American Horticulturist

Volume 53 Number 2 Summer 1974

Narcissi — A Scheepers' Specialty

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an editorial . . . .

This issue of *American Horticulturist* is devoted to the subject of environmental education through horticulture. It compliments a national symposium sponsored under the auspices of the American Horticultural Society.

In the Spring of 1972, the officers of the American Horticultural Society met to determine the most important priorities for Society involvement. Dr. Henry M. Cathey expressed the deep concern that American horticulture is fragmented and lacks coordinated direction. It was therefore decided that the American Horticultural Society—the one organization responsible to coordinate horticulture at all levels—would bring appropriate organizational and individual leaders together for a study and planning session. "Hort U.S.: Living and Learning" was the result.

The May symposium will produce a more unified direction in horticulture, a clarified statement of objectives, and will open the door for horticulture to be a more effective part of man's social surroundings, particularly in the urban areas.

It was suggested that the Society approach the U.S. Office of Education at the U.S. Department of Health, Education and Welfare, for a special grant to sponsor the four day event. The Office of Education was indeed cooperative. The Society formed a special committee of representatives from many interested areas to review the environmental relationship of horticulture and to create a unique and imaginative symposium.

In March of 1973, twenty-two representatives came together for an inspiring brainstorming session. The group, chaired by Dr. John W. Brainerd, a recognized leader in environmental education, included representatives from public television, the news media, major horticultural organizations, noted environmentalists, and distinguished academicians. This provocative meeting of minds brought to focus the far-reaching opportunities available through horticulture for improving our environmental surroundings. Following the general direction established at the Chicago planning session, Dr. Cathey was asked to organize the May symposium.

Marc Cathey is guest editor of this issue. He has been solely responsible for the general format, solicitation of manuscripts, photographs, and the overall theme. As Vice President of the American Horticultural Society and Chief, Ornamentals Laboratory for the U.S. Department of Agriculture, Dr. Cathey is well-known to all of us in horticulture. In the Spring of 1971 he was involved in the compilation of a special issue of the Society's magazine devoted to plants and pollution. That publication is still held in high regard as the best source of information on the subject. This current issue, addressed to the subject of environmental education through horticulture, will also serve as a lasting point of reference.

O. Keister Evans, A.H.S. Executive Director

Gardening With a Cause

How do plants and plantings fit into your life?

Are they a hobby which gives you a special time to grow a favorite group of plants?

Are they a part of your business, social, or professional activities?

Are they a vital aspect of the landscape which must be preserved and nurtured to maintain our world and our spirit?

Each of us would answer these questions with different rankings and priorities. This issue of the *American Horticulturist* is not concerned with the private pursuit of working with plants and plantings for self-expansion. Rather, it urges everyone to lend his skills to solving environmental problems.

- We *gape* at *stress-riddled* plants whenever we venture out of our residences.
- We are *embarrassed* when our *media* communicate the mounting levels of pollution.
- We are *disappointed* with the *ranking of priorities* ignore the full potential of what plants can do in the landscape and in our lives.

Each of us must learn new languages to cope with the newer view of our environment. We must begin to:

- *Share* the environment with all organisms, thus restoring a new balance of life.
- *Learn* to be contributors to the basic pool of information which must be acquired to guide the public sector to make sound planting programs.
- *Communicate* the great reservoir of information that resides in our minds but is not readily available to the public sector.
- *Follow through* with our concern right from the planning to plantings to insure that the useful life of our landscape will not become costly mistakes.
- *Interest* new gardeners to work their way through the myriad of conflicting information to develop a realistic view of what we must do to improve our landscapes.

Professional training in gardening is available to only a privileged few. Their direct influence can seldom be identified in our community, block, or apartment building. Even with the thousands of garden clubs which thrive throughout the U.S., there are still many un-horticultural people who must be reached. Only through a channelling of information to key people can we make the knowledge available. The amateur, with his intense interest and time, must see where his or her highly varied experiences can function for the public interest.

Where are you?

- Have you come to the aid of an environmentally-concerned group by supplying information from your pool of knowledge?
- Have you taught a 30-minute class on a plant project for a 3rd grade, church group, scout troop, nursing home, or for the neighborhood "our gang."
- Have you joined in with other gardeners to identify which plants are doing well in your community and found a way to get these observations into a Plant Record Center?
- Have you sought "in-depth" information from an article published in our newspapers and magazines to determine if the headlines convey the intent and the actual information reported by the scientist(s)?
- Have you attended a conference or study group which teaches the new languages of environmental quality and how we can make our knowledge valid and quantative?
- This increased awareness of what we can do as individuals to bring our knowledge of horticulture to solving environmental problems must occur in all sectors: education, gardens, flower and garden shows, horticultural therapy, advisory committees, plant society, and club. The articles in this issue present information drawn from all of these areas of leadership in American Horticulture. They all speak of the emerging activism of Living and Learning. Where HORT-(iculture) is for the U.S. and us.—*Henry M. Cathey*

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ENVIRONMENTAL EDUCATION ISSUE

DR. HENRY M.CATHEY, *Guest Editor*

OUR COVER PHOTO—The beginning of Environmental Education. Photo by Robert Bjork, Agricultural Research Service, Washington, D. C.

GRAPHICS: DOROTHY CHAISSON / PRINTING: GREINER-FIFIELD, KANSAS CITY, KANSAS

For United Horticulture . . . the particular objects and business of The American Horticultural Society are to promote and encourage national interest in scientific research and education in horticulture in all of its branches.

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WHY GREEN TURNS BROWN

(Environmental Horticulture–The Urban Planting Tool)

*Mrs. Pendleton Miller**

An idea is born—any idea—and if it is good we are apt to support it enthusiastically. And so it was with the recent national beautification crusade. We foresaw no problems as we visualized our cities and freeway banks transformed from sterile, depressing, polluted areas into vistas of beautiful trees and flowering shrubs. We anticipated immediate relief from outdoor walls and floors of concrete. It *was* a tremendous idea and it *still is!*

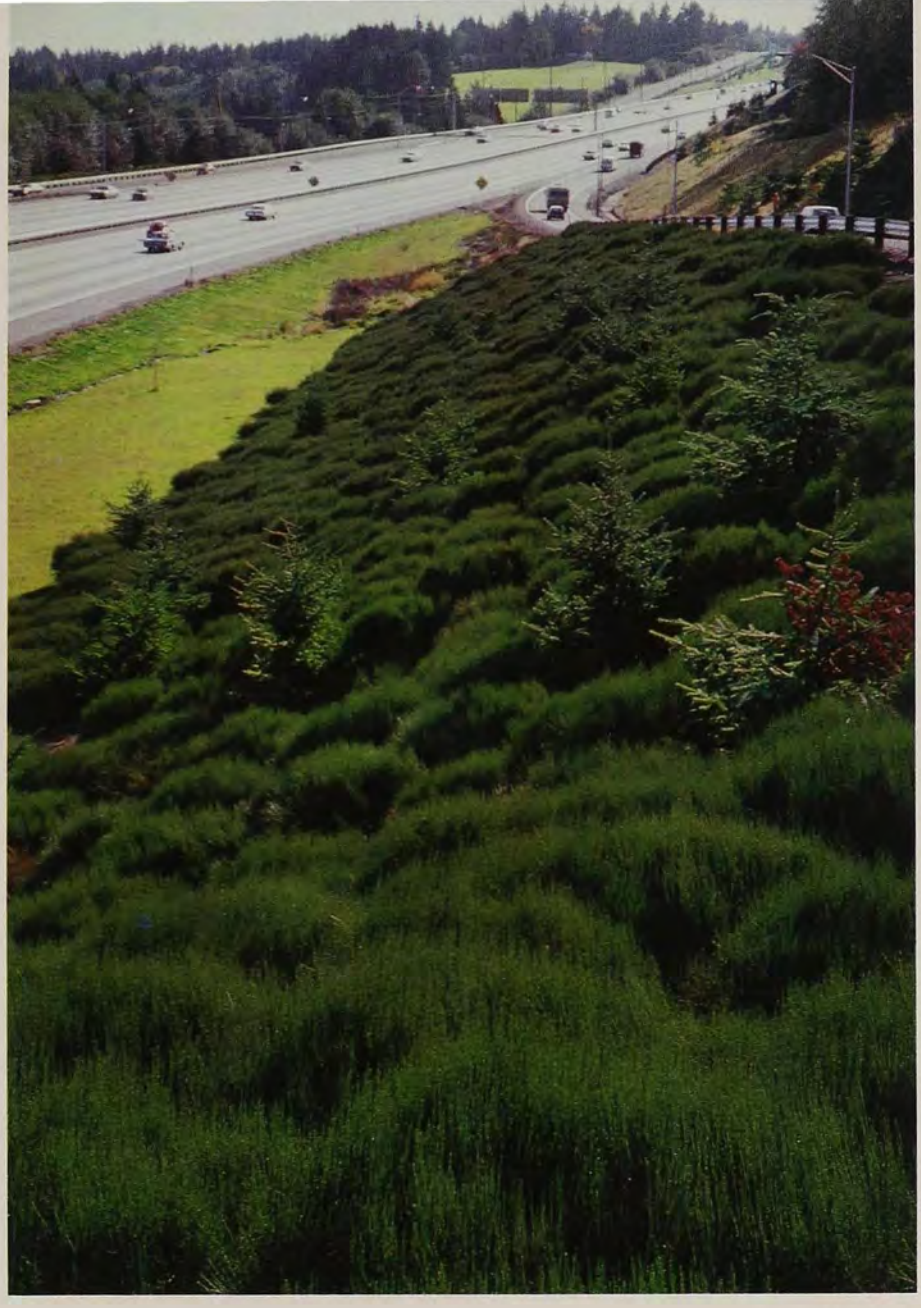
The beautification era was phase one—a period of trial. A rude awakening followed: we had so much to learn! How many ten year old plantings have survived to match the beauty of the original landscape drawings colored with lush green areas which were bought and paid for? If the financial losses on all the green that turned brown were spelled out nation-wide, the tax payers would revolt.

In phase two we found "beautification" succeeded by "environment"—a definite step ahead. An even stronger need for planting our cities and freeways became apparent. For example, *Plants, People and the Environmental Quality,* published by the U.S. Department of Interior, National Parks Division, and the American Society of Landscape Architects Foundation, vividly portrays the many desirable purposes plants can serve in providing environmental control and improvement. This publication introduces itself as a beginning in environmental design; as such, it is a promising step ahead in environmentally practical landscape design. Also available are dozens of scientific research publications explaining how trees and soil capacity can control pollution.

But these efforts do not spell Mission Accomplished! Both phase one and two are primarily efforts to prove the value of a plant's role in servicing our lives, whether it be aesthetics or practicality. But unfortunately, the drawing board does not guarantee the life of the plant. *The basic problem of why green turns brown has been bypassed!* The disastrous failures of many of our plantings have been like watching spectacular waves crash down a wall: we are appalled by the insurmountable maintenance costs and the failure of the green to *grow*. To color the urban environment with a green that stays green is our current challenge.

For a common case history, we can use a Seattle expressway planting, conceived by drawing board landscape architects and completed with a planting of 4,000 trees at a cost of $500,000, three years ago. Over half of those trees now are dead and have had to be replaced at a stepped-up cost. Everybody loses: the taxpayers are out a substantial sum; the nursery industry, already plagued by a critical shortage of plants, has to account for replacement trees; everybody is out three years' growth and beauty. Why does this happen? Who is responsible when green turns brown? It is time to define the problem, explore the factors that create it, and find ways to prevent its occurrence.

**The Highlands, Seattle, Washington 98177*



An effective freeway bank planting. Maintenance is minimal, soil erosion control is good and the plants are pollution tolerant. Shown are 'Moonlight' broom and noble fir.

Photo by Don Normark.

All this points to a supplementary need to provide realistic maintenance costs, to determine which plant species can survive unnatural conditions of growth, and serve a practical need. Environmental horticulture is the principal solution to this problem.

Horticultural encyclopedias give us the conditions under which a plant grows in its native habitat as well as its habit of growth, but there is no publication telling us how a plant will respond to the urban environment, or the plant's adaptability to the many differing combinations of environmental factors. This information comes only from the horticulturists' observation, experience, and research. Since no two locations are environmentally identical, no such general publication is possible.

Background of an Unsuccessful Design and Plant List

Whether maintenance and horticultural problems are given consideration first or last in the planning stages determines ultimate success or failure. An unfortunate precedent has been established in that major problems are considered last and least. Designs submitted by a landscape architect represent his concept of a ten to twenty year old, established planting; once the design is accepted, his responsibility ends. The selection of designs by councils or commissions has

A sorry solution to a critical problem. The pines for the downtown freeway maze were healthy when planted—all three times. The plant specifications originated with a renowned landscape architect. Horticultural advice is required.

Photos by Don Normark.

A well-graded bank, a good design, and the wrong plants. A fungus disease has destroyed the original planting (few remaining plants at top of bank now are infected) and spreading junipers were replaced with a resistant variety.

been based on developmental costs and landscape design, with little or no consideration given to survival potential of the plant material or to maintenance costs. The responsibility for development is then delegated within an agency or department.

It may take four years from the drawing board before there is evidence of success or failure. Perhaps this is why some landscape architects regard five years as the urban life expectancy of a plant. This concept is costly, serving neither the intended purpose of a mature planting, nor justifying the investment.

More often than not, the decision-making bodies do not concern themselves with maintenance budgets or whether such budgets are realistic. The maintenance department inherits not only the finished landscape planting, but also the criticism should the landscape become shabby. Those plants that cannot survive the conditions of the site are repeatedly replaced, and this is a costly cycle. And those that need excessive maintenance soon present a sorry sight. The situation is ridiculous.

When plant material is chosen for its ability to survive the site and within a predetermined maintenance budget, it remains *green,* and does not turn *brown.* Priority must be given to maintenance and environmental horticultural consultation in the initial planning stage. This is the role of environmental horticulture. The landscape architect must have plant tolerance and plant maintenance facts at hand *before* he develops his landscape design. Does the projected maintenance budget permit extensive lawn care or should a ground cover be used with practical pathways to accommodate the traffic? He must know which trees, shrubs and ground covers are environmentally suited to a particular site and what their maintenance demands are.

Typical Factors That Influence Plant Survival

What factors does the horticulturist take into consideration? Of course all plants are affected to some degree by various kinds of pollution. But other factors also influence the success of a planting:

Funnelled wind caused by large buildings dehydrates plant foliage. For example, rhododendrons are pollution resistant but will suffer from this unnatural dehydration. The direction of prevailing winds may also make a difference, or the site may have poor air circulation and become a stagnant air pocket.

Time and amount of sun must have an affect on plants. If the planting site is exposed to exhaust fumes and full sun during heavy traffic hours, it might need doubly tolerant plant material because the sun factor intensifies the pollution factors.

Intensity of sun reflection (or radiation) from neighboring concrete walls,

streets, and automobiles is a potent hazard to plant life. The effect of existing night lighting in the vicinity is another variable that influences survival.

When root systems are trafficked by pedestrians and animals, the soil becomes impacted, denying the plants the loose, friable soil they need to absorb air and water. Artificial watering and fertilizing are proving less and less adequate for a plant combating pollution. Ground covers or structural means of protecting the root system areas, or both, often are recommended.

Pouring soil over and around existing "spaghettied" underground utilities gives inadequate room for the plant's root development. Yet this is commonly done and represents a prime cause of street tree mortality. It should be remembered that some species have root systems that may break through concrete building foundations, underground utility structures, and sidewalks. Mistakes are costly. Specifications should include adequate drainage for existing hardpan or plant containers. This is a crucial necessity for areas subject to heavy rains. Root rot is slow but spells certain doom to plants given the "bathtub" treatment.

There are still more factors to be considered:

Plant materials vary in their soil requirements and standard soil specifications are often minimal.

Plants vary in their resistance to decay caused by wounds from broken branches. Accept vandalism as a *fact* of urban life.

Mortality is not always caused directly by pollution. A plant with a characteristic susceptibility to disease or blight will be further weakened by pollution. Such plants are best avoided for plantings in urban areas. Many species need expert pruning, spraying, and fertilizing and the hundreds of experts needed in every city are just not available. It is best to avoid these high maintenance plants, too.

If the lower branches of trees must be stripped for traffic clearance, many ornamentals have to be eliminated because they need to keep their lower branches until maturity for strong trunk and bark growth. Those that can tolerate stripping would fare much better if the exposed trunks were protected by loose wrappings or by other means, at least until plants are well established.

The environmental horticulturist considers all of these factors and more in his recommendations. He wants the plants in his design to grow! The horticulturist knows plant adaptability and has access to current findings on pollution resistant material. Substantial research is underway in seeking and hybridizing pollution resistant strains. The landscape architect may find his choices limited. Before urban conditions were so adverse to plant life, the architect could select simply to accommodate his design. No longer—the situation is *reversed!* Surely it is better to design from a limited selection of plants to assure a growing green. Each site is environmentally individual and studying its specific environmental factors before a plant selection is made can be the critical point.

In an effort to provide this pertinent information, the A.H.S. has undertaken a nationwide plant performance survey. Amateur horticulturists (our amateur gardeners) and professional horticulturists are supplying data on regional location, specific site (freeway, industrial area, street, park, etc.) and condition (doing well, fairy, or poorly). The resultant computerized manual will serve as a valuable guide. We will know which plants are holding up best and where. This survey program is a valuable contribution from the volunteer participants. The local horticulturist can complement this with his knowledge of the plants' adaptability to the other existing conditions. A sample form listing the essential conditions to be analyzed on each planting site is another useful reference. Both of these are available upon request from the A.H.S. Office.

Environmental Design and Environmental Horticulture Interdependence

Environmental landscape design now recognizes the need for plants to serve a variety of needs on the urban scene; our job is to add environmental horticulture to give these plants a fighting chance. A plant in the city is a plant in captivity.

A Seattle traffic triangle, once a weedy trash catcher, now a point of beauty. Trees are Norway maples, the under-planting is the 'Otto Luyken' cherry-laurel. The maintenance bill is $300.00 annually, a bargain for adjacent homeowners and a public school.

Photo by Dale A. Brenden.

As in a zoo or an aquarium, success depends on whether the basic conditions for survival are provided. Any plant growing in an unnatural urban environment needs a friend—the horticulturist who is concerned with the plant's source of life and its environmental tolerance in order that the plant can do the job we ask of it. Otherwise, landscape designs merely add to our high living costs without providing any benefits. A little research into the financial statements of any city or state relative to the costs of planting developments and their annual maintenance costs will verify this. The increases in maintenance are staggering. We *could* have had many more landscape plantings, and all of them successful, for far less than the costs of the known failures.

For the same reasons we must be wary of dramatic planting programs based solely on cost of installation. Demand both a maintenance program and an established source of funds; if there is no specific commitment, vote no!

Fortunately, most of the nation's eminent landscape architectural firms now use environmental horticulture and consistently seek horticultural assistance from local sources. The "new breed" of landscape architecture students is especially encouraging because these students are making an issue of the need for horticultural implementation.

Environmental design needs environmental horticulture to succeed. To quote Russell Page: *The Education of a Gardener*

> "Successful landscape architects have learned to abide by an established rule: the landscape architect and the horticulturist must work together in recognition of each other's talent, because these are two wide fields of knowledge and a man's lifetime is not enough for him to reach the limits of either. One without the other will usually result in dismal failure."

And Fletcher Steele: *Gardens and People*

> "Throughout history when masters of various professions have worked together and helped each other, much beauty has crowned their efforts. But when artists are touchy about their independence and compromise only after their quarrels, the results may be tidy but certainly dull."

A steeply tilted triangle planted to *Oxydendrum arboreum* and Canadian Hemlock, with *Raphiolepis ovata* as a ground cover. A $300.00 annual maintenance budget suffices as the planting requires no spraying, no fertilizing and little litter picking.

Photo by Dale A. Brenden.

Introducing Environmental Horticulture and Design to Public Agencies

This brings us to phase three: priority consideration of horticultural knowledge and recognition of maintenance costs by public agencies. Public agencies should not be held responsible for horticultural expertise. As an amateur horticulturist you have an opportunity to promote action; you are a citizen and a taxpayer, and are knowledgeable about plants. Your voice will be listened to by governmental bodies. If you take the initiative and if you represent a local group or organization, your impact is even stronger.

As a start, you might notice local public planting developments that are in poor condition or that require constant replacement. Any citizen has the right to request the installation and annual maintenance cost figures for a public planting. You might find annual maintenance is one-fourth of the original development cost. *No* budget should tolerate re-investing the original cost every four or five years. Small wonder the green turns brown!

From there you must go to the top whether it be the Mayor or the Governor. Nothing is accomplished in going to various governmental departments for each is subject to decisions handed on from above and no department has the authority to alter these decisions. The original plans are locked up as they are distributed to each successive department for implementation. Nor will the Mayor, the Governor, members of the City Council, Park Boards, Engineering or Urban Planning Departments be interested in a resumé of environmental horticultural factors. But they *are* interested in costs. This is your area of attack: costs are out of line, inadequate maintenance budgets are expensive, and both can be remedied. The Mayor or Governor can open doors by requesting department heads, collectively if possible, to give consideration to these suggestions. Such occasions can do much to clear the air. Department heads may be unaware that landscape architecture is a design profession and is not a horticultural profession, unaware that the architect should welcome the addition of environmental horticultural information, and unaware that this alone would remedy much of the maintenance problem.

Above. The labels in the Operation Triangles plantings are a real asset. They easily educate the interested amateur gardener.

Above right. The walk-through triangle becomes a pocket park where benches make waiting for the bus a pleasure. The trees are Washington thorn and the groundcover is *Viburnum davidii*.

Photos by Dale A. Brenden.

If the agency is receptive, a volunteer Horticultural Advisory Committee may be permitted to prove its value on a demonstration site. This committee studies the existing environmental factors of the site and should be able to assist the landscape architect in choosing plant material that would thrive and require minimum maintenance. Here is the time to determine a realistic maintenance budget. Maintenance departments welcome any effort to bring them into the original planning stages.

Volunteers on this Horticultural Advisory Committee can be drawn from experienced amateur and professional horticulturists alike. Educational institutions, Arboreta and Botanical Gardens constantly seek opportunities to provide civic assistance; their staffs will serve in areas such as soil assessment as well as horticulture. Don't ever forget that the capable amateur has had considerable experience in growing plants. He knows each plant's "cup of tea."

Local gardening groups can initiate a planting project by coordinating their efforts with public agencies, whether city, county or state. To do this may require accepting a small share of the overall project costs. This is commonly referred to as "seed money" and confirms serious intent. The group can be responsible for researching the environmental factors of the proposed site, work with the agency's landscape architect in arriving at suitable plant material for his design, and include prime consideration of a realistic maintenance budget. No prima donna posies allowed!

Operation Triangles Proves the Point

Speaking from experience: Seattle's "Operation Triangles," with its professional and amateur volunteer Horticultural Advisory Board, was initiated by the Chamber of Commerce, and introduced the idea of landscaping 700 small traffic triangles that were created by traffic thoroughfares and criss-cross freeway lanes. This project was carried out in a coordinated effort with our City Urban Planning Department. The program has been successful and is accepted by the city. Today we are developing these triangles as rapidly as financing permits. The city assumes the cost of development over and above the "seed money" and the maintenance.

A metropolitan triangle planted to *Photinia fraseri*. Traffic visibility requires a planting not more than three feet high, so the *Photinia* is sheared twice annually. The dense, twiggy growth hides litter and discourages trespassers.

Photo by Dale A. Brenden.

The Operation Triangles Committee solicits the interest and seed money from neighbors near the triangle; this consolidates community interest. The Horticultural Advisory Board studies the site and makes recommendations to the City landscape architectural department on suitable plant material. All this has not been easy, but the results are strongly providing evidence of success. The triangles cost from $10,000 to $15,000 each, average 5,000 sq. feet, and require $1,000 seed money. Annual maintenance for the first two or three years averages from $500 to $1,000 each, and $300 to $500 annually thereafter. Some of the neighborhoods have become so enthusiastic they have "seeded" additional nearby triangles, and plan to finance extensions of the triangle plant material to local boulevards or business sections.

Long before this, in 1959 the Seattle Garden Club knocked on our City doors, as well as those of the Army Corps of Engineers, with a proposal for a demonstration planting along the Lake Washington Ship Canal. We seeded $4,000. The demonstration was so successful that we selected another site on the banks of the Canal and repeated the story. Then came a third section. As the culmination of our efforts in arousing public interest and support, the Army Corps of Engineers now has underway an eight million dollar development of its property along the Canal; the Seattle Garden Club Horticultural Committee serves as an acting partner. Without that initial interest in a $4,000 demonstration planting, would this attention to the beautification of the eight-mile Ship Canal ever have occurred? Little acorns of enterprise—yes, if environmentally sound, they grow.

Another example is related to our new freeway plantings of six or seven years ago. Armed with facts, our interview with Governor Daniel J. Evans was effective. At that time, the State Highway Department had the responsibility for freeway planting developments; they began with a string of costly, ineffective and busy little gardens. Quoting Russell Page was particularly effective:

> "If the speed limit is 60 miles an hour, or a one-minute view of a distance of one mile, the planting should not consist of more than the continual use of three plant species. Even if the speed limit is only thirty miles an hour and a one minute view of half a mile, it can be even more satisfactory to view the same planting for a period of two minutes."

Above. The north side of the Lake Washington Ship Canal before clearing.

Above right. The north bank from across the canal after beautification.

Photos furnished by Author.

The State Highway Department is now on a horticultural/maintenance appreciation "beam," staffed with environmentally concerned horticulturists and landscape architects; our freeway plantings are more aesthetically appealing and much less costly. This, too, was brought about by pushing the maintenance consideration and plant failure to the forefront.

Once a responsive interest from governmental authorities is aroused, not a second should be lost in suggesting a demonstration to prove the point. The authorities can open the doors to the project manager, who in turn can allocate personnel to aid the demonstration project.

Another tactic is to organize a seminar, inviting key representatives of urban planning, park, landscape, engineering and maintenance departments to meet for an open discussion on the practical advantages of horticultural and maintenance considerations before final planning. Such seminars could even surface duplications within different departments, each unaware of the existence of the other.

It may be possible to review a current landscape development during the planning stage. If the environmental factors and existing site conditions suggest the plants are not suitable to the site, submit an alternate list. In doing this, attempts to conform to the landscape architect's design are important; it is basically negative to inform a landscape architect *after* his plans are completed that the plants are unsuitable. He is an artist, can misunderstand, and may resent interference. Also, it is more difficult to find environmentally tolerant plants to fit shapes already defined than it is for the landscape architect to work from an appropriate plant list to begin with. Granted, it can be a challenge if the shapes and textures of suitable plant material for the site severely limit the design. Yet consideration at this time will determine whether the ultimate result is to be green or brown!

Every effort will not be crowned with success. For example, every bit of horticultural evidence we could present in opposition to a landscape architect's proposal to convert an abandoned industrial site to a City park fell on deaf ears. A fifty year old gas works on a twenty acre site, saturated to China with tar,

The Montlake Cut on the Lake Washington Ship Canal showing progress on the landscaping.

Photo courtesy United States Army Corps of Engineers.

benzene, and oil soaked soil, was envisioned by the architect as retaining some of the structures, surrounded by trees, shrubs and lawns, and including a garden of native plants. This design was awarded an original one million dollar contract by the City. Despite all of the facts, digging began; immediately and predictably, a seething mass of oil was released. The landscape development plan has now reached a 1975 projected cost of over four million dollars and includes removal of a substantial amount (35,000 cubic yards) of the existing polluted soil, elimination of all plants except for a stand of trees in the parking lot, and surrounds the industrial forms with three plots of turf only. By 1975 this "park," composed of approximately five acres of lawn, could easily cost five million dollars (four million above the original contract) and by 1978, the remaining questionable soil conditions could even eliminate the lawn. This is to say nothing of the future annual high maintenance costs of lawn, or continual turf replacement.

A current success is our dealings with Lawrence Halprin & Associates; this firm is designing a park to cover a freeway in the City center. The first section was horticulturally reviewed *after* design completion; several substitute plant species were suggested and were readily accepted. For the succeeding section, and at the request of the firm, a plant list was submitted *before* the landscape planning. "This saved immeasurable time and cost."

There is no point in venturing forth on a mission to any public agency on a complaint platform. This route is circular: from the maintenance department to the engineering or city planning department to the landscape department and back to the maintenance department, finding no one who can answer to any responsibility.

In summary, the cause of costly public planting failures is two-fold: unsuitable plants for the conditions of a specific location, followed by excessive maintenance costs. The solution is simple: solve these problems *before hand.* Every plant is motivated; it's going to try its best to grow. The horticulturist is the doctor and must prescribe every horticultural compensation he can to build strong, healthy specimens. His tool is environmental horticulture. This keeps the green from turning brown, whether it be plants or currency! ⟡

HORT EDUCATION at the INTERFACE:

a blend of the arts and sciences

*Eliot C. Roberts**

Among the first to sample some of the recent advances in horticulturally oriented environmental improvement are many of our current college students. Increased student awareness concerning the environment has emphasized needs for change in the teaching of horticulture. Our college instructors have responded with new courses, modified teaching techniques, updated course requirements to meet the needs of new professions and even changes in department and college names to more adequately identify new missions of the 1970's. In some states these new efforts have nearly replaced production oriented horticultural education; however, in most geographical locations of horticultural prominence the need for traditional grower information is given predominance in program development.

Horticulturally oriented environmental education has been tested during the past three years at the University of Rhode Island with spectacular results. Students have responded enthusiastically to our efforts to meet their needs. For example, from 1968-1969 academic year to 1972-1973 numbers of students completing course requirements in our College of Resource Development doubled. During that same period numbers of students completing course requirements in our Department of Plant and Soil Science more than tripled. In fact in 1972-1973 the Department served more students than the entire college served in 1968-1969. This fall (1973) well over 1000 students will complete requirements in at least one of our environmentally oriented horticultural courses. Many of these subjects are also taught spring semester and a similar enrollment is expected. All of this with a University enrollment of about 10,000 students. Horticulture is doing something right.

To some extent students have responded favorably to changes in college and department names; from "Agriculture" to "Resource Development" and from "Agronomy and Horticulture" to "Plant and Soil Science." Departments of Environmental Horticulture have been formed in recent years to focus additional emphasis on relationships between horticultural crops and environmental quality. Use of the term "Environmental" to replace "Ornamental" as related to horticulture increases the sense of urgency for knowledge in this area.

To a major degree our students have favored course changes that have sacrificed in depth study of subject matter for a better over look at relationships between plants and the environment and man. For years we have exposed ourselves to increasing detail as the knowledge explosion has brought exciting new advances before us. We have gone with our students deeper and deeper into complex subject matter and in many instances lost sight of practical man-environment related objectives. Thus, many new freshman, sophomore and junior level service courses have been created to help put the pieces of our environmental puzzle together.

At the University of Rhode Island we have stressed the following:

The Art and the Science of Horticulture

Horticultural plants have high esthetic value, particularly those types classed and used as ornamentals. They provide an art form in both interior and exterior arrangements and through gardens to overall landscape establish features of incomparable beauty. They are the subject of paintings and the inspiration of millions of people the

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Mass production horticultural education; 500 students attend horticulture class at the University of Rhode Island.

Photos furnished by Author.

world over. Floral art and landscape design are of tremendous importance to all of us; however, public appreciation and recognition generally are lacking. We recognize readily the value of design in other industries, for example in the automotive or aeronautics industries. Here metals and engineering techniques developed through research are used to mold and fabricate functional structures that create market demand and needs for safer and faster transportation. Or in other more agricultural terms design may be likened in importance to utilization research which has as its objective the development of new and improved products from existing substances, like the soybean, which shows promise of developments of unparalleled importance in the food industry. We have a wide variety of existing products (ornamental plant materials); we are seeing now increased interest in determining new uses for these plants in the modification of our functional and esthetic environment. Students recognize opportunities for creative work with plants that says to them "life can be beautiful".

In one other sense there is evidence of the need for increasing emphasis on the art of horticulture. Problem orientation, the study of plant culture and management and related problems, has been and still is a major feature of the Land Grant University concept. This is entirely appropriate when working with professionals; however, when associated with the needs of laymen and amateurs, problem orientation of subject matter often produces negativistic reaction. This has resulted in a "turning off" or "tuning out" of valuable information. Discussions concerning cultural practices that are flavored with the art of plant use are more effective in bringing out enthusiasm for all that horticulture has to offer.

Environmental Horticulture

The environment is recognized as being all around us wherever we are. Advertisements caution us about germs on environmental surfaces. Thus, we are confronted

The University of Rhode Island flower garden display always attracts viewers through the summer months.

with a continuum of environmental change from rural to central city and from out of doors to indoors and from room to room within the house. In order to create and maintain the most livable environment, we must know what plants do well in an almost unlimited number of situations in which we live, work and play. In addition, we must know how to manipulate the plant's environment so that in turn plants, which are required to produce functional and esthetic affects for us, will persist. This concept of modification or enhancement of our environment (wherever it may be) by use of plants has an appeal for many people who want to move ahead from talking about the environment to doing something about it.

Attention is focused on five varying environmental situations in which plants may be used for specific purposes:

- Under controlled, generally indoor or protected conditions such as in residences, offices, restaurants, shopping centers or malls.
- Under urban conditions such as downtown street plantings, around high rise developments, in connection with multiple family residences, and in vest pocket parks.
- Under suburban conditions which include individual and multiple homesites, industrial and government facilities, memorial parks, golf courses, recreational and conservation areas.
- Under transitional conditions that exist between the suburban and rural and feature highways, rapid transit systems, airports and greenbelts.
- Under rural conditions where open space is more adequate for individual residences, town squares, community forests, parks, shelterbelts and windbreaks.

In each of these five situations and in each of the numerous examples that might be presented under these, different plant types used to create varying affects may be specified. In each of these situations the placement of the proper plant in the proper place and the culture and maintenance of these plants in the proper way can create a work of art that will modify the local environment in such a way as to make that place more liveable, more pleasing to view, more restful, more conducive to conducting business or more desirable for shopping, dining or conversation. Horticultural students are asking, "What is the proper plant?" "How does one characterize differences between various locations?" "What are cultural requirements of various plant types?" "How should plants be selected and grouped to produce the desired affect?" Answers to these questions and others that are closely related provide the foundation on which horticulturally oriented environmental education is built.

There is another aspect of environmental horticulture that has received increased

Professor Richard Shaw and students assemble for a Garden Management Class at the University of Rhode Island.

visibility and which is meaningful to our students. This involves environmental pollution and the less easily recognized aspects of visual pollution. Subjective reasoning related to the visual quality of our environment makes signs, lights and sagging wire acceptable. These forms of pollution are thus masked by monetary returns and immediate conveniences to the consumer. Litter and trash are also forms of visual pollution. Often primary emphasis is placed on just cleaning up the mess created throughout our cities and countryside and little is done concerning the cause for this problem. The result—these areas are relittered. Attention to the quality of our environment is in need of elevation to more nearly equal the level of support for technological achievements which have made much of this litter possible. Emphasis on replacing litter with natural beauty in such a way that it is recognized as desirable, even essential and thus respected by all concerned, is worthy of our most enthusiastic support. This issue is meaningful to college students because they recognize that they discard their fair share of trash.

Horticultural Economics

Plant quality, the production and availability of plants that will meet specific cultural or maintenance requirements, is related to business aspects of a complex horticultural industry. This matter is an important determinant of how effective we are in the improvement of local, state and national landscape scenes. The concept that landscaping information and landscape plants are free to hand on from neighbor to neighbor is excellent for the promotion of garden club activities, but this is not the solution to problems involving visual pollution or landscape quality on a large scale. Nurserymen, florists and sod producers who are highly competent in their areas of specialization, and well organized as professional and businessmen, are key personnel in environmental improvement at this level. Horticultural students are impressed with the knowledge that this industry does exist and that the value of plant materials and services rendered is worthy of improved public understanding. For example, the value of ornamental plants in enhancing our environment is partly esthetic, which is obviously difficult to assign a monetary significance, and partly economic as it involves, in addition to the value of plants, the value of fertilizers, irrigation systems, pest control practices, mowers and maintenance equipment of all sorts as well as the service provided by specialists who perform maintenance practices

Flower arranging is a part of the curriculum. This is the Floral Art class at the University of Rhode Island.

for the individual homeowner, industrial corporation, country club, city park department, state highway department or other public and private agencies involved in grounds management. In addition, the value of landscape plants increases with time and represents a far larger and more important series of interrelated activities than many economists have recognized. Career opportunities in these areas are appealing to many young people, and as our liaison with this segment of horticultural industry improves we are more realistically meeting both student and industry needs by adjusting course contents, by creating specialized training options, and by providing college and on-the-job training experiences of varying duration.

Horticultural Therapy

Involvement of people with soil and with seeding and care of small plants and with the culture of ornamentals to produce flowers and fruit represents in total a virtually untapped resource in the area of therapy through horticultural practice. Plants provide a means for encouraging more rapid human recovery from mental and physical illness. A patient who has the desire to recover because he has something to do, a job to accomplish, something that is living which needs his care, often has a better rehabilitative record than those patients who have lost interest in life and what it has to offer. Although not all people express outward interest in plants and in natural beauty, there is a realization that it is right and fitting to have an appreciation for flowers and foliage plants and to be concerned about their preservation and culture. Perhaps this is related to our lost ancestral contacts with a more primitive natural environment. Perhaps something about the fragile nature of a plant makes us desire to protect and nurture it and in so doing gain personal strength and satisfaction. Whatever the reason may be, the concept of horticultural therapy has real meaning and significance for our college students. They readily appreciate the opportunity for leadership along with medical doctors, psychologists, psychiatrists, sociologists and landscape architects in further developing appropriate projects and procedures involving plants for use in recovery programs with patients having different medical backgrounds and prognoses for recovery. This same opportunity exists for creative work in geriatrics.

The recent formation of the National Council for Therapy and Rehabilitation through Horticulture and the new curriculum in Horticultural Therapy at Kansas State University have reinforced the theories and proposals of many horticulturists throughout America. Great expectations in behalf of service to mankind are forecast for this coordinated effort.

Horticultural Life

A final challenge exists for our students just as it exists for all of us: that of bringing the expertise of landscape architects and horticulturists to focus on current environmental issues. We have traveled separate roads too long; the opportunity for cooperative effort is all around us. Just as the landscape and golf course architect have combined their talents with horticulturists to create recreational facilities that revitalize otherwise tired, discouraged or frustrated men and women and just as landscape architects, engineers and horticulturists have used plant materials in the creation of a safer environment for vehicular traffic, so we must insist that these same principles of plant use in the enhancement of the environment be emphasized in the restoration of our cities, slums and ghettos and in the prevention of further degradation of industrial, business and residential areas. We have succeeded in stimulating student recognition of the essential nature of plants and landscape plans in modifying what continues to be an intolerable environment in which many people live. They note that city planning regularly features the provision of space to culture native and introduced vegetation that forms a type of separation between areas of high density population. Greenbelts provide clean fresh air and relief from the noise and rush of the inner city. They provide people with space to regain their individuality and to contemplate the wonders of nature and the realization that we are all a part of a natural as well as a man made system. ◈

The mall and pool at Brookside Gardens.

Photos furnished by Author.

BROOKSIDE GARDENS

A COMMUNITY BOTANICAL GARDEN

*Carl R. Hahn**

Thank you for showing us the Botanical Garden. We liked the banana trees and the coffee plants best. The fountains were nice too. Thanks for the plant.

–Mrs. Randall's first grade class

That thank you note—actually written on a 2 by 3 foot poster—hung for months in the offices of Brookside Gardens in Wheaton, Maryland. In many ways, it is a symbol of what the botanical garden has been trying to achieve since it opened its doors more than four years ago. The concept is of a community garden, and community in the broadest sense—a place anyone can find useful and enjoyable, whether he is a second grader just learning about plants or a graduate student doing plant research, whether he is just a casual visitor who doesn't know an azalea from a petunia or a horticultural expert.

At Brookside, it's possible to do volunteer work, have your sick plant diagnosed, take a tour, hear a lecture, use library facilities or pick up a monthly garden bulletin. You can even be married there. And the garden's telephone number is a handy thing to know if your child has just swallowed a seed that could be poisonous.

The 35 acre garden—bordered on one side by a brook which gives the garden its name—is part of Wheaton Re-

**Brookside Gardens, 1500 Glenallan Avenue, Wheaton, Md. 20902*

gional Park, located in Maryland a few miles north of Washington, D.C. More than 100,000 visitors a year come to Brookside, and though it exists as a community garden, some of those visitors are from as far away as Japan and Europe. One Russian garden enthusiast is even on the mailing list for Brookside's monthly bulletin.

What they come to see is a garden that, though only a few years old, is already gaining National recognition. In 1971, it won a National Award for Landscape Design, which was presented by Mrs. Richard Nixon. This year, it made the garden world's equivalent of the best-dressed list. The *Grounds Maintenance* magazine and the Professional Grounds Management Society chose Brookside as one of the best-maintained gardens in America.

The design of the garden is simple and effective. After parking, the first logical step for the visitor is to go through the tropical greenhouse and a propagation greenhouse to other outdoor gardens. The greenhouse and parking area are at the bottom of a hill with various gardens, including a rose garden, a fragrance garden, and an ornamental grass garden on tiers rising to the top of the hill where a gazebo perches. A weary visitor can rest there and get an overview of the gardens and fountains he has just wandered through. Beyond the gazebo are one and a half acres of rhododendrons and azaleas, which grow along pine-carpeted paths in a natural woodland setting beneath a canopy of pine and dogwood trees. The effect is one of hushed beauty, quiet and solitude.

The Maryland-National Capital Park and Planning Commission—a bi-county agency for Maryland's Prince George's and Montgomery counties—began planning the garden in 1959 but the actual construction didn't begin until 1966. Part of the funds came from federal sources, administered through the Maryland Department of Forests and Parks.

Brookside opened in the summer of 1969 with three greenhouses and about three acres under cultivation. Now there are 25 acres under cultivation and plans call for about ten more to be developed. The greenhouses include a 100 x 60 foot conservatory, a propagation greenhouse, and a smaller display greenhouse.

A woodland trail brightened by azalea cultivars.

The conservatory contains a landscaped garden of tropical flowering trees and shrubs, complete with a stream, a waterfall and wooden bridge. Against this background of tropical lushness and greenery, the conservatory is alive with color with special shows every month of the year. At Christmas there is the traditional display of poinsettias and cyclamen, and at Easter, a display of lilies, hydrangeas and primroses. In the late fall, there are thousands of chrysanthemums, many of which are trained in unusual and interesting forms.

A look at some of the outside gardens, and how they came into being, is also a look at what Brookside means when it says community garden. The fragrance garden, scheduled to open in the spring of 1974, is one of the most interesting. The idea behind this garden is to appeal to all the senses, not just sight. Color and form are important in all gardens, but the fragrance garden also appeals to the senses of smell, touch and sound.

Flowers, for example, are being chosen for the garden on the basis of how they look as well as feel and smell. The artemesia has a soft, velvety texture; the bergenia has thick, smooth and glossy leaves. Herbs such as rosemary and thyme will provide fragrance, as do flowers such as viburnum and honeysuckle. In addition, the pavement flagstones through the garden will be of varying textures, and the fountains will beat out different rhythms with the rippling of water.

The fragrance garden quickly caught the imagination of the community. The Silver Spring Garden Club, alone, donated more than $4,000.00 toward purchasing the fountains. The Takoma Horticultural Club donated tape recorders to be used to describe plants to blind visitors. Stadler Nurseries is providing all the plants for the garden, and numerous other local garden clubs, private groups and individuals made other gifts.

A similar story can be told about other gardens in Brookside. The rose garden features roses that grow well in the Washington area. It is also a display garden for All-America Rose Selections. All the roses for the garden, which opened this year, were donated by the major wholesale rose growers in the United States. Benches in

the garden were donated by the Johnston family of Silver Spring.

Though groups and individuals have donated monetary gifts in one way or another, volunteers who give their time are also an important part of the community concept for Brookside. Ruth Gray, a past president of the Silver Spring Garden Club, helped with Brookside from the very beginning—propagating plants, setting up displays, whatever was needed. "At first," she said, "it was just because I believed in the garden. Then I realized it was giving a lot to me too. One day I actually saw a woman visitor crying because she said it was so beautiful. Brookside is just the loveliest thing we have around here."

As with the fragrance garden, Brookside also tries to fit its other activities to community needs. Tours, for example, are often highly personalized. A group of first graders, such as the ones who wrote the thank you note, will be shown bananas, coffee, chocolate, black pepper and vanilla plants, and perhaps will be told something about their economic importance. They might also be given a plant to take care of, which provides a point of interest for them to become involved in learning more about horticulture. A tour for homeowners and apartment dwellers would be quite different, because their interests would be more in plants that can be grown in their homes.

Christmas, with poinsettias and wreaths of fresh greenery.

Plant lovers and the problems they have with their plants also shows the community concept of Brookside, because members of the community have come to rely on Brookside as a sort of diagnostic center for their plants' ills. Some 200 to 300 persons a week either call or come into Brookside to find out what's ailing their plant. To take one example, a woman recently brought in her dracaena, a tropical foliage plant. The tips of the leaves were discolored. Brookside diagnosed it as tip blight, a disease which kills the tips of leaves and may eventually cause the plant to die. She was told to remove the affected leaves and spray it with a fungicide. Some problems can't be solved that easily. Another gardener, thinking he had purchased Kentucky bluegrass, over-seeded his lawn of Kentucky bluegrass. It was another type of grass altogether and he wanted to know how to save the bluegrass while killing the new grass. No way, he was told.

Another type of call which Brookside fortunately gets only rarely is more important and more dramatic. One case in point: On a Saturday evening, a Wheaton Park Policeman received a call that three young boys had been brought into a local hospital in serious condition after having eaten unknown quantities of a seed found growing near their homes. The policeman immediately notified and then had picked up the park's naturalist and the Brookside horticulturist. It was absolutely essential to identify the seeds before treatment. They were able to do this by first locating the plant, identifying it, and then finding medical data on the poison and antidote. The information was relayed to the hospital and the patients were successfully treated.

The park employees found their information on the plant in the Brookside Library, which is also another source of pride and of usefulness to the community. It contains some 1,000 books and the collection is added to each year. The garden also subscribes to forty periodicals, and maintains a file of nursery catalogs to let visitors know where they might find a particular plant either in the Washington area or by mail order. All material is cross-indexed for easy reference.

Employees of Brookside also put out their own monthly bulletin, telling what's going on in the garden—upcoming displays, new publications—and giving helpful hints on what should be done in area home gardens during that month.

Brookside offers other educational facilities and programs to the community in addition to tours and the library. Brookside plant specialists have, since the garden opened, been available for lectures to school groups, garden clubs and other local groups. In addition, in the fall of 1973, the Garden initiated a series of weekly garden programs of horticultural interest. Some of the first titles? Gardening in the Shade, House Plants Without Pain and Landscape Gardening.

Brookside also has initiated a summer work experience program. It hires six high school and college students interested in a horticultural career to work in all phases of the gardens' activities.

The GREEN CENTER

GARDENING SKILL

TOMATOES: HANGING BASKETS
Is it time to water?

BACKGROUND INFORMATION

AIR POLLUTION: Saving the Green

BEGINNING EXPERIENCE

DILL: Discovery time with plants

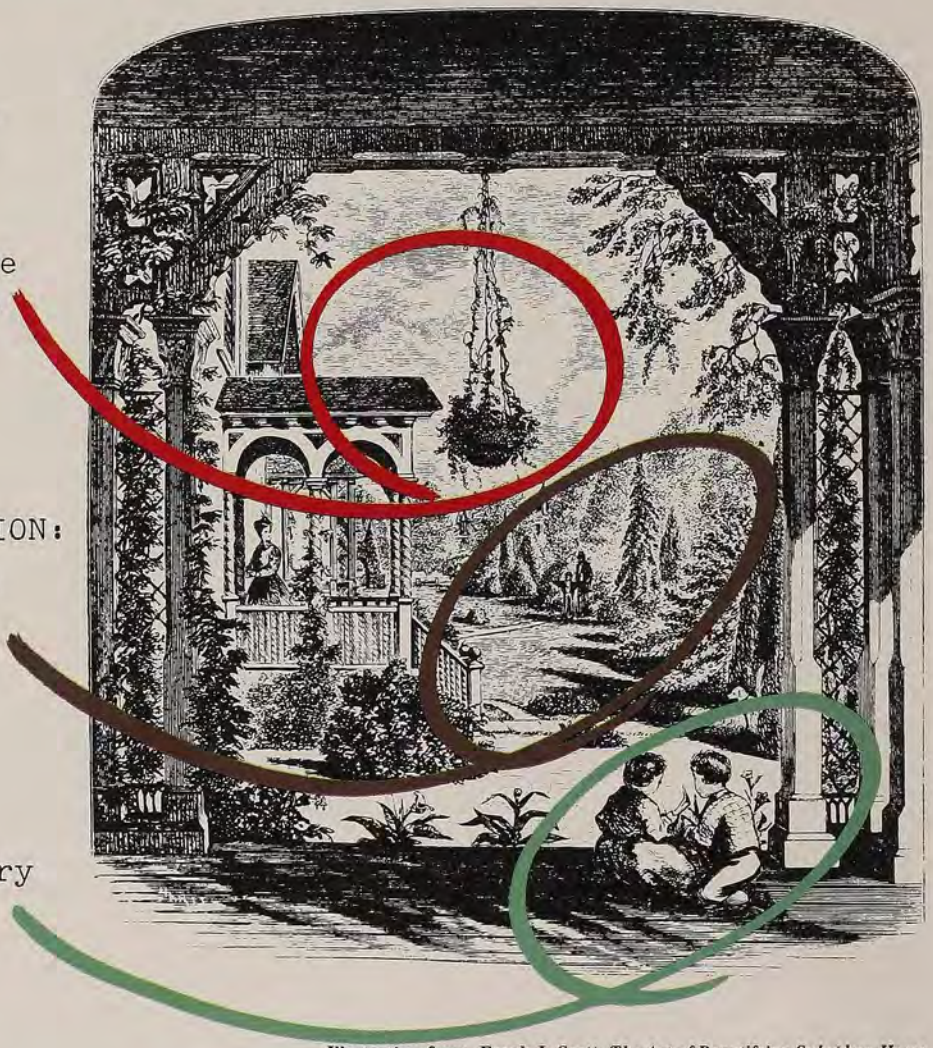


Illustration from, Frank J. Scott, *The Art of Beautifying Suburban Home Grounds of Small Extent.* New York.—Appleton & Co. 1870.

People involvement is one answer to solving environmental problems with horticultural methods. People, young and old, hale and handicapped, rich and poor, seem to respond to horticulture. But there is a catch. How do you start people off on a horticultural project? How do you choose a project that most likely will turn out well? The "Green Center" of this issue offers three projects designed to introduce people to horticulture. The materials are easy to come by. The projects are adaptable to the inner city or to a country town.

Make free use of these pages. You can open the magazine's center staples, lift out the pages, and photocopy them to use in the classroom, in a geriatrics center, in a Scout troop meeting. These experiments with plant materials will whet your group's interest in more plant research, more plant growing. Thumb through past issues of American Horticulturist for articles with adaptable ideas. You will fine information on starting seeds, on growing berries at home, on hybridizing your own garden species, on growing a landscape in a dish. Turn these into projects for your group. There's no end to horticultural education, and the more we learn the better equipped we are to restore and develop the beauty and productivity of our surroundings.

DILL: THE HERB THAT DOESN'T HOLD BACK

Take dill seed out of the package-- look at the long, ridged seed. With a knife cut one of the seeds in two parts, blot it with a piece of facial tissue. Close your eyes, hold the tissue up to your nose -- try to remember where you have smelled this scent before. Correct! It smells like dill pickles -- the scent comes from a member of the carrot family, originally found in Europe but now grown throughout the world as a seasoning. To learn about the plant and its parts -- do these things.

1. SEED: The seeds of the dill plant are elliptic (flat body that is oval, narrowed to rounded ends, widest at or about the middle) with thin ribs and sharp narrow wings, about 1/6 inch long. Cut seed into two pieces -- contains 2% of a yellow oil (carvone) which gives all parts of the dill plant a characteristic scent. Rub the oil of one seed around the inside of a wooden salad bowl-- just this amount of oil will flavor a whole bowl of greens. Use restraint!

2. SEEDLINGS: You can germinate seed in an expanded peat pellet (Jiffy-7). Place pellets in 2 inches of warm (100°F.) water, in a pan. The pellets will absorb almost all of the water, drain the excess away. Place two seeds in the depression of each pellet. Cover with 1/4 inch of peat mix from the pellet -- press firmly. Cover pan with plastic film and place seedlings in a cool (60°F.) environment. On the seventh or eighth day seedlings will begin to emerge -- move the pan to a bright window or under fluorescent lamps to promote immediate greening of the seedlings and to insure normal stem and leaf formatiom.

3. PLANTS UNDER FLUORESCENT LAMPS: Place seedlings under 40 watt fluorescent lamps -- two 4 foot lamps will supply enough light to grow the plants if hung 6 inches from the tops of the plants, and lighted sixteen hours daily. Use your ceiling fixture with the plants in a hanging basket if no other lamps are available. Place dill garden in basement, away from all heating ducts or radiators. Water plants thoroughly every third day, add half-strength water-soluble house plant fertilizer. Remove the extra seedlings by snipping the stems, use as an herb (discussed in Step 4). The plants will grow 2 to 3 feet and flower in about ten weeks after planting.

4. DILL WEED: The plants at all stages of development contain the characteristic oil of Dill. Prepare dill weed two ways. Cut plants off at the soil line -- make bundles of eight to ten stems, bind bottom of stems with cord. Hang bundles upside down in a dark, cool, dry room, shed or basement with good air circulation. The bright green color holds when plants are dried in the dark. The plants will dry in ten to fourteen days. When completely dry, fold, chop, and shred material and store in a moisture-tight container. For fresh dill weed -- snip leaves onto a cookie sheet; put in freezer. When frozen, store in containers and keep in freezer until needed for seasoning. The sharp flavor can be used to add taste to sauces or white vinegar, sprinkled on boiled potatoes or fish as an accent taste, or mixed into omelets or salads.

Dill, regardless of when it is used, provokes immediate recognition and identity. Try it and learn for yourself!

AIR POLLUTION:

Second true leaf of marigold is most sensitive to O_3. Sensitivity of leaves varies with age of plant.

I. TYPES: Air pollutants are divided into two major types:

- gases - ozone = O_3, PAN (peroxyacetyl nitrate), nitrogen dioxide, sulfur dioxide = SO_2, hydrogen fluoride, ethylene and chlorine -- all are chemically active.

- particulates - particles of all kinds of foreign objects suspended in the atmosphere -- usually chemically inert.

II. DISTRIBUTION: Pollutants may travel freely from their sources, cross city and state lines, and contaminate other communities many miles away.. Weather and land mass conditions that cause stagnant air masses may cause a buildup of pollution at certain times and places.

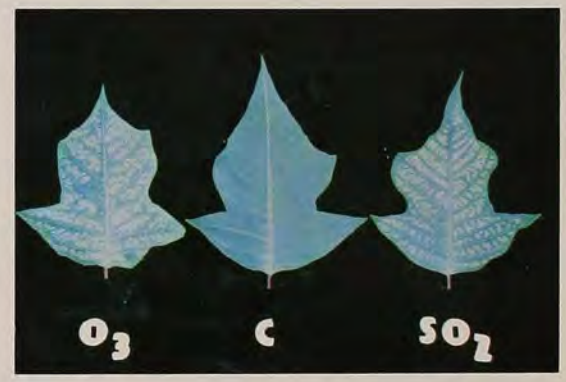
III. MAJOR POLLUTANT: Ozone

1. Source: Photochemical reaction of hydrocarbon and nitrogen oxides from fuel combustion, refuse burning, and evaporation from petroleum products.
2. Symptom: Fleck, bleached spotting, pigmentation, growth suppression, and early leaf abscission.
3. Injury: Destroy plant chlorophyll, disrupt the photosynthesis process, and consequently reduce sugar production in plants. Visible on leaves twenty-four to ninety-six hours following exposure to ozone.
4. Experimental Procedures: Test plants are exposed to ozone at various concentrations, measured in Parts Per Hundred Million (PPHM) in a growth chamber.. A temperature of 25 C., relative humidity of 78-88% and light intensity of 2,000 foot candles (fluorescent and incandescent lamps) is maintained during the exposure period.
5. Indexing Injury: Plants are indexed for injury forty-eight hours later on a scale ranging from 0 (undamaged green leaf), 1.0 (tan specks between veins), 2.0 (20% of most sensitive leaves dead) to 10.0 (100% of most sensitive leaves dead).

Typical O_3 injury on marigold.

Typical SO_2 injury on marigold.

Close up of marigold leaf-normal. C = control.



Poinsettia leaves, O_3 vs SO_2.

SAVING THE GREEN

6. Field Problems: Field conditions differ considerably from the experimental situation, it is often difficult to relate observed and reported behavior: type and severity and even occurrence of pollutant-induced symptoms may be altered by:
   - genetic background and variability of plants
   - stage of development
   - soil -- water and nutrient supply
   - climate -- temperature, light, relative humidity, or wind velocity

Sycamore grown in greenhouse. Air unfiltered.

7. Indicator Plants: O_3 type oxidents

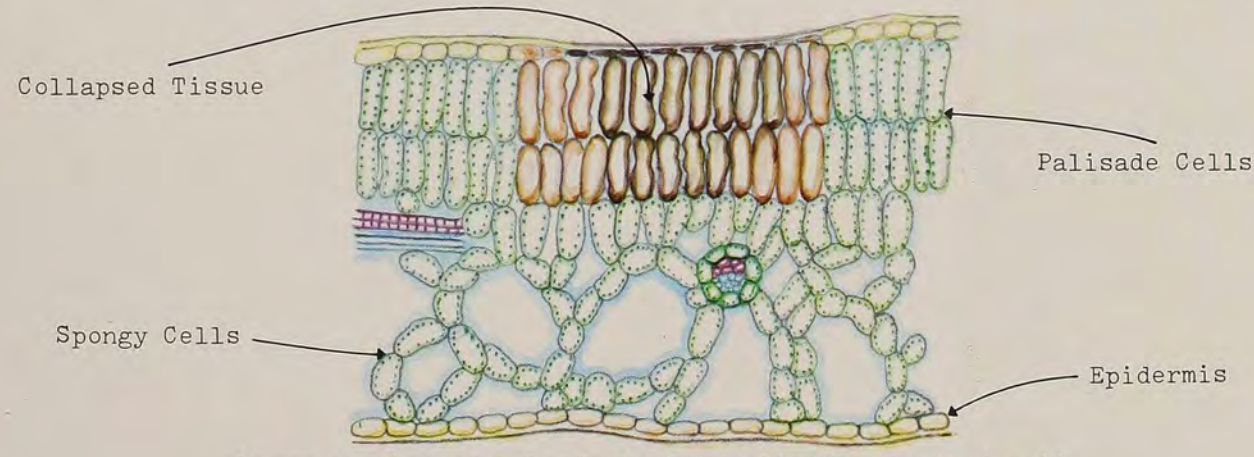
Crabgrass	Catalpa
Muskmelon	Silver Maple
Onion	Petunias
Tomato	Eastern White Pine
Radish	Sycamore

Many plants can serve as indicators of the presence of pollutants: Chemical analysis is not reliable for detecting accumulation of pollutants in tissue. Undamaged plants often contain higher concentrations of pollutants than are found in damaged plants.

Sycamore grown in greenhouse. Air filtered.

8. Agents which can be confused with air pollution injury:
   Natural factors: drought, frost, mineral deficiencies, diseases, viruses, insects and nematodes, pesticides - insecticides, herbicides

IV. RELATE WEATHER TO INJURY: Daily newspapers, in the weather section, report the Council of Governments Air Quality Index for the previous day. The reading is made during the period from 2 p.m. to 3 p.m. for pollutant photochemical oxidents, Index values below 25 PPHM indicate good air quality. Values between 25 and 50 PPHM indicate fair weather quality. When index exceeds 100 PPHM the air becomes hazardous, and persons with lung, heart, and eye problems should restrict their activity.



Cross-section of a leaf showing pollution-damaged cells which have collapsed and died.

TOMATO LIBERATION

LET'S LIBERATE TOMATOES!

They don't have to be grown on a farm like your country cousin's or in a garden or small plot of ground like your suburban neighbor's. Try liberating tomatoes from the constraints of growing them in the ground and grow them, instead, in hanging baskets in any sunny window of your apartment. You will have the satisfaction of growing some of your own food.

Follow these tips to citified gardeners wanting to grow tomatoes:

1. Pick small-fruited or patio types like 'Small fry', 'Patio', 'Tiny Tim', and 'Red Cherry', over the large-fruited, upright plants. You can plant several seeds directly into the container or buy the young plants from your garden store.

2. Use any container that will hold at least two quarts of growing medium. Otherwise, containers dry out so rapidly that daily care becomes extremely demanding. Plastic (bleach bottles or gallon-size milk containers) or wood (redwood or your own design) will do. Be sure to provide drainage holes. Use a nail to drive 3/8 inch holes, spaced 3 inches apart, near the bottom. Tie a cord or hemp bag around the container to make it into a hanging basket. The plastic hanging basket with attached saucer that is shown in the illustrations also is available commercially.

3.. Use a prepackaged growing medium (potting mix or potting compost) available in most variety or garden stores. Or you can make your own by blending equal parts of peat and vermiculite. Add to each bushel of mix 4 ounces of pulverized dolomitic limestone, 4 ounces of 20% superphosphate, and 2 ounces of 5-10-5 fertilizer. Mix thoroughly. Add water to bring moisture level up until the potting compost crumbles in large masses but is not soggy.

4. Line the bottom with 2 inches of coarse aggregate -- washed cinders, crushed rock, or shredded plastic containers. Drainage holes should be shielded with coffee filters to help hold the growing medium in place until the new root system meshes into a solid mass. Be sure to leave air pockets to permit easy drainage of water out of the container. Cover top of aggregate with 1/2 inch deep layer of finely crushed aggregate to prevent growing medium from plugging up the drainage holes.

5. Fill container up to within 1 inch of top with moistened potting compost. A 6-inch container is approximately equal in volume to 2 quarts of mix. Water with a solution containing 1/5 the amount recommended for most house plants. Use the water-fertilizer mix every time the plant needs water, throughout its entire lifetime.

6. In planting, tilt the potted plant on its side, with one hand pro-- tecting the plant. Tap gently until soil ball and plant fall out. Remove network of roots on bottom of soil ball. Dig a hole into which the soil ball will fit. The growing medium of the soil ball and of the new container should be on the same level. With your hands, firm the soil ball and growing medium to insure an immediate connection for water movement and knitting in of the root system.

7. In locating your tomatoes, remember that they need at least six hours of daily direct sunlight. This means you can hang your plant on a porch, in a window, or by an entrance to your home where for part of the day the area is shaded. Tomatoes grown in too much shade develop long, poorly branched shoots with few if any flowers and fruits. They are adapted to bright, sunny places with rapidly-moving air and, in these situations, they develop stout, highly branched shoots with abundant fruiting.

8. When you water the plant, continue to add water until all parts of the growing medium are thoroughly moistened and excess water is beginning to drip from the drainage holes. Note how much water you added and apply the same amount next time.

9. The plant must be acclimatized or trained to survive in its location for most abundant fruiting. You achieve this by controlling the watering and the fertilizing. Watch the plant when it has been freshly planted; wait to water until leaf color changes from a dark to pale green and they feel as if they are beginning to wilt. Then water thoroughly but keep the water off the leaves. Wait to water again until the plants begin to wilt. This treatment slows growth and helps the plant survive sudden changes in the environment.

10. In grooming the plant, pick off the yellowing or damaged leaves and flowers. As the plant develops, remove some branches to prevent crowding and to promote development of new flowering shoots. Turn the container at weekly intervals to expose all sides to the environment. Your plant will develop more symmetrically and balance out the effects of different exposures.

The bonus for all this effort? Vine-ripened tomatoes seven to nine weeks after you start the plants, plus some understanding of what it takes to raise tomatoes. And for your friends, maybe a mini-basket of highrise-grown fresh tomatoes.

Another beginning.
Photos by Gotlieb Hampfler.

Through Education We Grow

*Lois Woodward Paul**

From their inception the land grant colleges of the United States have had strong agricultural departments. Our survival and success as a nation depended on their teaching the methods for the production of food. To grant money "for growing flowers" I am sure seemed frivolous to our founding fathers and often could not be justified. It followed that horticulture for many decades was a stepchild in our scheme of things.

I became aware of these facts when I decided to go to The Pennsylvania School of Horticulture for Women in Ambler, which was founded by a small group of Bryn Mawr College graduates who believed in horticulture as a fine and rewarding career. The school was patterned after Swanley and Studly, schools in England.

After completing two years of a well planned work-study program in horticulture I knew this was the profession for me. I loved every phase of it but I realized there was so much to learn that further education was needed. I found another institution to my liking, a graduate school of Smith College, known as The Cambridge School of

**LONGWOOD GARDENS, Kennett Square, Pennsylvania 19348*

Architecture and Landscape Architecture for Women, ultimately taken over by Harvard University. It was here that I experienced the inspiration that gifted professors can give to students; namely, the desire and drive to achieve excellence.

Having come from a teaching family the following quotation has a special meaning:

"Those who want to leave an impression for *one year* should plant corn

Those who want to leave an impression for *ten years* should plant a tree

Those who want to leave an impression for *a hundred years* should educate a human being."

I soon found that horticulturists were a generous lot, willing to share their knowledge and eager to lend a helping hand. I also found that after lecturing to a club invariably an older person would convey the idea that had she known of horticulture as a profession, it would have been her life's work. Too bad that this was the case. With our expanded interest in the environment, horticulture in the past decade has been looked upon more favorably and has been coming into its own realm of importance.

The late Pierre S. du Pont, who founded his magnificent Longwood Gardens in Kennett Square, Pennsylvania, included education in his will thereby making many teaching programs possible. From visitors inquiring about the culture of the many beautiful plants in the conservatories and gardens grew the Short Course Program, which offers a wide range of classes for the serious amateur.

In the capacity of Supervisor of Education at Longwood Gardens many interesting experiences have come my way, giving me a tremendous insight into the lives of those who have studied horticulture with us.

A few quotes from the serious amateurs:

"I want to devote all of my free time to horticulture." She is doing this and recognition, with outstanding awards, has followed.

Another student who had lost her son, "Continuing with classes helped me keep my equilibrium."

One of our young married group, "You must come and see my beautiful perennial border."

From one who had difficulties in her personal relationships, "I am at peace with the world when I work in my garden."

A student of Landscape Design, "The most expensive course I ever took; we added a porch and rebuilt the entire garden. Come and see it."

Much to our amusement our students become so inspired they use our outlines for teaching classes themselves, after coming back for a briefing on a part they couldn't quite explain!

Some have entered the field of horticulture through a simple course in flower arranging. Wanting to have their own supply of flowers makes them grow a wide variety of plants and ultimately they are gardening in a big way.

It is rewarding to have doctors, law-

A lecture demonstration on vegetable growing; the Longwood Summer Student Program.

Plant identification and research; the Longwood Professional Gardeners' Training Program.

For interested amateurs, a bonsai course sponsored by the Longwood Education Department.

yers, and business men find time in their busy lives to include a course or two. One doctor recommended gardening to so many of his patients that he, too, quickly became an enthusiastic grower.

In addition to the amateur program at Longwood Gardens, each year approximately fourteen undergraduate students, mostly juniors and seniors majoring in the plant sciences, are selected from a list of applicants from universities throughout the country. They spend the summer at Longwood in a work-study program for which the University of Delaware grants academic credit. They are eager to have the practical experience in the conservatories and gardens. This is known as "*The Longwood Gardens' Summer Laboratory* for Ornamental Horticulture." At the end of the summer of 1973 when two students were asked about the program, they gave a very clear picture when they said, "We have learned so much we do not want to leave."

We also have students from foreign countries spend a year at Longwood Gardens in a similar program. We may have as many as four a year. The following countries have had students with us: Scotland, Denmark, Poland, South Africa, New Zealand, Israel, Holland, and Mexico. We learn from them and in turn they learn from us.

The Professional Gardener Training Program is our newest effort. The objectives are to prepare students (ages seventeen to twenty-five years old) for employment in horticulture to include nursery management, garden center operations, floriculture, park management, turf grass industry, botanical gardens, and private gardens. Upon completion of the program the graduate will have had approximately two years of broad, practical horticultural experience combined with a basic academic background in horticulture. These students live at Longwood Gardens. At the present time we have twelve enrolled, six juniors and six seniors (including two young ladies).

A young Professional Gardener, about to graduate, was introduced to a group in the conservatory and remarked, "I have just spent the best two years of my life." What greater reward could one have.

Indeed we are continuing "Living and Learning" in our part of the U.S.A.

Putting Horticulture Into the American Scene – I

Illustration from J. Milbert: *Intinéraire pittoresque du Fleuve Hudson et des parties latérales de S' Amerique du Nord.* Paris, Henry Gaugain.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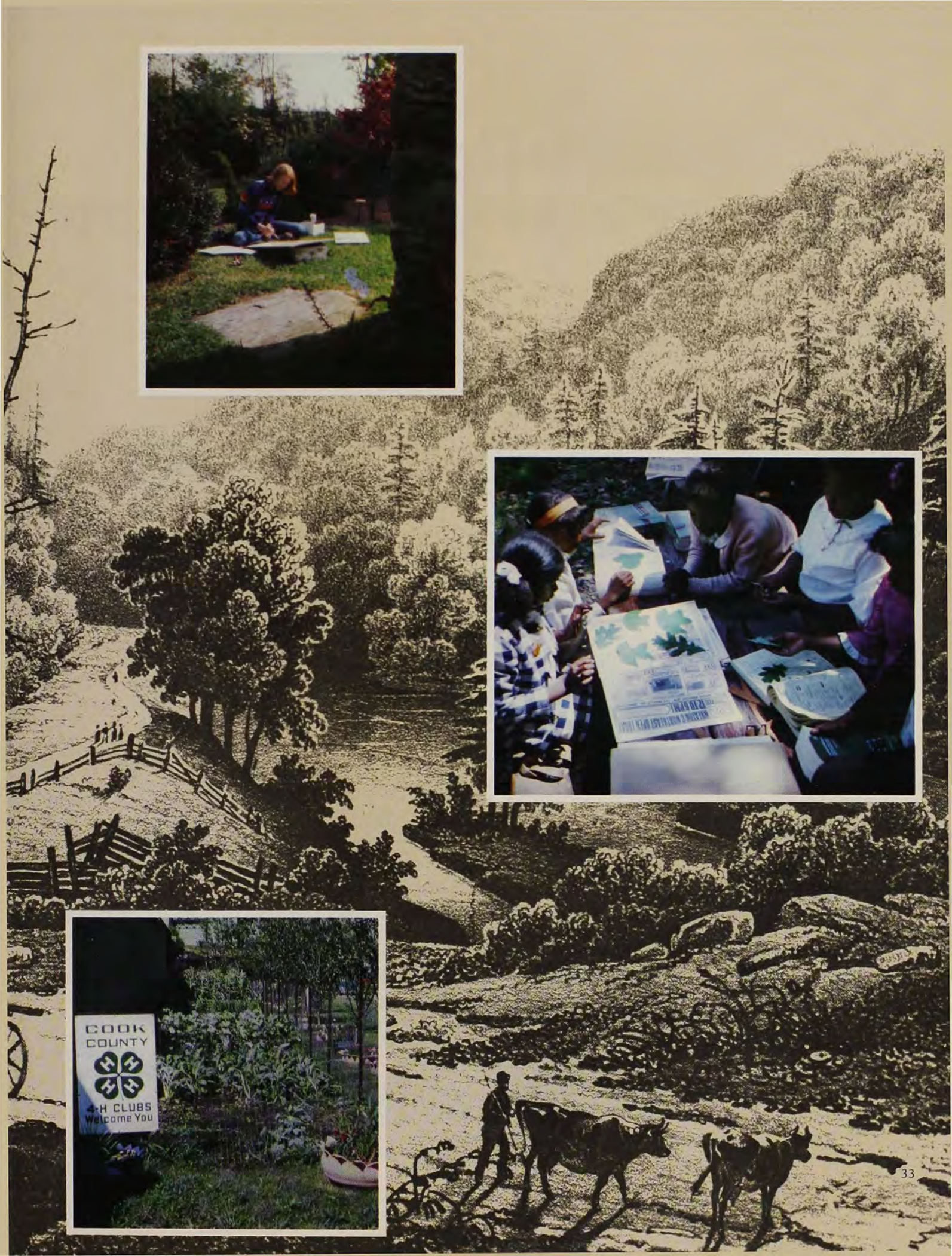
Putting Horticulture Into the American Scene – II

Illustration from J. Milbert: *Intinéraire pittoresque du Fleuve Hudson et des parties latérales de S' Amerique du Nord.* Paris, Henry Gaugain.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The Philadelphia Flower and Garden Show

Ernesta D. Ballard*

Photos furnished by Author.

The floor plan of a recent flower show sponsored by the Pennsylvania Horticultural Society.

The first step in a flower show; truckload after truckload of fresh smilax from the South conceals the ceiling. Tons of sand, peat and soil form the beginning contours of the floor display.

Each year, in March, more than 100,000 people pay to see the Philadelphia Flower and Garden Show. Over a period of eight days they stream into Philadelphia's hugh convention center and push their way along a half mile or more of winding paths to view some eighty-five exhibits. At times the crowds are so thick that it is difficult to see the displays, yet the visitors stay and enjoy themselves. And, I feel sure, they will be returning next year and in the years to come with undiminished enthusiasm.

What does a modern flower show visitor come to see? By no means the same thing he (or, better, she) saw in 1940 or even in 1960. Before World War II, flower shows lived up to their name. They depended heavily for their effects on masses of flowers displayed by commercial growers and gardeners from the great private estates. Nursery exhibits tended to be less important, and educational exhibits were few and far between. The visitor came to be impressed—not to be informed.

Today, all this has changed. The long rows of ranunculus and azaleas displayed by commercial growers have disappeared. The last big entry by a private estate was in 1970. The modern visitor finds a complex and diversified show offering less of a lavish spectacular, but much more

*The Pennsylvania Horticultural Society, 325 Walnut Street, Philadelphia, Pennsylvania 19106

in the way of information. It is a show that demands more attention on the visitors part—and provides more rewards for those who will give it the attention it deserves.

Perhaps the best way to understand a modern show is to walk with an imaginary visitor through a recent one. As she enters, she is confronted with an elaborate display of orchids (more than 500 of them) in a highly romanticized tropical setting—perhaps the only exhibit in the show that could lay claim to the adjective "lavish".

Walking counterclockwise (as ninety percent of all visitors seem to do), she comes first to a cluster of educational exhibits staged by the United States Department of Agriculture, local colleges and universities, vocational and technical schools, an arboretum, the Pennsylvania Forestry Department, and others, designed to instruct. If she gives even one of them her full attention she will be there as much as twenty minutes. Studying the whole group could take an hour.

Next come the competitive classes—specimen plants, hanging baskets, topiary, forced bulbs, tray landscapes, windowsill collections, greenhouse displays, flower arrangements, table settings, room sections and other horticultural treasures in bewildering variety—entered by individual horticulturists and flower arrangers from all over the Delaware Valley. These are the jewels of the Show. Their excellence is breathtaking, but the sheer number of entries shows that such excellence is not beyond the reach of anyone who will devote enough care to the undertaking.

Beyond the competitive classes are a display of the botany, history, culture and lore of coffee and tea, followed by a booth offering black walnuts for show visitors to plant, with information about this valuable and neglected native tree.

At this point our visitor turns a corner and finds ahead of her more competitive classes, another group of educational exhibits, and some 50 handsome bonsai, each displayed in a carefully lighted niche with its own stand, scroll and accessories. Outside the main bonsai exhibition is a small bonsai studio, with the owner at work pruning, wiring, potting and explaining.

Wherever she looks, if our visitor pays attention, she will see that every plant is labeled, every educational exhibit is provided with charts, diagrams and descriptive material, and every competitive entry is accompanied by the comments of the judges, pointing out its strong and weak points and making helpful suggestions. It takes nearly sixty judges all one morning to make their evaluations, and their recommendations are among the most

A commercial display takes shape; nurserymen show their finest specimens in handsome landscapes, hoping for one of the coveted awards.

Plant societies, garden clubs and individuals compete in various classes. As final sweep-up hour approaches, near panic reigns. Then the bell, minutes of quiet, and working people look around to see another beautiful exhibit.

The midway point where working gardeners say is it worth it, and why did I get involved.

Pots of grape-hyacinths forced in gardeners' houses throughout the Delaware Valley. Judging is tricky, here. The entries all are of good quality.

helpful features of the show. They amply repay the time spent in reading them and checking their comments against the exhibits. Forty more judges will go over replacement exhibits that are staged throughout the week.

But now it is time for our visitor to resume her stroll, past another series of educational exhibits, a group of displays by plant societies, a large entry by the city park commission, and a number of areas decorated by florists and specialized commercial growers. Finally she completes the circumference and is ready to start off again, this time down the center of the hall.

In the central area she finds a score of gardens and plantings displayed by landscape nurseries, plus half a dozen competitive gardens created by local garden clubs. The nursery displays range from a painstaking re-creation of a New Jersey bog—with all the bog plants carefully identified—to a formal court for a modern suburban office building. Many of them invite the spectator to walk through, or to pause for a moment's rest on a convenient bench.

At this point, if she is not thoroughly exhausted, our visitor can push on into the commercial section, which occupies nearly an acre and accommodates some ninety trade booths selling plants, pots, tools, equipment, cut flowers, bulbs, seeds, cheese, houseplants, books, fences, greenhouses, hanging baskets and innumerable other items related in one way or another to horticulture and gardening. When she has seen them all and bought what she wants, she can head for home—having spent, in all probability, three or four hours at the show.

So much for the content of the show as seen through the eyes of a single visitor. Now let's take a moment and watch the crowd pouring into the hall so we can find out what kinds of people the show attracts. The variety is astonishing. There are family groups—parents, children and grandparents—pleased to have

something they can enjoy together. There are information collectors, armed with notebook and pencil, studying every exhibit. There are devotees of particular aspects of horticulture, hurrying impatiently past all other displays until they come to the one or two they are interested in. There are newlyweds in search of ideas for their new house, decorators interested in aesthetics, horticulturists who want to know the name of every plant and how it is grown. There are people in wheel chairs and people in baby carriages, groups that have travelled 100 miles by bus, and local students attracted by nothing more than curiosity. While many are here for the first time, a surprising number have visited the show annually for years and expect to keep on doing so.

Anyone who visits the show, no matter how briefly, will sooner or later wonder how it is organized and staged. That, too, is a fascinating story. It begins in March, a year before the opening date. The first step is to enroll the volunteers who will plan and present the show. By the end of April the flower show staff has prepared a budget itemizing more than a quarter of a million dollars of expenses and at least an equal amount of projected income; a volunteers committee has gone over the budget with a fine toothed comb, and the finished product has been adopted. Careful budgeting and scrupulous adherence to the budget are the key to financial success.

Next comes a schedule of competitive classes—well over 100 in all—which must be completed by mid-June to allow time for competitors to prepare their entries. The floor plan is due by June 30th. Exhibit space assignments must be made by the end of July. Trade space assignments, construction contracts, program advertising and other arrangements must be completed by December 15th. All this is done by committees and staff of the Pennsylvania Horticultural Society, which has had sole responsibility for the show since 1964.

In the fall, the focus of activity moves away from the Society headquarters to the nurseries and campuses and houses and meeting places of the exhibitors. Plans are drawn and redrawn. Lists of plant materials and accessories are prepared. Projects are broken down into components each of which becomes the responsibility of an individual or group. Nurserymen make arrangements to force flowering trees and shrubs, twice as many as they will need to allow for failures. Individual contestants work out their schedules for forcing bulbs, bringing hanging baskets into top condition, decorating a windowsill or planning a unique flower arrangement. It is all completely decentralized. Each exhibitor—individual or group—works to his own plans and his own schedule to make the best use of the allotted space. While the exhibitor must inform the Society in a general way what to expect, no one person in the Society or anywhere else knows all the plans in detail. No one will really be able to picture the show until it takes shape.

Twelve days before opening, the focus of activity shifts again—this time to the three acre exhibition hall. Into the empty and cavernous structure come trucks loaded with peat, trees, shrubs and sod, and attended by front-end loaders, mini-bulldozers, lumber carriers and cranes. Carpenters erect the staging for the horticultural and artistic classes; riggers suspend smilax and bamboo mats to lower the ceiling at strategic points; electricians install flood and spot lights; nursery men go to work on the main structure of their exhibits; contractors place the green areas and mass plantings that define the paths. Each group works on its own within the space allotted by the plan—which has been laid out on the concrete by the floor manager.

As the heavy work nears completion and the big trucks and machinery leave the hall, their place is taken by a host of pickups, station-wagons, panel trucks and rented trailers loaded with the paraphernalia of the smaller exhibits. In one corner a group debates endlessly over the placement of a single plant. At another place a family that has worked steadily on an exhibit for four or five hours sits in a circle having a picnic supper. Thermos bottles of coffee are everywhere and headier refreshments add to the festive atmosphere. Some staging goes up with incredible speed. Other sets appear to defy erection—but in the long run, are put together. The overall effort involves 1000 people, or more. At any one time there may be as many as 600 persons in the hall, working with unbelievable energy, cheerfulness and consideration for one another. For many of them the week of setting up is the high point of the show, a unique experience of sharing with others in a tremendous creative effort.

On Friday night the work tapers off. Cars are packed up and taken out; sweepers begin to move down the aisles collecting trash and debris; finishing touches are put on the displays. By midnight the show is ready.

Saturday morning is devoted to judging. The panels of judges, usually teams of three, move quietly along their assigned exhibits, followed by clerks to record their comments and assistants to affix ribbons and prizes. To ensure impartiality, all judges are from other cities and all entries are displayed anonymously. The awards are of great importance to many of the exhibitors, and it is essential to maintain their confidence in the qualifications and integrity of the judges.

On Saturday evening there occurs an event of great importance to the show and to the Pennsylvania Horticultural Society. This is the annual preview dinner. All 5000 members of the Society are invited, together with friends, patrons and civic leaders. In 1973 more than 1700 accepted the invitation, paid the $50 subscription, put on formal dress, and converged on the show at cocktail time to see the exhibits, talk to

37

A finished commercial display. Who could resist ordering plants from a company capable of creating such beauty. But education is a benefit, too. Every plant is accurately labeled. You learn as you look.

Vegetable gardens always are attractive and the garden clubs invariably do them well. Imagine growing hundreds of individual lettuces in pots to assemble in a natural-looking row.

A romantic setting; orchids surround a jungle pool. It is the tropics for sure, really March in Philadelphia.

their friends and enjoy the satisfaction of supporting a worthwhile endeavor. After cocktails, they trouped into another part of the vast Civic Center, sat down to a gourmet meal without speeches, and returned to the show for another look. The result: some $40,000 dollars to support the Society's public service programs, plus the cementing of a lot of friendships for the Society and for horticulture.

The next day, Sunday, there is a preview for Society members and their guests in the morning, followed by the formal ribbon cutting at noon and a lunch for the exhibitors at which citations are read and awards presented. Then come the anxious eight days of public attendance. How will the show be reviewed by the local press? What will the first visitors report back to their friends? What will the weatherman forecast and how will it affect attendance. What can be done to improve the parking? Et cetera, et cetera. And throughout it all, the show manager and his staff handle complaints, restore lost children to their parents, monitor the issuance of passes, worry about violations of union rules, and each evening check the paid attendance against the previous year.

Finally it is over. At 7:00 o'clock on the second Sunday evening, the gates close for the last time and the weary exhibitors dismantle their displays. By 10:00 o'clock most of the smaller entries have disappeared and only the big gardens of the landscape nurseries remain. In four or five days the floor manager and his staff of horticulturally minded high school students will have emptied the hall and turned it back to the convention center, ready for the next event on the schedule.

One might think that this would be the end. But no, before the clean-up week is out, the Society staff and Flower Show Committee are reviewing the results, comparing notes and comments, and starting to work to make next year's show the best ever.

a personal statement:

LOVING LIFE THROUGH HORTICULTURE IS EASY.

Since my youthful days in the Maryland woods I have enjoyed the world of plants. The pleasures I have found are in colors, fragrances, and sounds; in textures and in designs. So keen is the balance and so beautiful are the relationships in the natural systems, that I have been compelled to present to the listener those joys in seeing and those surprises in discovery.

Being able to walk a new forest path and feel at home is a very secure feeling. Being familiar in the company of plants and flowers allows enjoyment wherever I visit. Appreciating the elements that affect the horticultural environment is truly satisfying. Clear air, fertile soil, and pure water are these elements. Recognizing their effects on plant performance cannot be overlooked. The key to successful plant culture is the enhancement of plant growth. Making the environment less hostile to plant growth and providing conditions for optimum growth are ways to enhance the plant environment. So responsive are plants to man's care that even the least informed yet willing person can employ his skills to enhance the environment.

Children are capable of providing plants with proper care to enhance plant growth. Just give a child a few of the basic plant care tips and you give him an interest for life. It is like possessing the ability to read or write. With the knowledge of plant needs people can transform themselves into caretakers and can provide for others' happiness and pleasure by making a garden.

Considering the elements that effect plant growth touches on the environmental concerns of today's world. It seems to me that horticulturists have long been cognizant of cleanliness in our environment. Horticultural practices touch not only the environmental needs, but also the psychological needs of people. In the pursuit of plant care, the human needs of accomplishment, security, meditation, appreciation are just a few that surface when man meets plant. Not the first time does such a transformation take place but after repeated encounters with the natural elements that associate so intimately with plants does man the gardener begin to see the unfolding patterns of life. With special groups such as the mentally handicapped, one horizon after another appears in an otherwise meaningless life through a pursuit of horticulture. The Melwood Horticulture Training Center in Maryland is far ahead in this horticultural endeavor.

It is not just a realization that we experience but an appreciation for the majesty of it all. We soon realize that we are surrounded by a great check-and-balance system. We see life in the context of reliance on one another and on plant to animal, animal to plant. We see beauty that dazzles the eye and catches the breath. In plants we also see traces of creation. We feel the life and sometimes watch the death of life in plants. The reward for us as gardeners is the thrill of possession and the oneness we feel with our surroundings. When caring for plants we are brothers with others caring for plants and we are related to the plants we manage. Being brothers through plants is novel when it is written and yet that seems to me to be true. Watch a group exploring the same forest walk or the vegetable garden team, or the greenhouse crew. They delight in the very same results. Our care for plants sometimes reaches out of bounds as we strive to provide plants with tender loving care. Often plants brought to professional horticulturists for treatment and revival are victims of extended T.L.C.!

Revival! That is the term that denotes the effect plants have in our lives. Their presence stirs our sense of being alive and they provide us with pleasure along the path of life. Plants, then, are the elixer of life. They furnish us with a medium for peacefulness and awareness. They bind us as brothers and they fill our lives with anxiousness by their seasonal performance. Plants cause us to control the environmental factors ultimately enhancing our lives through richer surroundings. Plants in our lives are factors of joy. Plants produce sharing and create laughter. They challenge the caretaker to provide a growing environment. Plants serve people well.

*— Joe Garvey **

Photos furnished by Author.

**5606 Dower House Road, Upper Marlboro, Maryland 20870*

Model of mid-winter display for Longwood Gardens' New Azalea House. This was part of a Longwood Program summer project in Museum Studies.

Training Stewards of the Landscape

*Richard W. Lighty**

If there's any lesson to be learned from the bewildering series of environmental crises we've recently suffered, it is the need for thoughtful and sensitive consideration and planning in our relationships with the world.

The first step is a realization that the problem is entirely ours. Oil wells care little if they go dry, bald eagles don't mind being extinct, land doesn't quibble about how it is used. Human beings are the only organisms that care; and one of the criteria for the humanity of each of us is how much we care. This said, it then falls to those who do care, to bring these important things to the attention of those who don't.

The Longwood Program in Ornamental Horticulture of the University of Delaware is dedicated to training managers for botanical gardens and arboreta. By their very nature, such institutions are centers for people who care. They are focal points for the interest people take in the world about them. They are educational centers where the public may gain insight into the plant and animal kingdoms, their interaction with each other and their dependence on the land. They are, ultimately, sources of understanding for an urban population in search of roots.

Longwood Fellows studying the conifer collection at Bayard Cutting Arboretum.

Photos furnished by Author.

Botanical gardens are not like universities. People may wander in, learn what they wish, and wander out. The teaching is informal and voluntary. Botanical gardens are not like parks. Their collections of plants are labeled and records are kept on them. Their recreative value stems from a passive response to a meaningful, humane world. Some concentrate on exotic and colorful displays, others stress nature education, and still others are involved in research with plants and plant groups. More and more of these institutions are stressing their role as formers of public opinion. This is not done through the techniques of Madison Avenue or with the tools of the political lobbyist; but by slowly bringing people to an understanding of plants, land, animals and what these mean to human beings.

So what is needed is a leadership that is sensitive to the complexity of the world outside of man and to the need of all men to experience this world in part or in whole, at various times and in varying degrees. In this scheme, the bald eagle has importance, clean air is meaningful, and a child's delight in an unfolding flower has value.

**Coordinator, The Longwood Program, University of Delaware, Newark, Delaware 19711*

Longwood Fellows on a field trip to Central Park. Mr. Cornelius O'Shea, horticulturist, explaining the park's approach to public horticulture.

Longwood Program Fellows on field trip at Queens Botanical Garden. The Director, Mr. Ralph Snodsmith, is explaining his approach to the public.

But such sensitivity is only part of the equation. Our leaders must also have the *capacity* to lead. They must be able to see things that do not exist, but should; and they must be able to make these things come about. Creativity and management must combine to lead us to a world more fit for human inhabitation than the one most people now live in.

The Longwood Program is a graduate program leading to the master's degree. Students from all over the country with strong undergraduate backgrounds in horticulture apply for Fellowships in the program. Five are granted each year and may be renewed for one year. The program is a cooperative one between Longwood Gardens, one of the finest display gardens in the United States, and the University of Delaware's College of Agricultural Sciences. Students are exposed to the many aspects of operating a large botanic garden; horticultural techniques, organization and personnel procedures, purchasing, maintainence and administration. Through special projects they learn of the complexity of educational programs for the public. They work in the offices of people dealing directly with the day-to-day problems of institutions working for and with the public.

Formal courses are given at Longwood Gardens and the University. Students spend much of their winter time studying horticulture, education, biology, museum studies, art history, landscape design, research methods, and other closely or distantly related subjects. The program's aim is to produce those broadly-educated individuals needed to lead us toward the satisfying life all humans are entitled to.

But in this age of specialization, each person needs an area of particular expertise, and to this end the program requires a thesis on some small area of importance to public gardens. This leaves a broad base from which to select, and students often find just the path into which they wish to direct their life's efforts. Some students have worked with mycorrhizal associations, cooperative relationships between higher plants and fungi of importance in nutrition. Others have monographed plant groups from a horticultural standpoint or worked with herbicides, turf grass competition, educational efforts of botanical gardens or cost analysis of bedding plant production. Still others have taken a non-thesis option and produced two publishable papers on diverse areas of pertinence to public gardens.

The Longwood Program then seeks to place specifically competent horticulturists at the service of the general public in botanical gardens or arboreta. While these people are not highly trained in areas such as Landscape Architecture, Plant Physiology, Elementary Education, Business Administration, Graphics and Publication; they are *aware* of all of these areas and how they must come together in the complex public-service institutions which relate plants to people.

Longwood Fellows' Delaware Fall Flower Show display on plants of colonial Delaware.

HIGHRISE HORTICULTURE

Chicago's affirmative program of environmental education and urban horticulture

*Virginia L. Beatty**

Vegetable gardens in containers at the Chicago Horticultural Society Mini-show in the First National Bank Plaza. This is highrise horticulture, demonstrated.

Photos furnished by Author.

Man is a part of nature and has a place in it. In urban technological societies he is often cut off from it. Man needs to feel at home in his world, and ecology (oikos, Greek for house or any place to live in) is the relationship living things have to each other and their environment. Buckminster Fuller defined the environment as "everything but me", which makes it easier for children to understand, but only if they also realize that they in turn become part of the environment for everything else in the world.

People influence their environments, and environments influence people. A positive philosophy is necessary to convey the idea that by "using your senses and your special brain you can make this a better world for everyone." It is a pleasant contrast to the approach that attempts to scare people into loving and taking care of their world.

Plants can and have existed without man, but man cannot live without plants. Plants are vital: knowledge about them should not be confined to the esoteric interests of the wealthy people. Galloping urbanization requires that people be made aware of the place of plants in their lives; that they understand the complex equilibrium of nature and work with nature rather than against it while developing a feeling of environmental stewardship through exposure to the cycle of nature and the changing seasons.

The great urbanization of the past thirty years means that many people living in the city today have never observed gardening or farming first-hand. Knowledge of the care of plants is not instinctive, although an appreciation or need for green plants may be physiologic.

These matters have been felt strongly in Chicago. In the late thirties and early forties Cora Mitchell, a Chicago teacher, formed a garden club at school and encouraged young people to have window box and even attic gardens. In the early

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sixties Virginia Carlson, a volunteer with the Chicago Horticultural Society, started working with physically, mentally and emotionally handicapped children in a strong program of horticultural therapy. About the same time the Chicago Housing Authority with the cooperation of the Chicago Flat Janitors Local No. 1 initiated a contest for the most beautiful plantings in the projects with the Union providing cash prizes. In developing the prize-winning plantings, the custodians have had instruction and assistance from the Cooperative Extension Service of the University of Illinois. In 1968 Mrs. Elma Douglas, a teacher at Raymond School who wanted to give children an inside view of nature and help them understand the cycle of nature through personal learning experiences, called on the Chicago Horticultural Society and other groups to help develop a nature program at her school.

Since that time, a large number of horticultural activities have been developed both inside and outside the Raymond School building, and this has set off a chain reaction which still is going strong. The annual spring plant sale (which since 1969 has brought plants into the heart of the city) was joined in the fall of 1972 by a bulb and house plant sale. Many of the plants were grown by the children themselves from cuttings taken from the school's garden. In March of 1973, a five-class plant show with ribbons and cash prizes was such a success that in 1974 the show will include show classes for teachers, parents and interested community residents.

The Raymond project, in addition to providing experiential learning for the students and teachers, has also had a profound effect on the program for Environmental Education which is being developed by the Office of the State Superintendent of Public Instruction. An important side effect, in addition to the interest in the indoor and outdoor projects, has been the beautification of the school site, the decrease in vandalism, and the improvement of inter-personal relationships at the school and in the community.

The work which was started at Raymond was spread rapidly through the school's exposure in the 1970 Chicago World Flower and Garden Show. Since then, the school section in the Show has grown from one school to fourteen, and represents projects in all three of the Chicago Public School attendance areas and several suburban and parochial schools.

Horticulture fifty floors high, is atop a skyscraper.

Horticulture on the highrise—a view, one of many, from the elevated railway.

Ben, doorman at the Chicago Horticultural Society's office building, tends his small garden. Next summer the Michigan Boulevard Tenant Gardens Association will plant the entire street.

Since 1970 the Chicago Horticultural Society has worked with Du Sable High School's strong biology course and Botanical Club, providing technical assistance for their 1971, '72 and '73 Flower Show presentations. In the fall of 1972 a Chicago Horticultural Society volunteer helped design a plan for the school's main courtyard so it could serve as an outdoor laboratory and teaching center for the horticulture course which began in the fall of 1973. The Botanical Club, which joined forces with the Math Club in 1972 (now the Bio-Math Club), has been doing a splendid job raising money through bake and taffy apple sales to promote the development of their courtyard, their greenhouse, and their flower show exhibits.

Since 1971, when a Chicago Horticultural Society volunteer served as a consultant in setting up a horticulture course at Austin High School, they have in addition to their 1972 and '73 Flower Show presentations at McCormick Place developed their west courtyard as an outdoor ecological laboratory. Their Green Thumb Club, through house plant and tire planter sales, has increased the plant collection in their greenhouse and provided funds for environmental field trips.

Recognizing the importance of environmental education and the challenge of people and plants in the city, the Trustees of the Chicago Horticultural Society in July of 1973 established the position of urban horticulturist to aid in the development of plant programs in the Chicago area. The work that has been developing in the schools for the past seven years has now produced techniques and approaches which can be reproduced in similar locations.

Taking the basic elements of the People-Plants-and-Kindness program which proved so successful in the schools, similar programs tailored to the needs of other institutions and agencies have been developed. Cooperating with the University of Illinois Extension Service Youth Advisors, the Chicago Horticultural Society has assisted in the planning and planting of vegetable and flower gardens in the Robert Taylor Homes, a Chicago Housing Authority highrise project. The Retired

Tire Planters, which were made under the direction of the Du Sable Bio-Math Club, now decorate the gardens and have been copied for forty blocks in three directions.

In the summer of 1973 the Chicago Housing Authority authorized tenant vegetable gardens for the first time and the results were spectacular, considering how late in the season they got started. The hard work, enthusiasm and imagination that was exhibited by the residents growing their own vegetables was impressive; and the cooperation between senior citizens and teenagers and between people who knew how and people who were just learning was inspiring. Working with these individuals, one realized that the care of plants is not instinctive, although the response to plants may very well be.

Working with a volunteer group from the Oak Park-River Forest area that was interested in saving the Oak Park Conservatory, the Chicago Horticultural Society helped set up programs at the conservatory which converted it from a static show house to a dynamic center for local schools and community groups interested in environmental education and gardening programs.

During the 1973 Flower Show the Chicago Horticultural Society helped the Chicago Board of Education put on a seminar-workshop on Urban School Horticulture. The teachers who participated in this were able to earn one hour of promotional credit. Following that positive experience the Division of Science of the Chicago Board of Education came to the Society and requested a second workshop entitled, "Field Experiences in Urban Horticulture." This course, which was produced cooperatively with the Chicago Park District, Chicago Academy of Sciences, the Field Museum and Open Lands Project, was a step toward introducing the elementary and secondary teachers of science to many resources available in the city. Great need exists for more sessions in urban horticulture and environmental education, especially in-service training sessions to help teachers develop and make the best use of on-site facilities.

Special education students with their bean crop. The boys ate an apple, planted the seeds and raised more than thirty seedlings.

Helping people enjoy plants in the city means rewriting the standard garden material (written for a suburban or rural location) into the language and the circumstances of the city. In the summer of 1973 the Mini Vegetable and Flower Show presented by the Chicago Horticultural Society in the First National Bank Plaza provided an opportunity to help city people discover ways to successful plant experiences. Answering questions also underlined the difficulty of finding plant materials and materials for working with plants in the city, and suggested the development of plant depots to overcome this lack. The response to noon-time lecturers and evening programs devoted to highrise horticulture suggests that many are ready, wanting and willing to learn how to meet the challenge of growing plants in the city.

Gardening in the city is not gardening in the country made small. It is not a rural or suburban experience scaled down to a city lot or a window box. It *cannot* be the rural or suburban experience scaled down to the city lot or smaller. Plants and materials for working with plants are often not available in the city. The kinds of

Above. Picking a posy at the Raymond School. The children raise their flowers and delight in careful gathering.

Right above. The Raymond School flower sale. Grandma and granddaughter buy a nice plant for the house and the school's horticulture fund benefits.

plants growing in the city are usually less diverse than those growing in natural communities. The development of the concept of disposable plants (since city conditions are not ideal for plants) and the disposing of sick plants should not reflect either on the plant nor on the person caring for it, but only on the conditions in the environment.

Before we can help people have fun with plants, we have to introduce people and plants to each other in a positive situation. When people have seen flowers only at funerals, it is sometimes hard to convince them of the excitement and creative pleasure plants can provide. There is a need for communication—to understand the special conditions of the city and to be able to communicate with individuals living in an urban setting in their own language, whether it is in the housing project or in the highrise of the affluent.

We should work with success and fight the tendency to be continually innovative, "killing" successful projects and reaching out so far that you can only involve a few. First planting experiences should be successful, and there is no place for individuals who go around saying, "I'm bored with marigolds," not realizing that there is a natural maturation process for plant growing as there is for any other dynamic process.

For seven years the Chicago Horticultural Society has been working together with many kinds and ages of people in the city of Chicago, sharing the importance of plants in our lives, the excitement that comes from the discovery of creation, the recreation afforded by plants and the people who appreciate plants, and the knowledge of the world and the feeling of security and of one's worth that comes from working with plants.

Time is short—and the need to reach non-plant people is great. It is imperative to educate people to the immutable laws of nature, since the world we make is the house we are going to be living in for the rest of our lives. ⟡

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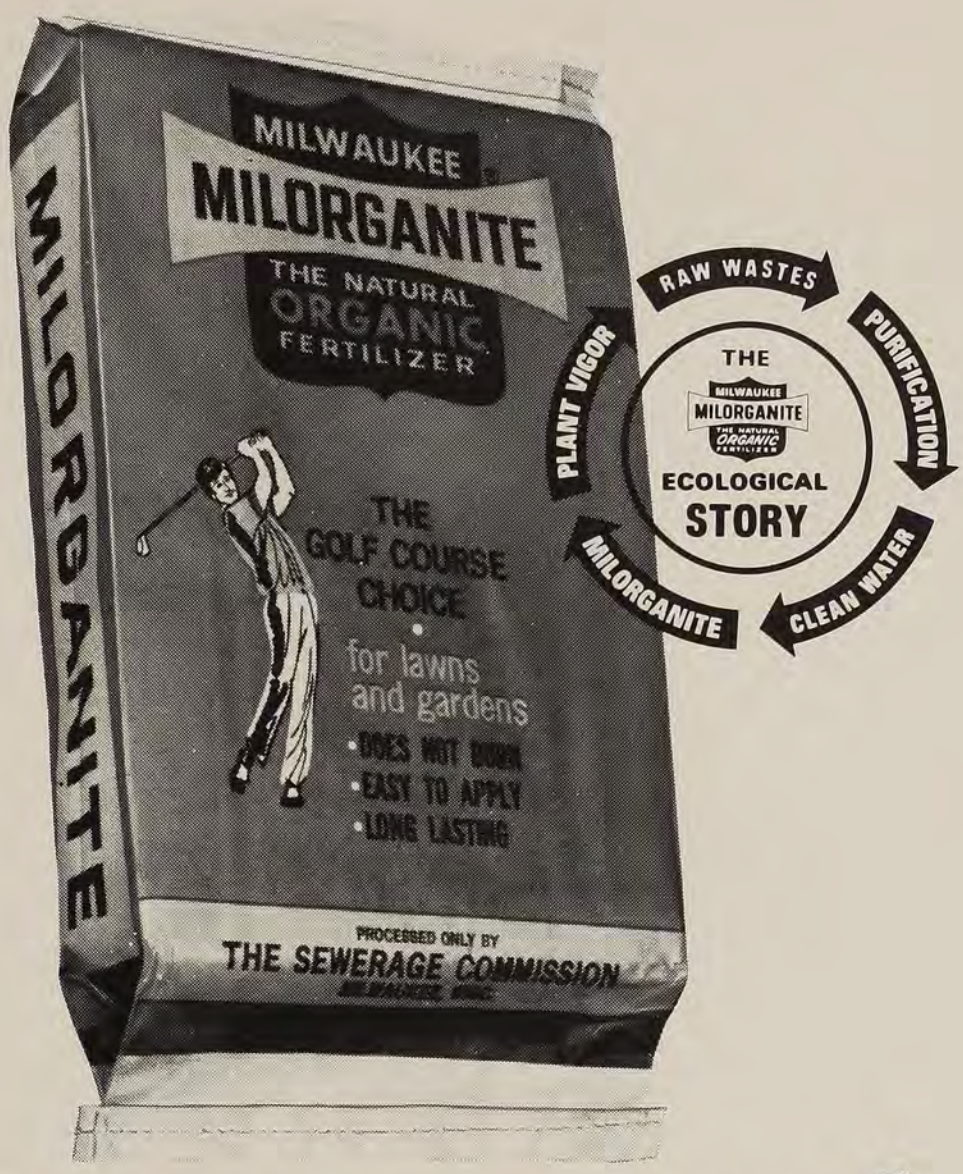

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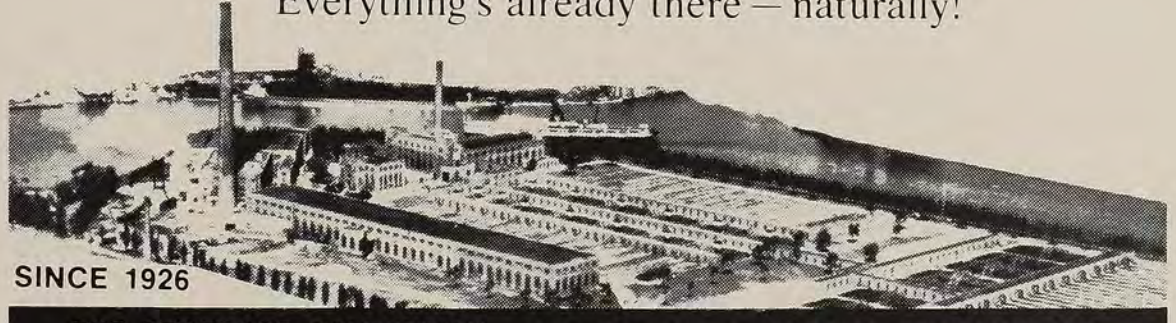

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