this old-fashioned garden plant is unsurpassable—detectable in the dried flowers as you add them to your wok dish. As a ground cover, it has the unbelievable ability to keep out lilac suckers! Do not ask me why.

**Lily of the Valley** *(Convallaria majalis).* The finely scented lily of the valley can spread more than you want. Watch it. Then again, it won't spread at all. If you want bright red berries in fall, you will have to have both strains, physiologically male and female. The plant tries to believe in unisex; but it still takes both kinds to get fruits. Best: plant somebody else's berries; and raise seedlings.

**Yellow water flag** *(Iris pseudacorus).* This plant is naturalized from Europe, along streams; but it really does not need wet sites. It will form a good dense cluster, that will need no care.

**Japanese iris** *(Iris kaempferi).* I have one Japanese iris that has persisted in an old field through a century and a half of agricultural operations and abandonment. It apparently dates from before the opening of Japan by Admiral Perry! Based on other studies also, I would suggest trying various Japanese irises. Some of them may require no care.

**Siberian iris** *(Iris siberica)* is another iris that can form dense solid patches that will last for many years.

**Beaked hazel** *(Corylus cornuta).* The hazelnut is a stoloniferous shrub, which the foresters dislike because it can form such thickets (8 feet high) that tree reproduction is eliminated. Thus, it is excellent for your purposes, where the height is permissible. But do not count on nuts. It can be finicky and when there are nuts, the squirrels get there first.

**Rhubarb** *(Rheum rhaponticum).* Do not overlook this superb plant at the back of what was your lawn. Plants last at least for 40 years. The large leaves and light tall flower stalks add much—at a distance. Check the price in the grocery store; and you will plant some.

**Bouncing Bet** *(Saponaria officinalis).* This plant is so common and colorful along roadsides that you might find a use for it—if your soil is as poor as on some roadsides.

**Virgin's Bower** *(Clematis virginiana).* Though the name seems curiously obsolete these days, this vine, with its attractive flowers and striking fruits, is a care-less plant that should be quite at home amongst your shrubbery.

**Wild hydrangea** *(Hydrangea arborescens).* This is a shrub from south and west of New England, usually growing about six feet tall, and gradually spreading as a colony. Once established, it requires no care.

**Meadow-sweet** *(Spiraea latifolia).* This stolon-spreading old-field shrub is so common you might refuse it. But the flower clusters are attractive, and it keeps out other plants.

**False spiraea** *(Sorbaria sorbifolia).* Another stolon-spreading rosaceous shrub that is worth a thought. I remember a long roadside cover of it before the Town sprayed it. Now not one sprig can be found at that site; but I brought some to my place, before the extinction.

**Blackberries** *(Rubus).* I have no objection to blackberries; but they spread where I do not want them, and fail to fruit. A few can form dense clusters. Do not try to identify them precisely. The plants are apomictic (an insidious form of matriarchy); and then spread vegetatively.

**Shore rose** *(Rosa rugosa).* Plants grown from seed from the Cliff Walk at Newport, Rhode Island, have proven to be rhizome-spreading. The plants, shoulder high, form a desirable stand, with attractive flowers. And the hip, hip puree (crushed fruits in sugar), will please you.

**Wild plum** *(Prunus americana).* A thicket of wild plum, spreading by heavy woody rhizomes can be 20 feet tall, and so dense that very few plants will grow in the shade below. Mine is almost forty years old. The flowers are beautiful each year, but it seems to fruit but once a decade.

**Chokeberry** *(Aronia melanocarpa).* This colonial shrub appears to be variable in height, but uniform for any one clone. The flowers are always attractive; the fruit of no special moment. It does hold the land free of other woody plants.

**Colonial shadbush** *(Amelanchier obovalis?).* Segregation of species among the colonial shadbushes is not easy. The flowers and fruits may not be overly conspicuous. Pick a low one, and you can develop it into a fairly solid cover.

**Wisteria** *(Wisteria floribunda).* This vine is superb, if it can be pruned each year, and *if* it flowers. Be careful. It can rampantly cover desirable plants.

**Bristly locust** *(Robinia hispida).* A five-foot colonial shrub from the southern mountains, not too dense, and with attractive flower clusters.

**Pachysandra** *(Pachysandra terminalis).* This common suburban ground cover is one of the very best, if all you want is deep uniform greenness. Encourage it until it forms a solid cover, and it will last for years, even under trees. Use it for "open spaces."

**Winter berry.** *(Ilex verticillata).* This 10-foot slowly-spreading shrub does not need the wet soil in which you usually find it wild.

**Bittersweet** *(Celastrus scandens).* A tangle of bittersweet needs no care, and can be a source of winter delight. The yellow and red fruits do not change color indoors with drying. Oriental bittersweet is even more aggressive.

**Virginia Creeper** *(Parthenocissus quinquefolia).* If a big tree dies, save some money and just have it topped. Then plant some Parthenocissus at its base. Soon you will have a huge column of verdure, brilliant red in fall, with many berries for the birds.

**Mountain laurel** *(Kalmia latifolia).* It is surprising that mountain laurel is not used more often for stable care-free tall shrub covers. In shade, prostrate branches will root, and a solid colony will form. The flowers make it indubitably one of the most attractive shrubs we have.

**Sheep laurel.** *(Kalmia angustifolia).* This miniature cousin of the mountain laurel, about 2 feet high, can be encouraged to form a low ground cover, covered with small editions of mountain laurel flowers in spring.

**Huckleberry** *(Gaylussacia baccata).* A rhizome-spreading shrub, usually about 3 feet tall, turning a deep blood red far into fall. There will be no trouble with anything invading it.

**Low blueberry.** *(Vaccinium angustifolium).* This name covers a tremendous variety of individuals, each forming a round and distinctive clone. Some are very low (even 6 inches) and small-leaved. Others are taller and larger leaved. There is infinite variety in the twigs (from reds to yellows to greens) in the color-variations in the spring leaves, and in autumnal coloration. It should be one of the best plants for the open stretches that had been lawn. Besides, it is remarkably resistant to invasion by herbaceous or woody weeds.

**Steironema** *(Steironema ciliatum).* Colonies of this stoloniferous herb one would not think are stable and resistant to invasion by other plants; but they are. It is an attractive yellow flowering herb.

**Periwinkle** *(Vinca minor).* This is one of the most desirable plants for what had been your lawn. Care for it, until it has formed a thick dense self-perpetuating cover. Do not let it spread outward through other vegetation, or you will uproot it in removing that other vegetation. Lay some asphalt shingles around the edge; let it pile up on the shingles; then pull out the shingles from under it, to a new position.

**Moss pink** *(Phlox subulata).* This low spreading sub-shrubby plant, with a little weeding of invading grass, can be trained into a low dense cover—if you like the shrieking magenta colors. If you want the colony to expand, use such as asphalt shingles, as indicated above for Vinca.

**Mints** *(Mentha* spp.*).* There are a host of menthas, spearmint, peppermint, woolly mint, and others, which can be trained into dense compact colonies. If you like mints for culinary purposes, save a few places. They take very little care—except to keep them in bounds. Their stolons can run off six feet in one season.

**Maple-leaved Viburnum** *(Viburnum acerifolium).* This colony-forming viburnum grows about five feet tall, and is attractive for its flowers.

**Nannyberry** *(Viburnum lentago).* This long-lasting colonial shrub, to 20 feet tall, can be counted on to keep out invading trees. The colony at Greenwich Audubon Center (Conn.) is famous for having been one of the first such examples that undermine the erroneous notion of "plant succession to climax."[4]

**Bush honeysuckle** *(Diervilla lonicera).* This 2-3 foot tall colonial shrub is highly remarkable for the stable cover it can develop. It even keeps out oak seedlings under oak trees, where the seedlings are usually a pest. The flowers are relatively inconspicuous, but attractive to bees.

**Perennial sunflowers** *(Helianthus* spp.*).* There are some rhizomatous colonial sunflowers worth knowing about, which require no care once established. *Helianthus occidentalis* is one of the best. Do not overlook *H. tuberosus* (badly named the Jerusalem artichoke). Providing you want to dig up some of the roots in fall, before the mice get them, you can provide yourself with some fine food, serving as crisp radishes, water-chestnuts, potatoes, or pickles, as you wish.

**Goldenrods** *(Solidago* spp.*).* Stoloniferous goldenrods—if you know the different kinds—can provide you with some very dense, stable weed-free covers, that add considerably to the autumn color. Among the best are: *S. rugosa* (Possibly the densest), *S. aspera, S. gigantea, S. altissima* (over your head in height), and *S. graminifolia.*

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### LIVING WITH WEEDS

Dandelions, speedwells, clovers, and a variety of other broadleaf plants or forbs often tend to associate with lawn grasses. In fact, Dr. Stephen Collins has recorded some 50 species in a typical non-herbicided lawn. Although they modify the textural pattern, these plants are green, add diversity, and stabilize the soil just as effectively as a monoculture of grass. Occasionally certain species of weeds may become so abundant that some control may be desirable. Application of weed killers to do this necessitates the use of another chemical consuming energy and resources in its manufacture. Although the environmental hazards posed by these chemicals may be minimal when they are properly used, improper use has caused damage to desirable woody species, including neighboring trees. In some cases the spread of dandelions is actually favored by the use of weed killers, since the openings in the turf provide sites for the establishment of dandelion seedlings as well as crabgrass.

## LOW SHRUBS

**Sweet fern** *(Comptonia peregrina)*: Aromatic fern-like foliage, tending to form clones. Tolerates poor soils and provides good cover for wildlife.

***Bush honeysuckle** *(Diervilla lonicera)*: Yellow to reddish flowers.

***Huckleberry** *(Gaylussacia baccata)*: One of the most brilliant autumn shrubs in the Arboretum, exhibiting remarkable stability in arresting tree establishment. Indications are that a chemical leached from the foliage and intense root competition may be factors in arresting tree invasion.

***Pasture juniper** *(Juniperus communis)*: A spiny-leaved evergreen of old fields. Often resembles Japanese yew in general growth habit.

***Sheep laurel** *(Kalmia angustifolia)*: A much neglected acid-loving evergreen, ideal in open or semi-open natural landscapes.

**Bayberry** *(Myrica pensylvanica)*: An aromatic deciduous shrub spreading in circular patches in old fields. Gray, wax-covered fruit from which candles can be made by boiling and floating off wax.

**Wild roses** *(Rosa carolina, R. palustris)*: Fragrant pink roses.

**False spiraea** *(Sorbaria sorbifolia)*: Compound leaves and ascending clusters of small white rosaceous flowers.

***Spiraeas—meadowsweet, steeplebush** *(Spiraea latifolia, S. tomentosa)*: Two native species, one white *(S. latifolia)* with flat clusters of flowers; the other pink *(S. tomentosa)*, named steeplebush from the shape of the pointed flower clusters.

***Low blueberries** *(Vaccinium angustifolium, V. vacillans)*: Several species, all of which produce delicious, edible fruit. Very stable in resisting tree invasion.

***Maple-leaved viburnum** *(Viburnum acerifolium)*: A typical forest shrub with maple-like leaves. Distinctive pinkish-purple autumn color.

## TALL SHRUBS

**Alders** *(Alnus rugosa, A. serrulata)*: Catkin-producing shrubs typical of wet or poorly drained sites. Provide habitat for woodcock.

***Shadbush** *(Amelanchier* spp.*)*: Earliest white flowering shrub. Excellent autumn color.

**Barberries** *(Berberis thunbergii, B. vulgaris)*: Two spiny introduced shrubs. The Japanese barberry *(B. thunbergii)* produces attractive fruit and foliage in autumn. The common barberry *(B. vulgaris)* is less dense and produces drooping clusters of red berries.

**Sweet pepperbush** *(Clethra alnifolia)*: A fragrant late summer flowering clonal shrub especially adapted to shaded wet spots.

**Shrubby dogwoods** *(Cornus ammomum, C. stolonifera)*: Two species with red twigs. Those of *C. stolonifera* are most brilliant red, especially in winter. Also produce fruit for wildlife.

***Hazelnut, beaked hazel** *(Corylus cornuta)*: Clonal upland shrub tolerant of intermediate shade.

**Witch-hazels** *(Hamamelis virginiana, H. vernalis)*: Yellow flowers either in fall *(H. virginiana)* or spring *(H. vernalis)*.

*Wild hydrangea *(Hydrangea arborescens)*: Straggling shrub with clusters of white flowers.

*Winterberry, black alder *(Ilex verticillata)*: Red fruit spectacular into late fall. Ideal as accent shrub.

*Mountain laurel *(Kalmia latifolia)*: Excellent evergreen for winter contrast with showy pink flowers in June.

**Spicebush** *(Lindera benzoin)*: Brightens the woodlands in early spring with its subtle, diffuse yellow flowers.

*Chokeberry *(Pyrus arbutifolia, P. melanocarpa)*: Clonal species with shiny, dark green leaves and white rosaceous flowers. Reddish-orange autumn color.

**Great laurel** *(Rhododendron maximum)*: Large broad-leaved evergreen that will withstand forest shade. Ideal planting for winter contrast. Large masses of white flowers in early July.

**Azaleas** *(Rhododendron nudiflorum, R. viscosum)*: Spectacular pink woodland azalea or pinxter flower *(R. nudiflorum)* which transplants easily and should be used more frequently in naturalistic landscaping. In wetter spots the clammy azalea *(R. viscosum)* is an extremely fragrant flowering shrub.

**Sumacs** *(Rhus glabra, R. copallina)*: Several species of sumac occur as clones in abandoned fields. They exhibit a striking red autumn color but may crowd out the more desirable species, especially grasses and forbs. The smooth sumac *(R. glabra)* produces the most striking red fruiting clusters.

*Bristly locust *(Robinia hispida)*: Clonal habit, producing beautiful pendulous clusters of pink flowers in spring. Excellent for dry sites.

*Roses *(Rosa rugosa, R. multiflora)*: The shore rose *(R. rugosa)* is typical along sand dunes and is tolerant of salt spray. Multiflora *(R. multiflora)* is an introduced species with attractive white flowers. Forms good wildlife cover but is very aggressive and may spread its spiny growth over a greater area than you wish.

*Blackberries *(Rubus* spp.*)*: These are usually considered undesirable. However, they can yield fruit and have high wildlife food and cover value.

**Pussy willow** *(Salix discolor)*: The opening of the gray, woolly catkins is another signal of spring on your homegrounds.

**Highbush blueberry** *(Vaccinium corymbosum)*: A shrub with striking autumn coloration in our naturalistic landscape area. (See front cover)

*Viburnums *(Viburnum lentago, V. prunifolium, V. cassinoides, V. alnifolium, V. recognitum, V. opulus)*: A large group of flowering shrubs with high cover and wildlife value. Most produce bluish-black fruit. The introduced *V. opulus* has red fruits.

## LOW-GROWING TREES

**Serviceberry** *(Amelanchier laevis)*: A small gray-barked tree with showy clouds of white flowers in early spring. Excellent near coast.

**Gray birch** *(Betula populifolia)*: Multi-stemmed gray-white bark. Excellent for winter and fall accent. Short-lived, about 30 years.

**Flowering dogwood** *(Cornus florida)*: One of the finest small trees, with landscape interest at every season of the year—flowers, fruit, autumn foliage and interesting branching habit.

**Red cedar** *(Juniperus virginiana)*: Columnar growth form can lend a striking focal point in naturalistic landscaping.

*__Wild plum__ *(Prunus americana, P. nigra, P. maritima)*: Showy, spring-flowering, small trees with white *(P. americana)* or pink *(P. nigra)* flowers. The beach plum *(P. maritima)* is typical along sandy coastal areas and is salt tolerant.

## VINES

*__Bittersweet__ *(Celastrus scandens)*: A native vine with fruit of considerable fall and winter interest. An introduced species *(C. orbiculatus)*, though attractive in the autumn, will tend to crowd out or smother other species.

*__Clematis, Virgin's bower__ *(Clematis virginiana)*: Native from Nova Scotia to Georgia, with clusters of tiny whitish-green flowers. Fruits collectively make fluffy balls. Easily propagated.

*__Virginia creeper__ *(Parthenocissus quinquefolia)*: A woody vine with five leaflets, especially brilliant in fall (see photo) within red cedar of Arboretum naturalistic landscape area. (See page 14).

*__Japanese wisteria__ *(Wisteria floribunda)*: An introduced vine with seven to nine pairs of leaflets and hanging clusters of lavender pea-like flowers.

## WILDFLOWERS

__Butterfly-weed__ *(Asclepias tuberosa)*: An especially showy orange milkweed. Ideal for open fields.

__Asters__ *(Aster* spp.*)*: Many species of blue or white composites, flowering profusely in autumn. The New England aster *(A. novae-angliae)*, with large blue flowers, is particularly spectacular.

__Ox-eye Daisy__ *(Chrysanthemum leucanthemum)*: Attractive white and yellow perennial daisy of open fields. Native of Europe.

*__Lily-of-the-valley__ *(Convallaria majalis)*: Introduced member of the lily family with fragrant, white, bell-like flowers and dense green leaves. Forms a good ground cover. Eurasia.

__Queen Anne's lace__ *(Daucus carota)*: Member of the carrot family, typical of old fields. Umbel of tiny white flowers forms the flat-topped flower cluster. Finely dissected leaves. Native of Europe.

*__Jerusalem artichoke__ *(Helianthus tuberosus)*: Tall-growing native sunflower flowering September through October.

*__Sunflowers__ *(Helianthus* spp.*)*: Several species, found in old fields, that add yellows to the natural landscape.

*__Orange daylily, yellow daylily__ *(Hemerocallis fulva, H. flava)*: Showy lilies, introduced from Europe and Eurasia.

*__Irises__ *(Iris kaempferi, I. pseudoacorus, I. siberica)*: A showy group, certain of which do well in wild grasslands. Introduced.

__Wild lily-of-the-valley__ *(Maianthemum canadense)*: A superb low ground cover, with small white flowers, to be found in dry forests. Selective clearing of undergrowth will help perpetuate this species.

*__Mints__ *(Mentha* spp.*)*: Aromatic plants with square stems. Mostly introduced.

*__Moss pink__ *(Phlox subulata)*: A showy, moss-like member of the phlox family forming carpets of pink flowers.

__May apple__ *(Podophyllum peltatum)*: Up to 18 inches tall, with one or two umbrella-shaped leaves that are deeply lobed. Single large white flowers beneath. Typical of moist forests, but tolerant of fairly open situations.

**Solomon's seals** *(Polygonatum canaliculatum, P. biflorum)*: Showy liliaceous spring woodland plants. The larger species *(P. canaliculatum)* is especially showy in the Arboretum Edgerton Wildflower Garden.

***Rhubarb** *(Rheum rhaponticum)*: An edible member of the buckwheat family, native of Asia. Petioles boiled and sweetened make a fine dessert. Leaves contain oxalic acid and soluble oxalates that can cause death. Siberia.

**Black-eyed Susan** *(Rudbeckia hirta)*: A showy biennial brown and yellow daisy typical of open fields.

***Bouncing Bet** *(Saponaria officinalis)*: Clusters of whitish-pink flowers. Tolerant of dry, gravelly soils in open, sunny areas. Native of Europe.

***Goldenrods** *(Solidago* spp.*)*: These yellow composites lend much color to our old fields in autumn. They are not generally associated with hay fever but rather are insect-pollinated.

***Loosestrifes** *(Steironema ciliatum, Lysimachia quadrifolia)*: Attractive yellow flowers, typical of old fields.

**Foam flower** *(Tiarella cordifolia)*: A lovely woodland ground cover with a showy white flower. Tolerant of shady conditions.

## PHOSPHATE SHORTAGE PREDICTED

One of the most essential components of fertilizer is phosphate. A recent study by the Institute of Ecology[1] has pointed out that phosphate supplies are in short supply and may run out in the next century. As a result, phosphate rock should be treated as a non-renewable resource in order to conserve the world supply. Recently the world population has grown at an annual rate of 1.9% and the use of phosphate fertilizer at 5.25%. If these growth rates are projected into the future, known reserves will be used up in 60 years, stranding a phosphate-dependent population of eleven billion. At somewhat lower rates of growth, reserves may last 90 years. Most nations must now import phosphates from the few that produce them.

[1]Man in the Living Environment: Report of the Workshop on Global Ecological Problems. The Institute of Ecology, 608 North Park St., Madison, Wisconsin 53706.

## FERTILIZER USE IN CONNECTICUT

"Of the total fertilizer used in Connecticut, nearly 40 percent is sold for nonagricultural purposes. Since much of this is used on lawns where the harvested crop is not utilized, such use may well be a significant source of nutrient pollution. This suggests that a tax on nonfarm fertilizer might reduce its use and thus reduce pollution from this source. At the very least, we can tell suburban homeowners that green lawns may lead to green lakes."

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# CONNECTICUT COLLEGE ARBORETUM BULLETINS

No.9. *Six Points of Especial Botanical Interest in Connecticut.* 32 pp. 1956. The areas described are the Barn Island Marshes, the Connecticut Arboretum, the North Haven Sand Plains, Catlin Wood, Cathedral Pines and the Bigelow Pond Hemlocks. **$1.00**

No.12. *Connecticut's Coastal Marshes: A Vanishing Resource.* 36 pp. 1961. Testimony of various authorities as to the value of our tidal marshes and a suggested action program. Second printing with supplement 1966. **$1.50**

No.17. *Preserving Our Freshwater Wetlands.* 52 pp. 1970. Reprints of a series of articles on why this is important and how it can be done. **$1.00**

No.18. *Seaweeds of the Connecticut Shore. A Wader's Guide.* 36 pp. 1972. Illustrated guide to 60 different algae with keys to their identification. New edition 1985. **$3.00**

No.19. *Inland Wetland Plants of Connecticut.* 24 pp. 1973. Some 40 species of plants found in marshes, swamps and bogs are illustrated. **$1.00**

No.20. *Tidal Marsh Invertebrates of Connecticut.* 36 pp. 1974. Descriptions and illustrations of over 40 species of mollusks, crustaceans, arachnids, and insects found on our tidal marshes. **$1.50**

No.21. *Energy Conservation on the Home Grounds- The Role of Naturalistic Landscaping.* 28 pp. 1975. **$2.00**

No.22. *Our Dynamic Tidal Marshes: Vegetation Changes as Revealed by Peat Analysis.* 12 pp. 1976. Description of a method for sampling peat and identifying plant remains in order to document vegetation change on tidal marshes. **$1.50**

No.23. *Plants and Animals of the Estuary.* 44 pp. 1978. Descriptions and illustrations of over 70 estuarine species. **$1.50**

No.24. *Garden Guide to Woody Plants - A Plant Handbook.* 100 pp. 1979. Lists and descriptions of over 500 different trees and shrubs useful for landscaping. **$2.50**

No.25. *Salt Marsh Plants of Connecticut.* 32 pp. 1980. Illustrated guide to 22 plants which grow in our tidal wetlands. **$1.50**

No.26. *Recycling Mycelium: A Fermentation Byproduct Becomes an Organic Resource.* 32 pp. 1981. Documents the role of industrial mycelial residues as soil amendments on ornamental plants, agricultural crops, and in natural vegetation. **$1.00**

No.27. *Birds of Connecticut Salt Marshes.* 48 pp. 1981. Illustrations and descriptions of 24 birds commonly seen on our tidal marshes. **$1.50**

No.28. *The Connecticut Arboretum: Its First Fifty Years 1931-1981.* 56 pp. 1982. Historical accounts of its formation and growth. **$2.50**

No.29. *Mushrooms of New England.* 49 pp. 1984. Descriptions of 89 species of fungi, 62 illustrated. **$2.50**

No.30. *Native Shrubs for Landscaping.* 40 pp. 1987. Descriptions and lists of the best native shrubs for home, commercial and institutional landscaping. Color Photographs. **$5.00**

No.31. *Birds of the Connecticut College Arboretum.* 50 pp. 1990. An annotated list with seasonal records, and an account of the bird research program. Illustrated. Replaces Bulletin No.10. **$5.50**

No.32. *The Connecticut College Arboretum, Its Sixth Decade and a Detailed History of the Land.* 96 pp., 47 photos. 1991. Historical accounts of the formation and growth of the Arboretum. Supplements Bulletin No. 28. **$5.00**

No. 33. *Archaeology in the Connecticut College Arboretum.* 56 pp. 1992. Detailed descriptions of prehistoric and historic archaeological sites in the Arboretum. Photographs and illustrations. **$5.00**

No. 34. *Tidal Marshes of Long Island Sound: Ecology, History and Restoration.* 73 pp. 1995. Describes the ecology and chronicles the history of Long Island Sound tidal marshes. Photographs and illustrations. **5.00**

**Other Publications**

*Connecticut's Notable Trees* by Glenn D. Dreyer. 93 pp. 1990. Memoirs of the Connecticut Botanical Society No. 2. Records the locations and stories of the historic trees that have witnessed major events in Connecticut's past, and the largest trees of each species. **$12.95**

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*The Wild Gardener in the Wild Landscape* by Warren G. Kenfield. (Memorial Edition) 232 pp. 1991. The results of decades of creative research involving the plant ecology and horticulture to create an original volume for the homeowners, park and natural area managers. **$25.95**

(plus postage & handling - $4.00)

*Connecticut Lakes* by Richard Canavan IV and Peter A. Siver. 299 pp. 1995. A study of the chemical and physical properties of fifty-six Connecticut lakes, presenting both current information and summaries of previous studies.

**$9.95**

(plus postage & handling - $4.00)

***This list includes literature available at the time this publication was printed. Prices and availabilty are subject to change. Order from the Connecticut College Arboretum, Box 5201 Connecticut College, 170 Mohegan Avenue, New London, CT 06320-4196. Include $1.00 postage and handling for each bulletin. Arboretum members may deduct 40% from the cost of the bulletins.***

# ENVIRONMENTAL IMPACTS OF INTENSIVE LAWN MAINTENANCE

## I. APPLICATION OF COMMERCIAL FERTILIZERS

Some 3,000,000 tons or 15% of the fertilizers produced keep American laws greener than normal or necessary, thereby squandering resources, an appreciable fraction of which are non-renewable and needed by the peoples of the world in food production. In Connecticut 40% of the fertilizer sold is used for non-agricultural purposes.

## II. POWER MOWING EQUIPMENT

Power mowers, especially riding types, are fossil fuel demanding devices. They require more energy in initial construction, operation, and maintenance than do hand-operated mowers.

## III. EXPENDITURE OF FOSSIL FUEL

Millions of gallons of fossil fuel are used annually in power mowing equipment on home grounds, where manually operated mowers could do the job adequately.

## IV. NOISE POLLUTION

The noise produced by power mowers, especially the larger riding types, is an environmental insult that no neighbor should have to tolerate. In the present age one is not immune on Sundays—the one time that used to be recognized as a day of rest.

## V. LOSS OF HEALTHFUL EXERCISE

The use of the riding mower, particularly among the younger age groups, represents the epitome of waste in our affluent society. It is well documented that vigorous exercise, such as that experienced in pushing a lawn mower, is excellent for cardiac and skeletal systems.

## VI. INCREASED USE OF PESTICIDES

Up to 40% of the pesticides used are applied in urban and suburban environments. Intensive lawn care may involve the use of both herbicides and insecticides. By reducing lawn area and living with weeds herbicide use can be eliminated.