A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.
THE GREEN THUMB
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THE GARDEN
Colorado is Not Connecticut—George Kelly
Gardening and the Law—Jacob V. Schaetzel

REPORTS
Mushroom Poisoning—D. H. Mitchell
Traveling with Trees and Flowers—Josephine Robertson
Air Pollution and Plants—James Feucht
The Work Goes On at Denver Botanic Gardens
Mid-Summer Annual Garden Tour

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Membership Roster—DENVER BOTANIC GARDENS 1972

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Columnea schiedeana
Epiphytic Gesneriad (on trees)
Native to southern and eastern Mexico

Gesneriads are the members of the plant family, Gesneriaceae, to which the common African violet, flame violet (neither of which is a violet), florist's gloxinia, and many less known but often spectacular plants belong. Gesneriads have been grown in botanic gardens and greenhouses for little more than a 100 years and have become popular as house plants only in the past 20 years.

These tropical plants belong to a larger group — the snapdragon order — which includes the catalpas, trumpet vines, pentstemons (beard-tongues), broom-rapes, and unicorn plants. Some gesneriads grow in the lowlands in hot and humid areas. Some grow in the rain forest. Many grow in the cloud forests of the tropics in steep and sometimes almost inaccessible areas. Many are epiphytes — perched high on the trunks and branches of trees seeking the sunlight along with orchids, bromeliads, and tropical ferns and mosses. Some of these epiphytes have large brilliant red flowers to attract the humming birds which pollinate them.

Stories of Plant Hunters

Roads are difficult to build and more difficult to maintain in the areas which are richest in gesneriads, and the stories of the hardy plant hunters who brought them into cultivation deserve some attention. Because many gesneriads and orchids grow together in nature and require somewhat similar growing conditions (the gesneriads are easier to grow and bloom more frequently in the home), plant hunters sent after orchids have also collected gesneriads. It is only since World War II that plant hunters have gone looking primarily for gesneriads — and even some of these have come home with orchids. The early plant hunters sent home anything and everything of interest.

While a few gesneriads have acquired common English names — African violet, flame violet, Temple Bells, lipstick plants, Queen of the Abyss, Cape Primrose — most have not. As T. H. Everett has said about other plants lacking common names, "They are neither common nor English." There are no "rules" as to the pronunciation of scientific names. They can be anglicized or given a Latin accent. The purpose of names is communication of ideas. If you try to pronounce a plant name the way it is spelled and the person to whom you are speaking knows which plant you mean, that is all that is necessary. Most plant names are no more difficult than Chrysanthemum and Poinsettia. They only seem difficult because they are unfamiliar.

From Captain Bligh to Denver Show

ADVENTURES OF THE GESNERIADS

Miriam Denham
Why Raise Them?

Why do we raise exotic plants? Perhaps the question should be, "Why do we raise plants?" We could answer that plants are essential in renewing the air we breathe, but we are not conscious of this and most of us grow plants for the pleasure they give. The poorest indio with a flower potted in a tin can receive the same pleasure that a pampered orchid in a greenhouse gives its owner. We are all aware of the artistic miniature gardens created in the orient in areas where people are crowded and land is scarce. The mention of Anne Hathaway's cottage brings forth a picture of the cottage surrounded by a garden. Perhaps man has a basic emotional need to be surrounded by living (and hopefully decorative) plants.

How did exotic plants reach our home? A complete survey of all that is known about the introduction of plants around the world would fill an encyclopedia. A few journeys and a few gesneriads have been chosen to illustrate the general pattern of early introductions.

The development of the printing press coupled with the many journeys of exploration bringing reports of intriguing flowers, strange fruits, and weird animals led among other things to a blooming of the natural sciences and the development of botany and horticulture.

The earliest account we have of a gesneriad is one of the few nontropical members of this family — that by John Parkinson in 1629 of a plant called, "Blew Beares Eares with Borage Leaves." This is *Ramonda myconii* and is known to have been cultivated in English gardens since 1731. *R. myconii* makes an interesting plant for the alpine garden. While it is considered hardy in the northern United States and we grow it in our rock garden in Boulder for about two years, it does need mid-winter moisture and we believe that it succumbed to drought rather than the cold. With the exception of two other southern European plants, the remainder of the gesneriads were introduced to English and United States gardens from overseas.

By the time of Linnaeus (1753) about a dozen plants were known which are today considered to be gesneriads. He listed *R. myconii* as a *Verbascum* (related to mullein). All of the others (two *Gesneria*, three *Besseria*, two *Columnnea*, one *Gloxinia*, etc.) were from the New World. How did these plants travel? Picture the traveling conditions of that time:

**The Old Ships**

The ships were small and cramped. Sails as a power source were dependent upon the weather. Voyages of any distance crossed a variety of climatic zones and those of any duration a variety of seasons. Salt spray blown by the wind doused the ships except in the best of weather. Humidity promoted the growth of molds and mildew. Hammocks, clothing and bread became moldy. Bread and grains became infested with weevils. Drinking water spoiled and even ran out upon occasion (imagine the thoughts of sailors as precious water was used in the attempt to keep plants alive). Dried meats became rancid and maggoty. Rats gnawed at anything and everything. For extended trips, the captains and mates did not have comfortable quarters, and those of the crews were worse. Travellers going out tried to return with dried specimens, drawings, seeds and bulbs at first. The dried specimens and drawings only increased the desire to acquire the living plants. One estimate is that perhaps one plant in a thousand survived the ocean trips.

Botanical travellers took the same risks as other travellers — tropical diseases, unfamiliar and sometimes spoiled foods, sometimes unfriendly or even hostile indigenous peoples. Botanists sometimes ran additional perils because of lack of comprehension as to what they were doing, hence their actions seemed suspicious or antagonistic. Many plants were sent home by resident managers of colonial companies such as the Dutch and British East India Companies.

**Kalu-tali**

The second earliest gesneriad for which we have been able to trace its history is *Kalu-tali*, a plant from India described by Heinrich Adrian van Rheede tot Draakestein in 1689. More than a century later, in 1826, Karl Blume, Dutch physician residing in the Netherlands Indies, equated *Kalu-tali* with a gesneriad from Java which he was describing as *Rhynchoglossum obliquum* (the oblique snout-tongue). This same year, a Danish Superintendent of the Botanic Garden at Calcutta described the plants from India also as oblique-leaved. These plants were reported as growing like weeds in the hills of India, Ceylon and Java and sometimes used as vegetables. They were considered weedy and of only botanical interest until 1896 when it was noted that under cultivation the gentian-blue flowers increased from 1/2 inch long to an inch and a half. Because it is a non-hardy annual or biennial and somewhat difficult to cultivate, *Rhynchoglossum* is little grown, but it is of interest to note that this is the only genus in the family Gesneriaceae to be found in both the Old World and the New World.

A recent book on Plant Hunters by Kenneth Lemmon details the voyage around the world of the Endeavour from
after a specially-built ship was declared top-heavy and unseaworthy. The Bounty sailed from England in December 1787 and only after unsuccessfully attempting to round Cape Horn did the ship turn and sail around the Cape of Good Hope, reaching Tahiti in October 1788 with the log recording over 27,000 miles.

Six months were spent collecting the breadfruit plants and readying them for the trip in pots to the West Indies. In April 1789 the Bounty sailed. Twenty-four days later, Fletcher Christian led the famous “Mutiny on the Bounty”, casting Captain Bligh, David Nelson and 17 others adrift in a small boat. Brown stayed with the mutineers, but the potted breadfruit plants were cast overboard. After surviving the hazardous trip by small boat to the Dutch Indies, Nelson died. Brown was shot on Pitcairn in a land dispute. Nelson’s journals were lost and we have only second-hand accounts of his botanical searches.

The earliest form of protection for travelling plants were boxes with hoops that could be covered by canvas for protection in bad weather. Although the manufacture of glass dates back into antiquity, greenhouses with glass were first reported about 1730, but the idea of adapting this to transport of plants came much later. N. B. Ward in the late 1830’s had buried a butterfly chrysalis in damp leaf mould and soil in a bottle and sealed it.

When a fern plant and a grass seedling sprouted, Ward maintained the sealed bottle without addition of water for several years until the cap rusted through. This experience gave him the idea for building sealed boxes tightly glazed with glass so that plants could receive light and did not need to be watered. Larger models of Wardian Cases became popular for raising ferns in the home. With this method of transport, a much larger quantity of plant material was introduced successfully into cultivation. Lemmon credits the Wardian Cases with the success of John Gibson in returning the “Queen of Flowering Trees” (Amherstia nobilis) to England along with orchids and other strange exotic plants.

The Beauty and the Splendour

Gibson’s work was facilitated by a letter of introduction to Dr. Wallich at Calcutta. Dr. Wallich had described several species of Aeschynanthus (a vining, epiphytic gesneriad with large, bright orange flowers) and Gibson is believed to have introduced some of these to English greenhouses. Gibson said the Aeschynanthus “do not yield in beauty and splendour to any other production”.

One last collector will be mentioned, Theodor Hartweg, a German who was hired by the Royal Horticultural Society of London to travel in the higher regions of Mexico to collect hardy and half-hardy plants to be grown outdoors in England. Arrangements were made to send his collections to England by Her Majesty’s Mexican Packets, whenever room could be found for them, without inconvenience to the passengers. He sailed from England in the fall of 1836 landing at Vera Cruz two months later. He noted the rich tropical vegetation of the lowlands, but spent his time in the highlands according to instructions until the French blockade and other political difficulties caused the Society to send him to Guatemala in the summer of 1839. En route he spent some time at Oaxaca waiting to travel into Guatemala. While there he made several side trips toward both coasts. Among the gesneriads he collected in this area was Solenophora coccinea. This plant was collected during a month-long trip to the lowlands near Tuxtepec south of Vera Cruz. (Today a lumbering road is cut through much of this area and can be driven within two days. We covered part of this route, from Oaxaca and from Tuxtepec in 1962, recollecting Solenophora coccinea. We had hoped to travel 40 miles off the road to Villa Alta for other plants which Hartweg had collected, only to discover that the road was still passable only on horseback or by ox cart.)

Hartweg continued on horseback and by mule to Guatemala by the high road which is now the Pan American Highway, collecting flowers along the way, including Achimenes species, a Drymonia, Niphaea oblonga and a “Gesnera”. After a relatively short stay in Guatemala, the Society sent him to Peru where he collected more Achimenes and Gesneras (among many other plants) before returning to England in the summer of 1843.

As we read the diaries and letters which detail in small measure some of the efforts put forth by the men who first brought these lovely plants into cultivation, we can properly enjoy and cherish their beauty.

* * *

Readers who are interested in seeing some of these plants are invited to attend the American Gloxinia and Gesneriad Society Flower Show, June 30 – July 1, at the Airport Holiday Inn, Denver.
Thioctic Acid as antidote?

MUSHROOM POISONING

D. H. Mitchel

On June 22, 1971, The New York Times printed a story of a dramatic recovery from mushroom poisoning following the use of a new drug— a drug so rare it was flown by jet from Naples to Philadelphia to be given to a family critically ill from mushroom poisoning. This was the first time most Americans had heard of thioctic acid, heralded as an antidote for the dread poisoning of the mushroom aptly called The Destroying Angel.

To many novice mushroom hunters, this sounded like the panacea they had long awaited, the cure-all antidote to rid them of the fear of mistakenly picking the wrong mushrooms for the table. No longer would they be frustrated by the mycologist specialist, who obstinately refused to give them a simple rule of thumb for telling the good mushroom from the poisonous "toadstool". Nor would they even have to worry about whether the old wives' tales were true or not, whether the silver spoon turned black, or whether the cap of the mushroom peeled. Utopia for the myco-phagist, that peculiar breed of gourmet who gets his kicks from eating mushrooms, had arrived! Or had it?

Though almost a year has passed, this, like many other Utopian dreams, still evades us.

The Deadly Cousins

It is true that if thioctic acid proves to be an effective antidote for the poisons of the beautiful white Angel of Death, known scientifically as Amanita verna, then about 95% of the fatalities from mushroom poisoning could theoretically be avoided. This Destroying Angel and her relatives, Amanita virosa and Amanita bisporigera, that are so nearly identical that even the experts cannot tell them apart without a microscope, are responsible for over 90% of the fatal mushroom poisonings in this country. Her more distant cousin, the greenish Death Cap, Amanita phalloides, causes most of the deaths in Europe, but is seldom, if ever, found in the United States. Two other cousins, Panther Cap, Amanita pantherina, and Amanita muscaria, the fly poison of the Middle Ages, are plentiful in Colorado and help bring the batting average of this genus Amanita up to the impressive 95%.

So, if all of these lovely, but lethal amanitas produce the same poisons, and if the highly touted thioctic acid proves to be the specific antidote for this poison, then this dream might come true.

In fact, if this deadly genus were avoided, eating mushrooms indiscriminately might be as safe as the indiscriminate use of other plants— smoking hemp or cactus; chewing coca leaves or morning glory seeds; or even drinking the fermented juice of the grape! — and certainly as safe as using the juice of the poppy! Not that any of these ventures are without harmful, or even lethal effects; I am only trying to put things into perspective!
The Mycophiles were skeptical

Fifty Fatalities

The Magic Acid
As usual for Americans, there was a minority group opinion more skeptical about such an easy solution to the problem of mushroom poisoning. To a few biochemists, thioctic acid, originally called lipoic acid, was anything but new. Discovered in 1952 it was tested for a time by physiologists and nutritionists to determine if it was another member of the Vitamin B group of compounds. It was found to enter into the chemical reactions of the body in the metabolism of certain foods, much as Vitamins B1, B2, B6. But it was soon shown that unlike the Vitamin B complex, it was not essential to the diet, since the body could manufacture it readily. Considered useless, since it could not be marketed for it was a health food, it was quickly forgotten. How then, asked the chemists, could such an old hat get such a magic sparkle?

Another minority group expressed their doubts. Eminent mycologists, including Dr. A. H. Smith of the University of Michigan, who has studied mushrooms and mushroom poisoning for years, knew that even the closely related amanita caused different symptoms in their victims. They also knew that analytical chemists in the early 1930's had extracted the death cap, the Death Cap of Europe. Though the complicated chemical structure of these five poisons fell into two basic chemical formulas, it seemed unlikely that one simple vitamin-like compound could render all five harmless.

Mycophile
Even the amateur mushroom students were a bit skeptical; for once the Mycophile scooped The New York Times by almost a year! Let me quickly explain that the Mycophile, loosely translated "Mushroom Lover", is the rather erratic publication of the North American Mycological Association, which the national organization of amateur mycologists in this country. At their national foray in the summer of 1970, the successful use of thioctic acid in amanita poisoning in Europe was reported. One or two members researched the literature, all in Italian or French, and made a brief report in the Mycophile. The Toxicology Committee of NAMA then further reviewed the literature and advised against more publication of the European reports without further confirmation. They feared that the novice would be more careless if he thought a cure was readily available to rescue him from a fatal mistake.

Another minority, though larger, it's true, failed to see any excitement in mushroom poisoning generally, and in thioctic acid in particular. This group comprises the medical profession and drug manufacturers. Many of us who are interested in the study of mushrooms are amazed at the lack of interest in, and knowledge of, mushroom poisoning evidenced by most physicians. We wonder why mushroom poisoning is not included as a reportable disease by the Public Health people, and why pharmacology textbooks skip over the whole topic in one or two paragraphs of information, outdated 50 years ago. Before one condemns this attitude, however, he must realize that this is another area requiring perspective. With over 50,000 automobile fatalities annually in this country; with about 3,000 fatal poisonings; with over 100,000 narcotic addicts in New York City alone, no one can get very excited over 50 fatalities from mushroom poisoning.

How Many Poisonings?
The number 50 is only a rough estimate made in 1955 by extrapolation of European figures and applying them to the U.S. population. This is possibly a high figure, since European people use wild mushrooms much more frequently than Americans, but by the same token, most European collectors are familiar with their local species and make fewer mistakes.

No one really knows how many cases of mushroom poisonings occur. Many cases are so mild no medical attention is sought. Many cases mimic, or are actually, simple food poisoning, so common in the summer months when mushrooms fruit. Mushroom dishes can be spoiled or infected by toxic bacteria the same as any other food. Other cases are those of simple allergy or indigestibility that many people may have with strawberries or green apples. With these cases eliminated, however, there are still many serious and a few fatal cases each year — how many will never be accurately known until there is a better method of reporting them. Regardless, the number is miniscule, compared to the tremendous drug problem in this country, and has not claimed the attention of the national health organizations.

Drug manufacturers in this country are certainly not interested in thioctic acid or any other experimental drug used in mushroom poisoning. The regulations of the Federal Drug Administration are so stringent that expensive, exhaustive tests must be done on any drug before it can be released for human use. The demand would certainly never justify this investment of time and money by the pharmaceutical houses.

Course of the Poison
Then why was thioctic acid ever tried in amanita poisoning? To understand this, one needs to know the sequence of events in this poisoning. Unlike simple food poisoning or many milder types of mushroom poisoning, amanita poisoning is very slow and insidious in its onset. First of all, the amanitas taste great, as death bed statements attest. There is no
solutions, so not regulations the warn to taste tangy bitter both made, were thioctic acid purified dangerous other many is there as other the species.

Intravenous for Italy, and Germany, and Italy, for intravenous use. Physicians in various countries tried adding it to the other Vitamin B group of drugs in treating hepatitis from any cause. There were many logical reasons, based on the biochemical reactions involved in the functions of the liver, to warrant this trial.

In 1955 at a medical symposium in Naples, good results were reported from the use of thioctic acid in heavy metal poisoning. In 1958 a Dr. Josef Herlinka in Czechoslovakia published some results that suggested this therapy was useful in various liver disorders. In 1959 Dr. Jiri Kublicka, working in Prague, began treating cases of amanita poisoning with massive doses of this drug. It was his glowing, optimistic report, presented at a medical meeting in Trebon, Czechoslovakia, in 1968, that led to the trial of thioctic acid in the poisonings which occurred in Philadelphia in 1971.

During the past year, American toxicologists have cast more doubt on the efficacy of this treatment. The various species of amanita found in this country, especially A. virosa and A. bisporigera have very small amounts of the group of toxins theoretically counteracted by thioctic acid, but have, instead, large amounts of the other lethal amanita poisons, for which thioctic acid seems to be useless.

Once again we are back to the old dictum: Know the mushroom before you eat it! There is no simple test to tell poisonous from nonpoisonous mushrooms. Don’t risk your life for a few cents worth of vegetables!

Top: Forming for New Walks – Botanic Gardens Improvements

Bottom: Steam sterilizing Nursery Plots

THE WORK GOES ON
Denver Botanic Gardens
GARDENING AND THE LAW

Jacob V. Schaetzel

From the time that Eve was told not to eat of the fruit of the Garden of Eden, down to the present time, we have had our trials and troubles over what is mine and what is mine in our gardens. These problems have principally arisen between neighbors. Many people have had pleasant relationships until something occurred in the garden to upset their Saturday visits over the fence.

When we are spraying with the new chemical, we must remember that this may have a killing effect on broadleaf plants. We would do well to consider how hard the wind is blowing before we start spraying with a lethal insecticide. If we permit the spray to get on the neighbor's roses or other plants, we are sure to hear from him and, of course, we are liable for the damage. If damage does occur, be sure not to argue over it but tell the neighbor to replace the plant right away and send you the bill.

Insist That Your Neighbor Spray? We have had a lot of tree spraying around Denver. Some people spray and some of them don't. With infestation spreading from one tree to the next, the question often arises as to whether or not a man can be held liable for damages resulting from failure to spray his own tree. Such a situation recently occurred in one of our western states.

The man with healthy trees complained to his neighbor, who had a tree infested with vermin, and asked him to have his tree sprayed. He was told to mind his own business. He then went into court and actually secured an injunction. The court said that a tree infested with vermin, interfering with adjoining owners' ordinary use of their property for occupancy, may constitute a nuisance. The injunction compelled the man with the infested tree to have it taken care of. There is no longer the nice friendly feeling that existed between them, but the trees are healthier.

Trees that are growing on the dividing lines between adjoining properties have been the cause of expensive litigation for more than a hundred years. The question arises as to who owns these trees? Well, it seems that sometimes one neighbor may own them; the other may; or it might be that both own them.

Two neighbors agreed on a sunny spring morning that both of their properties would be improved if they planted a row of trees down the dividing line. After this was done, differences arose between them. Without saying anything about it, one man, thinking he owned half of the trees, removed every other tree from that long row. The second man thought that he would just take down his trees too. So he proceeded to start chopping down what he thought were his half of the trees. That day an injunction was served on him. The court, much to the surprise and indignation of the defendant, held that two wrongs would not make a right. The first neighbor had no right to take down every other tree because he only owned an undivided interest in the trees. The court ordered him to pay damages and to leave the standing trees alone.

Branches Over The Line

Another gardening problem that often gets into court results from overhanging tree branches at or near the boundary line. If the branches bear fruit on your side, do you have a right to take off the fruit? Can you cut off the branches? Can the neighbor come over in your yard and take off the fruit? In western Kansas, the court said that if the tree stands on the other fellow's land, you cannot take the fruit from any branches hanging over on your property. If you do, he can sue you for the value of the fruit.

In another case the tree shaded the neighbor's property. He went into court only to be told that while he was technically correct, nevertheless the damage was so small that the court wouldn't recognize it.

It is pretty well settled as a matter of law that if an owner plants trees or shrubs near or on the property line and you object to it promptly, the courts will protect you if the roots of the trees or the branches extend over on your ground.

We gardeners have found out that the roots of trees take up practically all of the nutrients of the soil. We can't raise good flowers and vegetables close to large trees. So if the roots do go over next door and clog sewers or prevent the growing of nice flowers, then I would suggest that a good neighbor policy would demand a compromise.

Some of us still have the idea that when we own a piece of land, we own it from the center of the earth to the top of the sky. That is not always the law, though. Here is one for "Believe it or Not but It is the Law." Two men in Kentucky were living side by side. One was on a hill above the other. A storm came and removed the soil from the uphill property by washing it down hill to the other property. The down-hill man evidently thought that it was a gift from heaven and he used this top soil. But, the court said that the down-hill man could have removed the soil which accumulated on his lot and he was liable for its value if he appropriated the soil for his own use.

Whose Trees? Nearly all of our courts have uniformly held that trees standing on the boundary line between adjoining owners are common property. Both owners are tenants in common as to the trees. That should lead us to the conclusion that if you don't like the branches over your land, you can't take them off without the consent of your neighbor. He owns those branches just as much as you do. You, in turn, have ownership in the branches on his side of the tree.

If a tree is growing in the next yard and if it is not a "natural" or "volunteer" tree, and if a branch of that tree accidentally falls on your house, the accident not being caused by what we lawyers call "an act of God," the neighbor on whose ground the tree is growing would be liable for the damage. There was a case in our courts where the branch of a tree extended over on the neighbor's property. The branch was on a "natural" tree. The owner, wanting to do a kind act hired
a good tree surgeon to go on the neighbor's property and, at his own expense, remove a branch of the tree. Unfortunately, the branch fell and injured the roof of the other fellow. The court, on receiving the case, said that the neighbor who was trying to remove the branch of the tree had hired a good competent man and he couldn't be held responsible for the negligence of the tree surgeon.

What Is The Law?
The law generally might be stated about like this: A person is not permitted to use his property in such a manner that damage to his neighbor is a foreseeable circumstance. If a prudent person could have foreseen the result of a certain act, or the result of not doing a certain act, then he is going to be liable for the result if injury is caused his neighbor.

Have you ever looked at the fine print on a package of seeds? It states in substance that the seed company is not liable for any damage resulting from planting the seed. They will only replace the seed. If you buy pansy seeds and onions come up you cannot hold the seed house liable. Read your labels before you plant.

In Denver you can't even build a fence without securing a permit. The courts will not allow the building of a spite fence just to shut out unfriendly people.

Finally, my advice would be to try to be the best neighbor possible. If your neighbor wants to borrow anything from you such as your favorite tool, let him have it. If he fails to return it, don't say anything to him because he is sure to get angry. See that your water stays on your side of the fence. Don't let your insecticides get on his flowers, and be sure to control the roots from your trees in order not to interfere with his planting. Try to settle your differences in a friendly manner. If you can't settle the problems amicably, then at least find out the law from your lawyer. Going to court is like going to war; it should only be done as a last resort!

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DENVER BOTANIC GARDENS
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Class of Membership desired: (check one)

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POLLUTION AND PLANTS

Dr. James R. Feucht reports on Pennsylvania Workshop

"Colorado needs more studies to determine just how much damage air pollution causes to our plants," Dr. James Feucht observed in a report on a national workshop on environmental pollution as it affects plants, held at Pennsylvania State University. The report says:

From this workshop several conclusions have been made which apply to the situation in Colorado. First of all, it is obvious that air pollution damage to plants cannot be determined beyond reasonable doubt without adequate and sometimes very sophisticated monitoring and analytical equipment. Plant indicators are a valuable tool, but used alone can lead to erroneous diagnoses because of the mimicking results often encountered from other environmental influences such as nutritional disorders and herbicide damage. A good case in point is the tip burn in ponderosa pine, which was at first thought to be caused by one or more air pollutants. Studies by Drs. Staley and Altman, however, showed conclusively that the injury was from toxic levels of chloride salt and of soil origin.

It would be difficult to estimate the amount of damage to plants in Colorado which is directly or even indirectly associated with air pollution since most studies in the past have been concerned more with public health than the assessment of plant injuries. Companion studies of pollution injury to vegetation in key areas of Colorado should, however, be conducted since the highly urbanized locations are experiencing sufficient air pollution incidents to cause economic losses. Some greenhouse growers are already experiencing alleged air pollution losses. How much effect air pollution has in weakening landscape plants, causing them to succumb to other causes (diseases, etc.) is also an important and as yet unanswered question.
We can still have good gardens in Colorado while using less water.

I have been preaching the idea that "Rocky Mountain Horticulture is different" for some 40 years now. A few people are beginning to get the idea and find that they can have as good gardens and parks here as anywhere else in the world, if they learn to design their gardens, select the plants to construct them, and learn how to maintain these plants, in a way to fit Colorado's distinctive climate. So long as ample water seemed to be available, many continued to use the old methods learned in the moister areas of the east. Now, that the pinch of limited water is beginning to be felt, unless we can voluntarily adopt more of these "different" practices, some regulations must be made which will require everyone to learn ways of maintaining a garden with less water.

Alternates to Bluegrass

It has been estimated that at least half of the water that the communities on the eastern slope use as "domestic" water is used to maintain bluegrass lawns. I certainly appreciate the value of an appropriately designed bluegrass lawn, BUT, I maintain that every square foot of "yard" surface need not be planted in bluegrass for a pleasing effect. Even more attractive and useful grounds may be designed which use other features that require less water. Close to the house, especially the front of the house, a small plot of well kept lawn is most effective, but in more distant areas where the area is not as conspicuous or used as much, a lawn or ground cover requiring much less water can be planned. Groups of flowering shrubs might be appropriate in other areas, dense screens to block off undesirable views may take up quite a little space, rock gardens of desert plants may be used, or groves of trees to give shade and privacy. Carefully designed plantings in the front yard even may be more distinctive and useful than the plain, open bluegrass lawn. It is possible to plan gravel areas or even colored aggregate, though the use of this material has been much abused.

The fairway strain of the crested wheatgrass can be planted at half the cost and can be maintained with less than half the water and mowing, though it still gives the feeling of a bluegrass lawn when seen at a little distance. There are many low-growing native plants which can be used as ground covers on slopes or odd corners that will give a pleasing effect and still require less water and care. True, we cannot use many of the things so freely used in California but we can develop many plants that are adapted to our dry climate.

It is a curious habit of people moving into a new area to consider all native plants as weeds and try to grow all the familiar ornamentals that they have known as children. We have here many native plants that have adapted themselves to our dry climate and alkaline soil over the centuries, but we have not learned to use them. They are truly "different" but no less beautiful. We can get all the landscape effects found in eastern gardens by using these native or adapted plants and save much water.

Water Less Often

As we look over the state we find that evergreens dominate our mountain forests with few native deciduous trees. We find that there are few broadleaf evergreen plants and most of our shrubs have smaller leaves and less conspicuously colored bloom. Bare ground is not all automatically covered with grass as in the eastern, moister areas. We should learn to accept these "differences" and incorporate them into our garden design.

Even with the traditional eastern kinds of plants we can learn to use much less water without affecting their growth. In general a good rule is to "water less often and more thoroughly." Ornamental plants have much deeper root systems than most gardeners realize, and shallow, frequent watering may keep them alive but they can not grow vigorously without moist soil around their roots. Shallow, frequent watering wastes as much as fifty percent of the water used. Hand watering is usually wasted time and water. Automatic sprinklers are often set to come on for a few
minutes EVERY day, which is most wasteful. If they are set to soak thoroughly and are only turned on again when the ground starts to become dry they can be efficient. On heavy soils and steep banks often the only efficient way to water is letting the sprinklers run until the water begins to stand, then turn off for a while and back on again to soak down deep. Then, when thoroughly soaked this ground can go for a week or even two weeks. Putting the water down deep forces the roots to go deep, and only deep rooted plants can be vigorous and fool-proof plants.

Prevent Loss of Water

More than half of the sprinklers used commonly today are very inefficient. It is nice to have those that throw a fine mist high in the air, but we cannot afford them, for often twenty percent of this water never gets back to soak into the soil. A sprinkler that throws large drops of water, low down and slowly, is the most efficient. These can be left to run and soak for a long time and then be turned off for many days. Flooding an area is still more efficient, but takes special preparation and is subject to many abuses. We may have to come to this however, if we cannot learn to use other efficient methods.

ROUTINE watering is most inefficient — watering for 20 minutes every Monday and Friday, for instance, regardless of weather or other conditions. The amount and frequency of watering depends much on the type of Soil, the Slope of the land, the amount of Sun that the area receives and the Season of the year. Remember these four S's when planning a watering program.

Plants must have moist soil around their roots at ALL TIMES. In the eastern, moister areas where we developed our garden practices this is almost automatic with the more or less regular rains and snow, but here we very seldom have natural precipitation sufficient to soak deep down and keep the subsoil moist over winter. So, we must learn that it is NEVER time to stop watering, and if we have long open periods of weather in winter, plants may need water. Of course, it is no use to water when the ground is frozen, but if it is frozen it must already have water in it.

Water Deep

Most gardeners are governed too much in their watering by the appearance of the SURFACE of the soil. It is the soil underneath that is really important. Then you will ask, "How can I know when the soil underneath is in need of water?" The answer is so simple that no one thinks of it. "Just dig in and see." This is not too difficult to do, until you learn exactly how much water is needed in every situation of Sun, Slope, Soil and Season. Finally after the soil is thoroughly soaked, much water can be conserved by the addition of some sort of mulch over the surface. This is nature's way as can be seen in any forest. There are many things that can be used — peat, ground corncocks, chopped hay, chips from the chipper, leaves (preferably composted). This also cuts down on the weeds that come through and robs the plants of their share of water. When lawns are watered infrequently they may also be allowed to accumulate some "thatch" to their betterment rather than detriment.

Sawdust may be used for mulching when it is more available if a small amount of nitrogen (ammonium sulphate) is added to compensate for the nitrogen robbed from the soil as it decomposes.

Most lawns are overfertilized which only requires more watering and more mowing. True, most lawns are put in soil that is not fit to grow anything, and they need extra food, but if lawns were planted in good soil they would need very little extra fertilizer. Mowing a lawn a little higher than is customary will also encourage the growth without extra water or fertilizer.

Recommended Plants

Here are some suggestions for plants to use in Colorado landscaping which can be grown with much less water than the usual eastern plants:

Most of the pines and junipers will grow with little water. In large pines this would include the Ponderosa, Scotch and Austrian; in smaller scale the native Bristlecone, Limber, Pinon and the Dwarf Mugho. We have many low growing junipers with which most people are familiar, such as the Pfitzer, Armstrong, Narrowleaf and Marshall. In the upright type, generally called "cedars", it is best to stick to the native J. scopulorum and its named varieties, for they have a root system especially adapted to drier areas.

In deciduous large trees we can use the native hackberry, honeylocust, in its many varieties, green ash, Russian olive, and in special situations, the western catalpa, native pink locust, boxelder, "Chinese" elm and native cottonwood. With just a little more water and care, trees such as the lindens, sycamores, birches, hard maples, or even certain oaks can be grown.

In shrubs we have a great variety of drouth resistant kinds. In areas where only 5 to 10 inches of natural rain can be expected we can use some of the native desert shrubs, including several of the sages (Artemisia), desert thorn (Lycium), rabbitbrush (Chrysothamnus), yuccas, Mormon tea (Ephedra), buffaloberry (Shepherdia), kinnikinnick (Arctostaphylos), oaks (Quercus), barberries, winter fat (Euroticia), greasebrush (Forselleta), buckweeds (Erigeniums), and horsebrush (Tetradenia).

Under more favorable conditions, from 10 to 15 inches of rainfall, such as is found over much of the populated area of the eastern slope, we can grow some of the nicer natives such as: elders (Sambucus), mountain mahoganies (Cercocarpus), serviceberries (Amelanchier), sumacs (Rhus), chokecherry, hawthorns (Crataegus), silverberry and autumn olive (Elaeagnus), flowering currant and wax currant (Ribes), wild roses, snowberries (Symphoricarpos), Apache plume (Fallugia), cliff rose (Cowania), antelope brush (Parsinia), single-leaf ash (Praxinus), mountain privet (Forstiera).

In this area there are many perennials which will grow with little water, including the hollyhocks and other mallows, iris, vetches, statice, galliardia, coreopsis, chrysanthenums, most of the mints, spiderworts, fall asters, bouncing bet, docks, oriental poppy, milfoils, ajugas, penstemons and English daisies.

Bulbs would include such as cannas, dahlias, tulips, gladious, narcissus and grape hyacinths.

Annuals, Ground Covers

Many of the nicest annuals will thrive under our conditions. Included are the petunias, zinnias, calendulas, cosmos, marigolds, snapdragons, candytuft, kochia, cleome, lunaria, poppies, portulacas, centauria and celosia.

Used for ground covers of various heights could be: Low species of artemisia, evening primroses, vetches, antennaria, sedums, euphorbias, festuca, flax, Nepeta mussini, potentillas, sempervivums, erigeniums, cerastium, and even the wild strawberry.

There are several grasses in addition to the crested wheat before mentioned, including some of the grasses, bromes, buffalo and dropseed.

We need to acquaint the general gardening public with these plants, first through our garden writers, then our landscape architects who draw the plans, and the nurserymen who grow and sell these things. At the moment the use of these plants and practices is voluntary, but unless many accept these principles, the time is almost here when their use will be compulsory, if we would still grow good gardens.
TRAVELING WITH TREES AND FLOWERS

Josephine Robertson

While conducted garden tours cover the most ground with the greatest expertise, it is possible to work in many do-it-yourself visits on business and vacation trips. This has been our hobby for years and we have found some useful helps along the way.

Last September, for example, we had occasion to drive to the east coast and planned our itinerary to stop at a dozen arboreta. We had with us copies of The Directory of American Horticultrue and Handbook of American Gardens, A Traveler’s Guide. These booklets with the latter going into more descriptive detail list, by states, both arboreta and gardens.

Most of our friends had never heard of an arboretum tour and wondered who anyone, except a professional, could think it interesting. Strictly amateurs, we find it a delightful pursuit, but for different reasons.

My husband, a former chemical research director, took up the study of trees from the scientific angle. My field is human interest. I want to know who started the great tree collections and why, the adventures of the early botanists and plant explorers.

It is fascinating to see how the threads interweave: how John Bartram influenced his contemporaries and following generations; how Sir Joseph Hooker of Kew Gardens inspired Henry Shaw to found the Missouri Botanic Garden; how Dr. Manasseh Cutler, friend of Benjamin Franklin, collected plants along the Ohio River in 1788, hoping to found a botanic garden – a dream realized by his great-great-grandson, Beman Gates Dawes; how the Arnold Arboretum inspired Albert F. Holden, publisher of the Cleveland Plain Dealer, to endow an arboretum for his city, the site chosen by Ernest “Chinese” Wilson; how J. Sterling Morton founded Arbor Day a century ago in Nebraska, resulting in the planting of millions of new trees across the country – and surely influencing his son to establish the great Morton Arboretum fifty years later.

Early arboreta and physic gardens were designed strictly for scientific study, not for public enjoyment. England’s beautiful Oxford Botanic Garden did not even admit the public for its first two hundred years. Many of today’s arboreta, generally pressed for funds, post stern notices that they are NOT parks and NOT for public recreation – such as picnicking. However, since some are located far from eating places, there are, occasionally, picnic tables in some inconspicuous corner. We have learned from hollow experience, to take at least a pocketful of nuts and raisins.

The size of the welcome mat varies. Visitors are admitted freely to the excellent Morris Arboretum of the University of Pennsylvania, but we have found no printed information available on the grounds. At the other extreme is the truly people-oriented Los Angeles State and County Arboretum. Many others, such as Longwood, Morton, Dawes and Holden, have attractive visitor centers offering information. Increasingly, it appears to us, they are reaching our through tours, courses, displays and publications to teach environmental appreciation to the public of both school and voting age.

In Cincinnati we had the privilege of touring an arboretum with its founders, Mr. and Mrs. Stanley M. Rowe, who began planting forty-five years ago and now have opened their large estate to the public. It is particularly beautiful in the spring when the 150 cultivars of crab-apple are in bloom. Mr. Rowe pointed out a small shrubby oak, Quercus havardii, which had come originally from the Andrews nursery in Boulder. “At first,” Mrs. Rowe told us, “we planted everything people gave us. Now we are wiser and advise others to specialize. It is useful to show what is native and what will grow well in your own locality.”

We have joined the American Association of Botanical Gardens and Arboreta, as associate (non professional) members, and find their modest Bulletin full of interesting news – and ideas to file away for future trips.

The arboretum world is a quiet world, but it holds never ending trails of interest, both scientific and human. Furthermore, as Dr. Louis B. Martin comments in his introduction to A Traveler’s Guide, “Every day is Earth Day at a botanic garden or arboretum.”
The term “exotic” does not necessarily mean a beautiful and rare plant; it merely refers to any plant growing in an area where it is not a native plant. An exotic can be a handsome ornamental, but it is just as likely to be a troublesome weed. This is the case with common crabgrass, *Digitaria sanguinalis* (L.) Scop., familiar to every gardener as an obnoxious lawn weed.

*Digitaria sanguinalis* is indigenous to Europe but is found at low and medium altitudes in most temperate and tropical areas of the world. It was brought to this country, probably unintentionally, and is now naturalized throughout the United States although it is more common in the east and south. It is to be found in lawns, golf greens, cultivated fields, pastures, gardens, roadsides, waste places or any disturbed soil.

Crabgrass has been able to extend its range so far beyond its natural limits in part because of the enormous number of seeds produced. The *North Dakota Experiment Station Bulletin 112* estimates that 204,000 seeds are produced from a single plant.

We think of crabgrass as a prostrate, creeping mat plant. It is true that when crabgrass is mowed or grazed, it mats close to the ground. Under ideal conditions, however, it will send up stems 6 inches to a foot or more tall.

In the southern part of the United States, crabgrass is a common weed in cultivated soil. It makes a prolific growth in late summer on fields which have been cropped, and it is used as a forage plant or sometimes cut for hay when other forage is scarce.

Crabgrass is an annual grass. It starts growth rather late in the season and often goes unnoticed until late summer when it takes on a purplish hue, making unsightly blotches in a lawn. It grows best in hot weather and is usually killed by the first frost.

The plant is branching and spreading, rooting at the decumbent base. The leaf sheaths are noticeably hairy. Flowers are borne in few to several spike-like racemes in whorls or approximate at the ends of culms. This is a digitate or finger-like arrangement. The genus name *Digitaria* is from the Latin *digitus*, finger. *Sanguinalis* comes from the Latin *sanguis*, meaning blood, and refers to the purplish color of crabgrass.

Common crabgrass is also known as fingergrass, August grass, watergrass, crow-foot, purple crabgrass, hairy crabgrass.

Because crabgrass is an annual, the best controls are those which prevent the production of seed. This might be hand-pulling of small infestations, but is generally use of a chemical crabgrass killer. There are several of these on the market, and directions should be followed carefully. Early treatment when the seeds are germinating and the seedlings appearing has proved effective. Germination usually takes place in May or June but is variable. Viable seeds may endure in the soil for several years, making a continuing control program necessary.

One of the best defenses against crabgrass is a good growth of blue grass. Close-mowing of a lawn is a common mistake which encourages mat growth of crabgrass and weakens blue grass. Cut your lawn at a height of 2 inches and do not overwater in order to promote a good stand of blue grass and inhibit the growth of crabgrass.

Smooth crabgrass, *Digitaria ischaemum* (Schreb.) Muhl., is also a very common and troublesome lawn weed. A native of Eurasia, *Digitaria ischaemum* resembles *Digitaria sanguinalis* but is not as coarse or as tall. The leaf sheaths are smooth and the foliage is usually more purple.
MONSTERA DELICIOSA

in the
Boettcher Memorial Conservatory

Peg Hayward

Monstera deliciosa Liebm., a relative of Philodendron, is a coarse, woody climber, or liane, native to the jungles of Mexico and Central America. It is now grown in many tropical gardens and under glass in temperate regions for its curious perforated leaves and its sweet edible fruits. This monstrous evergreen aroid, Araceae family, will spread along the ground in a tangled mass, or climb over walls, or to the tops of tall trees. It clings to its support by numerous cord-like aerial roots.

Ceriman, also commonly called Mexican breadfruit, has stems up to 3 inches thick. The immense leathery leaves, which are long-stalked, have blades that are roundish in outline but slashed at intervals half way toward the center. The rest of the blade is characterized by large perforations, more or less regularly placed. Their function is uncertain unless it is to protect the leaf from being torn in the wind. The leaves may get to be 3 or 4 feet in length.

Flowers appear from June to September. They resemble huge calla lilies. A club-like flower spike (spadix) bearing a great cluster of flowers rises from a waxy, white enveloping leaf or bract (spathhe). If pollinated, the ovaries mature to become components of a compound fruit about the size and shape of an ear of corn. The fruit matures in the late summer or fall of the succeeding year, some 14 months or more after blooming. The collective fruits are built up of hundreds of small single fruits pressed so firmly against each other that they appear as tile-like, hexagonal sections. The fruit has a delicious fragrance and delectable flavor between that of pineapple and banana, hence the species name deliciosa. As the fruit ripens, the sections gradually fall away from the hard core, beginning at the stem end, and reveal segments of cream-colored edible pulp. Not everyone likes the fruit, however, as the spicules or crystals of calcium oxalate which are present cause a burning sensation on the throat and tongue, especially if one attempts to eat portions that are not fully ripe.

The roots of Monstera are tough enough to be used as rope and for the making of hats, chair seats, and baskets.

Monstera deliciosa in the juvenile stage is the house plant by some authorities called Philodendron pertusum and is even better known as split-leaved philodendron. The youngest foliage is entire and heart-shaped and as it matures it develops first one split, then several. It is propagated by cutting up the stem and rooting the pieces in a mixture of sand and leafmold.

Botanic Garden Guild
MID-SUMMER ANNUAL GARDEN TOUR — JULY 26

Nine lovely “in town” gardens, varying greatly in size and planning, will be visited by those who make the Annual Garden Tour on July 26th, from 10 in the morning until 6 in the evening. Some of these were designed by the owners, one of whom is a landscape architect himself. Some are maintained by the owners, others are professionally cared for. A real treat!

The gardens of:

Dr. and Mrs. William C. Jackson, Jr. 855 Vine
Mr. and Mrs. Charles Nicola 144 Downing
Mr. and Mrs. Norman Davis 222 Cherry
Mrs. Charles P. Gordon, Jr. 414 Eudora
Mr. and Mrs. O. A. Chanute 2515 E. Alameda Circle
Mr. and Mrs. W. H. Kistler 860 So. Madison
Dr. and Mrs. D. W. Hosseus 865 So. Adams
Mr. and Mrs. Chris G. Moritz 495 So. Jersey
Mr. and Mrs. William Andrews 1433 So. Eudora
Down-to-Earth Instructions on DAHLIA GROWING

Edward J. Pankoski

Plant your dahlias in sunny areas, although shaded places are satisfactory if plants are given more space and kept well thinned out. Dahlias should have an area of their own. Large varieties should be kept 2-1/2 to 3 feet apart in a bed 3 feet wide, or plant two rows in a 4-1/2 to 5 foot bed with 2-1/2 feet between rows. The ideal spot is where the plants get the full benefit of all the morning sun only. However, I have been successful in growing good blooms that are exposed to the hot sun the greatest portion of the day. It is up to the individual to experiment to see what varieties do well in sun or shaded areas. Certain red varieties seem to burn quickly under the hot sun rays.

Prepare the soil for your dahlia beds by spading the full depth of your shovel. Turn the soil over in the fall, if possible, leaving it rough. In the spring turn the soil over again, breaking up the clods and smoothing the soil as much as possible. Loose and bumpy soil dries out fast; smoothing the soil will retain moisture longer.

Dahlias will grow in any soil that has air, sufficient moisture and food in the right proportion. Many soils are in need of air. Heavy, soggy soil can be improved by tilling in peat moss, sand, red wood sawdust and chips, compost, or well rotted manure. If your soil area is very poor, till in bone meal at 5 to 8 pounds over a 100 sq. ft. area. When the dahlias are about a foot high, apply 2 pounds of potash in this area. Till it into the soil around the dahlias and you will have a good fertilizer. (Be sure to keep the potash off the foliage.)

Planting time for dahlias will vary according to the area of the country in which you live. In this area planting begins in early May to early June. You will have dahlias from the early part of August until the first killing frost. The dahlia is a beautiful autumn flower and is usually at its peak after the heat of summer is waning.

Planting the dahlia tuber: Lay the tuber flat in a hole 6 inches deep, with the “eye” sprout pointing up. The size of the tuber makes no difference as long as it has one good “eye” or sprout. Put some fine sand and peat moss, or vermiculite, or fine soil around and over the eye of the tuber and then fill in the hole with 2 inches of the surrounding top soil. The remainder of the hole can be filled in after the plant grows above the surface of the soil. Allow only one sprout to grow from each tuber. When the plant has its third set of leaves, pinch the top out. This will grow a stout branch at the base of each of the six pairs of leaves left. The plant will be lower and produce more and better flowers.

Staking dahlias: Stakes should be 4 to 6 feet long. Redwood makes good lasting stakes. However, leather gloves should be worn when driving them into the ground to avoid painful slivers. Single stakes may be placed in position when planting the tuber in the hole. Place the stake several inches away from the tuber and drive it in at least 12 inches into the soil. Later you risk the chance of damaging the tuber when the stake is driven in. Two stakes may also be used — one on each side of the tuber — driven in about a foot from the plant.

The dahlia in one of the easiest and most beautiful flowers to grow and will produce more flowers, considering size, than almost any other plant.

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Tying materials should be soft harvesting twine, soft tape materials or any soft materials. They should be tied loosely to avoid cutting and breaking the plant. Old bed sheets torn in 1 inch strips make ideal tying material.

When buds appear, stop deep cultivation, and give the beds a mulch of manure, leaves, or grass clippings. A shallow basin around each plant may also be used and this should be filled with mulching.

Disbudding: Larger dahlias of greater substance with longer and stronger stems may be had by disbudding at the proper time. When buds the size of peas appear, pinch off the buds on the left and right leaf clusters, leaving the center bud if it is in good form.

For healthier looking dahlias give your plants a light shower bath when sprinkling every evening during the hot weather of summer. This shower also helps to hold insects in check.

Sufficient moisture when watering your dahlias is very important in producing good blooms. As the dahlia grows, so grows the demand for water. Your tuber is planted 6 inches deep so water should go down a few inches below this depth.

The dahlia tuber will produce many fibrous rootlets. These rootlets spread all through the soil looking for food and moisture. If the tuber is planted too shallowly, these rootlets work up close to the surface, where they are subject to starvation and burning on hot days. The proper feeding of these rootlets will reward you with a good blooming dahlia plant.

When your first buds appear, stop all deep cultivation around your plants. Cultivation can injure and destroy the fibrous rootlets which are so important in flowering. Budding also indicates that now is the time to begin applying mulch around the plants.

A general rule that is good to remember when watering your dahlias is that a dahlia consumes its weight on each hot day. Therefore, an 8-pound plant would consume a gallon of water a day. Also remember one good watering lasting for several days to a week, is better than a light watering every day. Top watering of your dahlia plants is permissible until the buds begin to bloom; then all watering should be done at ground level.

Should you desire to improve and increase the size of your dahlias, an extra feeding of fertilizer may be applied. This feeding should begin after the buds have formed. If liquid feeding is done, it should be applied when the soil is fairly wet from rain or watering. Do not apply too much fertilizer at this time. Space your applications about 15 days or two weeks apart. There are many good fertilizers on the market but I would suggest you use one where the first element (nitrogen) is much lower than the last two (phosphate and potash). Follow directions on the label or package for how much to use per plant or area.
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Junior Science Book of Trees.

National Audubon Society
You are at home one day, sick in bed, but not too sick to luxuriate in a quiet morning. Suddenly a horrible rasping, buzzing noise jolts you wide awake, mangles your nerves, jangles in your head. It's the lawn-mowers next door. You don't have to look to know what is going on. There is a truck with the tail gate down and four or five frenetic little men wresting gasoline-powered mowers and trimmers onto the lawn. The rasping, buzzing sound is doubled, then tripled, as the infernal machines start up. You know the men are running desperately as the machines drag them furiously back and forth, around and around, efficiently cutting the grass to a Persian rug fineness.

Ten, fifteen, maybe twenty minutes, and the job is done. The machines shut off, one by one. There is much clanking and banging as they go back into the truck. Then they are gone, the normal noises of the city return, and the lawn next door is mowed, trimmed, pared and, probably, shaved. Your nerves are shattered.

This is the modern way of lawn care, of gardening, in a sense. It gets the job done with no dilly-dallying. It's a lot easier than pushing a mower yourself. It may even leave a prettier lawn than you had in the old days, although that is not guaranteed.

It is also a long way from nature and the joy and pride of working with nature. The machine is fast, efficient, impersonal. It does away with irksome toil. But it leaves emptiness and uneasiness in the soul of a true gardener. The machine has destroyed some things. Leisure, for one. Oh yes, we have more time for other things we want to do. In statistics we have more leisure. In reality we have little, if any. Time is saved from our chores, so we rush into an automobile and race to an appointment, or an entertainment.

There is little peace or satisfaction in our speed.

An English woman, writing long ago, saw what was happening to us. “Surely,” she said, “all other leisure is hurry compared with a sunny walk through the fields . . . as such walks used to be in those old leisurely times . . . Leisure is gone — gone where the spinning-wheels are gone, and the pack-horses, and the slow wagons, and the peddlers.

Ingenious philosophers tell you, perhaps, that the great work of the steam-engine is to create leisure for mankind. Do not believe them: it only creates a vacuum for eager thought to rush in. Even idleness is eager now — eager for amusement . . . Old Leisure . . . was a contemplative, rather stout gentleman, of excellent digestion, — of quiet perceptions, undiseased by hypothesis . . . He lived chiefly in the country . . . and was fond of sauntering by the fruit-tree wall, and savoring the apricots when they were warmed by the morning sunshine, or of sheltering himself under the orchard boughs at noon, when the summer pears were falling.”

You and I can't go back to that — it was gone when George Eliot wrote Adam Bede in 1858 — but we can spend some quiet hours in a garden, in rewarding toil, in contemplation. In using our hands, in working with the soil and the trees and the plants, we can even discover a faint trace of the genuine flavor of Old Leisure, sometimes called Peace.
A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.