



The American HORTICULTURAL Magazine

winter 1969 / volume 48 / number 1



Journal of the American Horticultural Society, Inc.

2401 CALVERT STREET, N.W. / WASHINGTON, D. C. 20008



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THE AMERICAN HORTICULTURAL MAGAZINE is the official publication of The American Horticultural Society and is issued during the Winter, Spring, Summer, and Fall quarters. The magazine is included as a benefit of membership in The American Horticultural Society, individual membership dues being \$15.00 a year.

THE AMERICAN HORTICULTURAL MAGAZINE is devoted to the dissemination of knowledge in the science and art of growing ornamental plants, fruits, vegetables, and related subjects. Original papers which increase knowledge of plant materials of economic and aesthetic importance are invited. For manuscript specifications, please consult the chairman of the Publications Committee.

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COVER ILLUSTRATION

Prairie sunflower (*Helianthus annuus*). Thrives in prairie states gardens. Of the 37 species of this All-American flower native to the tall grass prairies, half a dozen or more have found their way into herbaceous borders around the world and are grown for food and ornament.

PHOTO MISSOURI CONSERVATION COMMISSION



The Role Of Plants In Curbing Air Pollution

It is said that not since 1950 has it been possible to get a good clear photograph of the New York City skyline from Staten Island.

To the three monkeys of "hear no evil," "see no evil," "speak no evil" fame, some cartoonist recently added a fourth. This monkey is surrounded by obnoxious sources of air pollution—and is holding his nose.

As early as 1949 air pollution did \$500,000 worth of visible crop damage in the Los Angeles valley. By 1956 this figure had risen to five million dollars' damage to food crops alone. The pattern continues outward from an ever-widening basin each year. Currently the visible crop damage caused by air pollution was reported at eight million dollars in California, \$18 million along the Atlantic seaboard, and \$500 million dollars annually on a national basis.

For the student who wants a fundamental knowledge about air pollution throughout the world and its effects on human health, on animals, and on plants, I suggest the World Health Organization monograph, Series No. 46, entitled *Air Pollution*. Geneva, 1961.

A basic principle I must emphasize is that plants contribute to nature's means of purifying our air. They reconstitute befouled atmosphere into breathable air by their photosynthetic action, as well as by precipitating and filtering out dust and other pollutants.

Therefore, we as conservationists, public officials, gardeners, horticulturists, and citizens, ought to press for the preservation of natural areas and the replacement, as far as possible, of every tree that is removed. We should urge the planting of trees and shrubs on every open space which will support them—in the cities, around, and even on top of them as roof gardens, for their air-cleansing value as well as their esthetic value.

In the April 1967 issue of *Landscape Architecture*, Werner Kaufman reports that Stuttgart, Germany cleans its air. How? By protecting the city and suburban plants and the surrounding vineyards, and by adding more parks and forests. In other words, by

legally safeguarding and fostering fresh air lanes into the city, and in green belts around the city. Plantings competently designed and capably executed must be legally built into every development and urban renewal project. We as citizens must insist upon it.

The protection of our plantings, the maintenance of healthy atmosphere, the care of our soil—which is non-renewable—are basic to the maintenance of our civilization.

Dr. O. C. Taylor of the University of California has stated that “if the pollutants in the air go unchecked, it won’t be many years before agriculture in certain parts of America ceases to exist.” At the same meeting—the American Association for the Advancement of Science, December 1966—a panel said, “Air pollution in parts of New York, New Jersey, Florida, California, Oregon, and Washington now causes more crop damage than the combined havoc of wind, cold, and ice.”

One of the best and most understandable statements on the subject is an article, “Air Pollution Damage to Plants,” by Malcolm C. Shurtleff, in *Grounds Maintenance*, Vol. 2, No. 4, April, 1967. It deals with the pollution damage of plants with which both amateur and professional gardeners are familiar.

We are creating a situation in which the federal government will have to clamp down on all offenders because we in our own communities don’t control our own pollution. We must, by every mechanical, chemical, legal, political, and physical means at our disposal, clean up air, land, water, and visual pollution.


Here is what we can do to make further use of nature in pollution control: First, bring together lists of plants which demonstrate tolerance to man-made pollutants. This should be done for different climatic zones throughout the temperate-to-tropical world. *Air pollution is now an international problem.*

Second, determine which plants are the most efficient “smog eaters,” and which can utilize and eliminate the other ingredients of man-made pollution in the air.

Third, at every opportunity plant those plants that not only enhance the setting but also tolerate the most adverse metropolitan conditions. Every tree and plant we can grow will bring us that much closer to keeping the air breathable.

Our survival depends on our breathing environment. It seems to me that we have every excuse to insist on plantings and their maintenance in and around our towns, villages, cities, and industrial centers.

In my opinion, the problem is fundamental and is one which cannot be over-emphasized.



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PERENNIALS

For Mid-Western Gardens

JOHN PHILIP BAUMGARDT

Growing conditions in the middle of a great land mass are far more stringent than in areas where ocean conditions modify winds and weather. Summer temperatures are hot, and while humidity usually runs high, rainfall may be insufficient. Winters are off-again-on-again affairs. Though frosts may begin as early as late September in the prairie portion of Hardiness Zone 5, Indian Summer allows hardy perennials to bloom through October, and in some years hellebores, autumn-flowering crocus cultivars, violas, and even roses bloom until Thanksgiving.

On the other hand, temperatures suddenly (in a matter of hours) plunge way below freezing, causing crowns to crack as plants are caught in a soft and succulent condition. To compound the problem, temperatures are not at all constant through winter. If a low pressure area hesitates near the lower Mississippi Valley while a high crosses the Canadian Rockies, intense cold pours down through the Missouri-Mississippi River drainage area. But if the conditions are reversed, warm gulf air surges north-

ward, raising temperatures as high as 60° to 70° in mid-winter.

Every gardener knows the root rotting, crown heaving action of winter freezes and thaws; in mid-America it is a way of life. The worst side of the picture, then, is hot, humid summer weather, conducive to "instant blooming" (and fading)—in days rather than weeks—and to crown rot; winter brings continuous freezing and thawing with almost no snowcover but with bright scalding, sunshine.

There is a good side to the story, however. Prairie soils, while heavy and not well drained, are deep and fertile. Frequently the weather behaves favorably, or the knowledgeable gardener is able to modify environmental conditions in his garden enough to do some gardening most of the year. Houses, trees, and fences make windbreaks and offer shade to keep the soil cool and temper the force of the breeze. Mulches help to control freezing and thawing. And since the year has open seasons through winter, and rainy spells to break the heat of summer, prairie gardeners can find something to enjoy outdoors much of the time.

Now for particulars. Last winter was fairly typical: moderate through October, after substantial September frosts. Warm days prevented the soil from chilling, and autumn crocuses, colchicums, Christmas-roses, chrysanthemums, fragrant violets, and late hardy asters made a show almost until Thanksgiving. In the vegetable garden, late-sown lettuce, spinach, beets, and chard did well, while parsnips, leeks, and late cabbage grew satisfactorily.

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Fig. 1. Shooting star (*Dodecatheon meadia*). North America's beautiful native cyclamen relative. This mid-spring blooming perennial is extremely variable and would provide wonderful breeding material as a garden ornamental. As yet it is quite unexploited. Strangely enough, this prairie species usually ends up in a rock garden.

PHOTO MISSOURI CONSERVATION COMMISSION

Fig. 2. Goldenrod (*Solidago speciosa* var. *angustata*) in a bluestem prairie. It begins to flower in August and continues until heavy frost. Ranges in height from 1 to 3 feet; the flowers are yellow. Other species are gold to white and many are fragrant. Especially beloved by German gardeners, the cultivars 'Goldstrahl' and 'Mondstrahl' come to us as 'Sunshine' and 'Moonbeam'.

PHOTO MISSOURI CONSERVATION COMMISSION

Fig. 3. Black-eyed susan (*Rudbeckia hirta*). The elegant gloriosa daisies belong to this group. Not long lived, although plants are free seeders. These are among the most important late summer prairie flowers.

PHOTO MISSOURI CONSERVATION COMMISSION



Fig. 1.



Fig. 2.



Fig. 3.

Christmas saw heavy snow and sub-zero weather, but late January turned mild, with a few 60° days so that winter-flowering crocuses, witch-hazels and more hellebores bloomed out, with winter-aconite (*Eranthis hyemalis*), snow drops, (*Galanthus elwesii* and *nivalis*) and *Iris reticulata* following in early February. Through March the days were warm, nights in the 20° to 30° range. By late March most springflowering shrubs and many perennials were blooming nicely. In early April with Forsythia and daffodils finished, tulips and dogwood coming on, the parsnips and leeks were still delicious, lifted from their growing rows for kitchen use.

This lengthy introduction involving weather conditions is typical of the prairie gardener's state of mind. He is perpet-

ually concerned with the weather. It is not so much a matter of what will grow in the prairie states, but whether the weather conditions will allow it to bloom properly.

What perennials can be counted on for mid-America gardens? In broad terms, those originating from prairie areas do well, especially those from central China, the area from Turkey to the Afghanistan frontier, and plants from central Europe—Poland, south through Bulgaria—usually make a show. In contrast, plants from temperate-zone rain forests, from alpine regions and from far northern Europe are not for the tall grass prairie states. For example, gardens of our area must do without *Meconopsis*, *Primula auricula* and certain other primroses, English hybrid delph-



Fig. 4. Pink coneflower (*Echinacea purpurea*). Abundant on the central Missouri bluestem prairie in midsummer with the heavy stems of sunflower shooting up through the grass cover.

PHOTO MISSOURI CONSERVATION COMMISSION

iniums, most kniphofias, and other delightful items. But many things thrive if given good growing conditions.

To drive this point home, let's resort to a plant list. Almost everybody has access to the Wayside Gardens catalog which carries a typical list of perennial plants. Of approximately 115 herbaceous perennials listed, excluding bulbs, tubers and corms, in the 1968 list 74 genera are represented by native prairie species or species that have "gone native" having escaped from cultivation. This is not to say that the same species represented in the catalog are found growing wild in Kansas, Missouri, Nebraska and Iowa, but they *may* be, or sister species are found in the wild. The prairies teem with *Achillea*, *Asclepias*, *Coreopsis*, *Delphinium*, *Gaillardia*, *Helanium*, *Helianthus*, *Hypericum*, *Liatris*, *Lobelia*, *Penstemon*, *Physostegia*, *Polygonum*, *Rudbeckia*, *Thalictrum*, *Trades-*

cantia, and many other valuable ornamentals. It's a marvelous sight to drive to the edge of the city and find a field dappled with Indian paintbrush (*Castilleja*) and shooting stars (*Dodecatheon*).

Later in the year the same field will probably be a picture, with prairie clover (*Petalostemum*), which belongs in every herbaceous border, plus *Echinacea* and *Achillea* (Yarrow). Autumn will bring the marvelous goldenrod (*Solidago*)—of which there are 54 species and varieties in Missouri¹—gayfeathers (*Liatris*), and asters galore. The point is, a sensible prairie gardener leans heavily on these natives, or cultivars horticulturally derived from them, for his perennial border. Of course the ironclad items, such as *Anchusa*, *Astilbe*, *Macleaya* (*Bocconia*), *Dictamnus*, *Gypso-*

¹Steyermark, J. A. 1963, Flora of Missouri, Iowa State University Press, 1963.



Fig. 5. *Achillea millefolium* 'Coronation Gold'. A garden selection derived from the wild yarrow. The yarrows grow in grasslands throughout the northern hemisphere. Color forms and plants with outstanding flowers have been garden favorites in Europe and America for centuries.

PHOTO M. L. COONAN



Fig. 6. *Solidago* 'Cloth of Gold'. A number of native American species of goldenrod have been improved by English and German horticulturists and returned to American herbaceous borders to add a glint of gold in the late summer garden.

PHOTO THE WAYSIDE GARDENS COMPANY

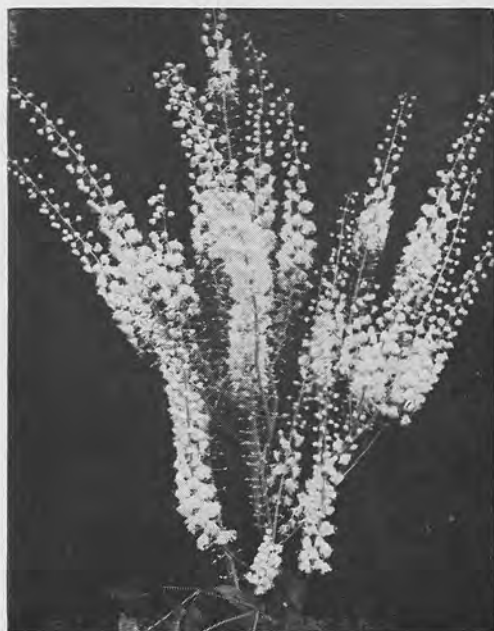


Fig. 7.



Fig. 8.



Fig. 9.

Fig. 7. Black cohosh (*Cimicifuga racemosa*) is a native species from the prairies eastward to the north-central and Atlantic states. Used medicinally a century ago, this stately plant today adorns partially shaded borders with spikes of shoulder height from late spring to midsummer.

PHOTO M. L. COONAN

Fig. 8. *Echinacea purpurea* 'Robert Bloom' is a cultivar dating from the time when pink cone-flowers were included in *Rudbeckia*. Cultivars abound in these closely related species consisting of white, pink, rose, yellow, and orange shades that blend in the midsummer garden. On the prairies naturally occurring variants appear frequently.

PHOTO THE WAYSIDE GARDENS COMPANY

Fig. 9. *Geranium grandiflorum*. A beautiful blue-flowered species from Eastern Asia, with flowers 1½-2 in. across. Plants establish quickly to supply much needed color in late May, but need a little noontime shade in the prairie states.

PHOTO THE WAYSIDE GARDENS COMPANY

Fig. 10. *Hosta* 'Royal Standard'. Hostas are all foreign introductions but most thrive in a shady, high humus bed in mid-America. Only the variegated sorts prove somewhat fragile or have a tendency toward all green foliage through the heat of midsummer. The vigorous new hybrids are especially promising.

PHOTO THE WAYSIDE GARDENS COMPANY

Fig. 11. Bleeding-heart (*Dicentra spectabilis*). Two relatives of woodlands west of the Mississippi are Dutchman's-breeches (*Dicentra cucullaria*) and squirrel-corn (*D. canadensis*). Bleeding-heart is apt to suffer through prolonged drought and goes from father to son in a well tended garden. The new *D. eximia* hybrids bloom over a very long season and are reasonably hardy in mid-America, too.

PHOTO M. L. COONAN

Fig. 12. *Campanula garganica* creeps happily through the dry limestone garden walls of prairie rock gardens, blooming profusely in May. Most of the tall-growing perennial bellflowers adapt well to prairie conditions. The alpine sorts usually fail to survive.

PHOTO M. L. COONAN



Fig. 10.



Fig. 11.



Fig. 12.

phila, *Hosta*, *Paeonia*, *Pyrethrum*, *Stokesia*, and other exotic perennials known for their dependability are also used freely.

To a prairie gardener it is maddening, particularly if he is a botanist, to realize how many of our wonderful native species have been "improved" by foreign specialists and sold back to us at exorbitant prices. All too often, in breeding for spectacular blooms, inherent hardiness and disease resistance is lost.

Today the prairies are being developed. Of twenty-three prairie tracts observed for flora from 1936 through 1966, only two remain undisturbed, and both are scheduled for development as housing sub-divisions. The chain of lakes on White River in the southern Missouri and northern Arkansas Ozarks flooded out the entire natural habitats of two desirable species. At this time there is no federally protected preserve of native

prairie flora, which is probably one of the greatest gene pools for horticultural exploitation in the world. Take another look at that Wayside Gardens list: over 70 percent of the species listed have counterparts in the prairie flora. An article on perennial gardening is no soapbox for a harangue on the desirability of creating a preserve of native prairie, but it is worth mentioning, since not only mid-America gardens, but all herbaceous borders in the temperate zone depend heavily on ornamentals derived from prairie species.

What is so different about managing a perennial border in the prairie states? First, certain species—those demanding a cool, moist climate—must be excluded from the plant list. Second, special attention must be given to the blooming season. Where a particular *Erigeron* species (according to the R.H.S. *Dictionary of Gardening* blooms in England for



Fig. 13. A late autumn view of goldenrod (*Solidago*), several species of *Liatris* (*L. spicata*, *L. spicata* var. *albiflora*, *L. scabra*, and *L. pynostachya*), old seed heads of *Echinacea purpurea*, and, in the distance, fine clumps of big bluestem grass (*Andropogon gerardii* var. *chrysocomus*).

PHOTO MISSOURI CONSERVATION COMMISSION

five weeks, and can be depended on for a month's show in the eastern United States or the Pacific Northwest on its native prairies it completes its blooming cycle in two weeks. And this is the typical shortening of flowering due to bright, hot sunny days that affects many cultivars.

Third, the total environment must be manipulated: soils have to be drained and lightened as well as fortified with humus-yielding organics and other fertilizers; windbreaks become important,

and both summer and winter mulches deserve considerable study. In other words, a full blooming, long season perennial border in mid-America demands a lot more planning than it would in a milder climate. But the compensations include an extra long season, free access to native species, and tremendous pride when a crop of some difficult thing, such as Blackmore & Langdon's 'Bath' *Delphinium*, comes into perfection owing to an inordinate amount of love and coddling.

Excerpt From Peter J. Van Melle*

On Feeding Plants . . . in the Rock Garden (1930)

Although plants in the garden must be accommodated with the same type of soil as nature provides for them under natural conditions, it would seem to me that, especially in the case of plants with foliage values, the same type of soil should be furnished with a greater content of actual plant food. We demand much more in the flower garden than in the rock garden of this type of plant, in the way of foliage and appearance, than they furnish in their wild state. Nature starves many of her older plants and turns them unsightly. It is only the exceptional wild specimen that would be considered a fine piece for the garden. Therefore, since we demand the utmost of our plants in the garden, we should put a little more in the soil than nature generally does.

*For biographical sketch see Vol. 47, No. 3 (Summer 1968).

Systemics, A New Tool for The Home Gardener

WILBUR H. YOUNGMAN

The use of modern-day systemics in plants is a new development of far-reaching importance to gardeners. Systemics are chemical compounds that may be absorbed through the leaves, bark, or roots, and translocated by the sap stream throughout the plant in sufficient quantity to destroy insects and/or disease. Systemics are far more effective than contact sprays. The latter control diseases and insects but they are effective only at the point of exterior application.

So far, only a few systemic insecticides have been formulated to work in some kinds of plants. Also, research is currently underway to find a systemic fungicide for control of plant diseases.

Importance of systemics for the home gardener:

- For control of pests on trees too large for the home type of spray equipment. Systemic control of pests would be possible in a large tree at a nominal cost, as compared with the higher cost of a commercial operator.
- Systemics persist in the plant for an extended period of time and are not affected by weather; in comparison, contact sprays require several applications to be effective, because of being washed away by summer showers. It should be noted that the chemical nature of the sap may alter or modify the action of systemics. In other words, the systemic may give protection in some plants for a considerable length

of time, but in other plants it may be effective for only a week or two.

- Systemics do not harm many beneficial predatory insects. This is a most desirable advantage over regular spray programs which normally kill a great many beneficial insects, such as ladybird beetles and preying mantids.
- Systemics are particularly helpful in controlling leaf miners, borers, and related pests difficult to control. With conventional contact sprays, leaf miners in holly (*Ilex*) and boxwood (*Buxus*) are difficult to control effectively because it is difficult to coincide time of spraying with emergence of the insect pest. By comparison, a systemic once applied is available at all stages in the life cycle of the insect.

Those who have had to spray for spider mites, laceflies, and other sucking insects on bushy shrubs, such as boxwood and azaleas, know the difficulties of doing a thorough job with the standard contact sprays, even after several applications. Moreover, most of the materials used in fighting these pests kill only adults and do not affect either the nymphs or the eggs. Thus it takes at least three sprayings to give a reasonable degree of control. Normally, a single application of a systemic should provide full control of these insects.

From the foregoing, it should be clear to the home gardener that there is much to be gained in the rapidly growing field of plant systemics.

History of Systemics

Systemics are not new nor is the desire to have them of recent origin. It is said that Leonardo da Vinci, who is best known for his artistic efforts, proposed the use of arsenic on plants to control much they are no longer effective as a

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Dr. Floyd F. Smith, Investigations Leader, Entomologist, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, has been consulted on all phases of this article.

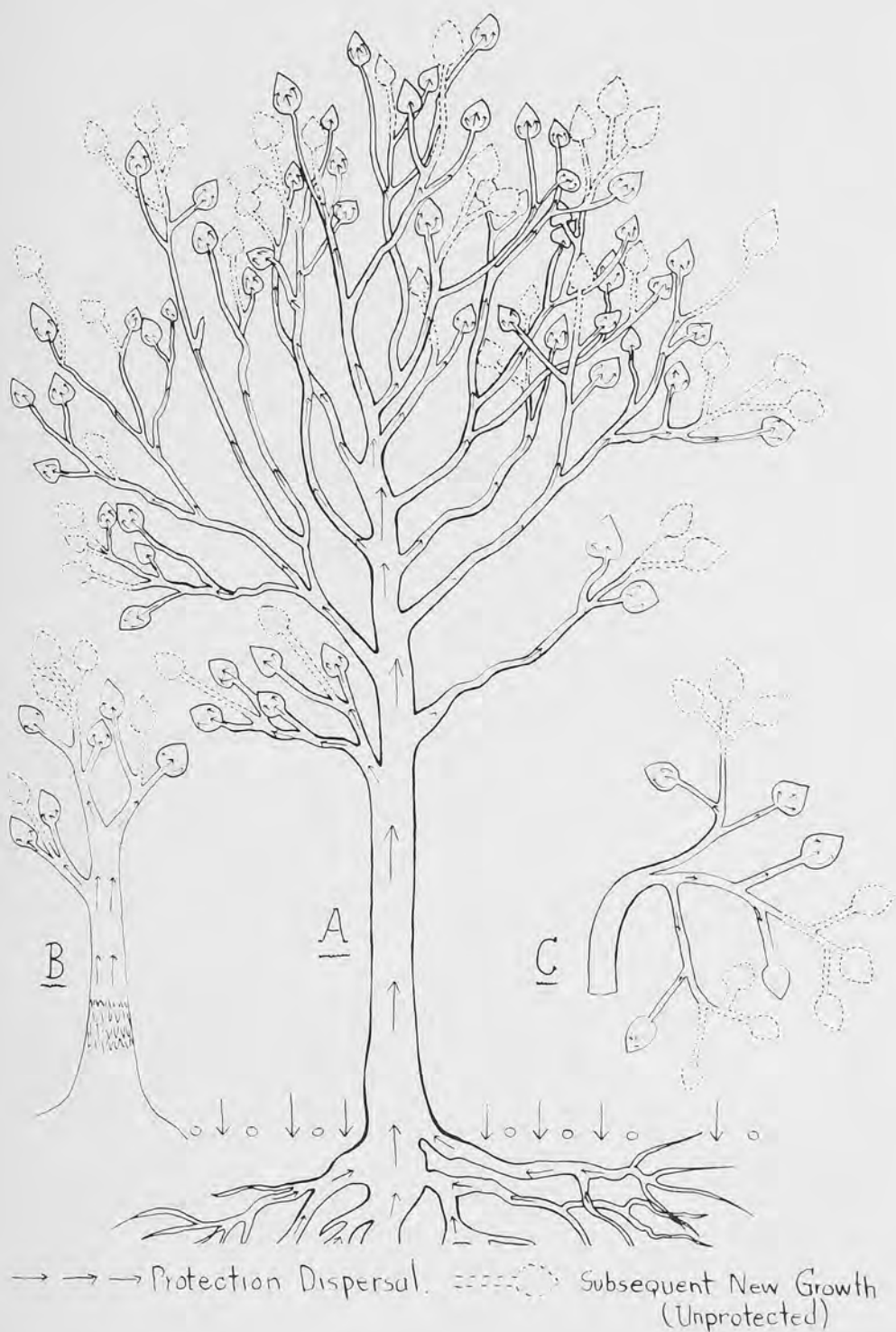


Fig. 1. Application methods for systemics. A. Solutions or granules soaked or cultivated into soil. B. Solution painted on the bark or stem. C. Solution sprayed on foliage. Arrows indicate areas of dispersal and protection. Dotted lines show subsequent new growth (unprotected).

DRAWING BY L. N. MEYER

insects. Unfortunately, arsenic is a cumulative poison in humans. In the late 1920's arsenic and other chemicals that were investigated showed systemic action but were otherwise too highly toxic and killed the plants being treated.

It is only in comparatively recent years that effective work has been done in plant systemics. Early investigators noticed that plants growing in soils containing selenium were free of aphids and other sucking insects. This inspired the testing of sodium selenate as a possible systemic. It proved to be very effective in controlling insect pests, but it was never permitted for sale to the home gardener because of its extreme toxicity. Commercially, it still is used for the control of sucking insects by some growers of African violets.

The effectiveness of sodium selenate opened the door to further research for systemic insecticides. A German, Gerhard Schrader, and associated workers discovered in 1947, that an organic phosphate, later called *schradan*, could be absorbed into some plants to control insect pests and not injure the plant. This discovery stimulated many researchers to study other related compounds.

One of the major problems in systemic research has been to find non-injurious compounds that could be translocated in the sap stream reasonably quickly and still be retained in sufficient concentration to kill insects. This problem has been particularly difficult to overcome. The solubility of the chemical particles and their forms influence the distribution in the plant. Also, the normal tendency is for the sap to carry the chemicals up in the sapwood into the newer rather than the older growth. These properties determine the effective useful period of a systemic chemical. However, any new growth that occurs subsequent to the spraying is unprotected. (Fig. 1.)

It was soon discovered that the sap has a marked influence on the systemic material. In some cases the chemical is broken down into new forms (metabolites) which are more toxic in the plant. Sometimes sap alters the chemicals so

systemic. This means that the systemic must be tested extensively for each kind of plant to determine its effectiveness. For example, the systemic called *dimethoate* provides nearly season-long control of sucking insects in azaleas, but in roses, it gives protection for only slightly more than a week.

Effect on Plant

The action of systemics in the plant needs to be examined. Does the systemic chemical remain effective within the plant for the entire growing season? Does the systemic kill all of the insects initially without further problems until the plant is re-infested? These problems are of no great concern to the gardener, but the researcher is interested in the amount retained and the effectiveness of the chemical in the plant throughout the growing season. It is only in this way that he will know just how long the systemic is effective.

It has been noted by some researchers that as the season progresses the new flush growth often is not protected. In other words, the systemic often is not redistributed into new growth which occurs subsequent to the time of spraying. Also, quite often damaged leaves will not have a sufficient concentration of the systemic to provide protection.

Uptake in Soils

Uptake of systemics directly through the roots seems to be much more practical than bark application or spraying of foliage, although when applied to the soil much of the material is lost. Various estimates indicate that perhaps only 20 percent of the material applied to the soil is taken up by the roots. On the other hand, a soil application of very toxic materials is probably safer for the gardener. More important, soil or bark application is essential if systemics are used to control insects or diseases in tall-growing trees. The home gardener, with his available spray equipment cannot effectively treat foliage of plants more than 20 to 25 feet in height.

It has been observed that the uptake of systemics in sandy soils is much faster than in clay soils. In fact, it may be so

rapid that the systemic will be phytotoxic to the plant. In clay soils, or in soils well supplied with humus, the uptake is less rapid. The humus may act as a reservoir or absorbent to retain supplies of the systemic until needed by the roots; also, humus acts as a buffering compound. Another interesting observation relates to a greater uptake of systemic chemicals by healthy plants than by weak plants.

Insects vary in their susceptibility to control by systemics. For example, aphids are the most easily killed of all the insects. Spider mites are next, but thrips are more difficult, and whiteflies are particularly hard to reach with a systemic. Chewing insects and beetles are harder to control with systemics than with sprays. It should be noted that the Mexican bean beetle is an exception to this rule and can be effectively controlled at low dosages of any one of several systemics applied to soil.

Gardeners are most hopeful that a systemic will be found for effective control of scale insects on trees. Difficulties here are associated with the feeding habits of scale insects, and to a rapid translocation of the sap-borne chemical to the growing areas of the plant. The concentration of the systemic in the area where the scale insects are feeding is thus too dilute to be effective.

Kinds for Home Use

Many systemics have been formulated in recent years but few are available that are safe for the home gardener. A number of highly toxic systemics have been put on the market for use only by trained persons who wear protective equipment and observe all necessary safety precautions to prevent skin contact, ingestion on tobacco and food, or inhalation. To all others their use is highly restricted.

Systemics recommended here as safe for home use are *dimethoate*,* *disulfoton*,† and *meta-syslox R*.‡

* Cygon is the trade name for dimethoate.

† Di-syston is the trade name for disulfoton.

‡ Systox is the trade name for demeton.

§ Meta-systox R is the trade name for oxydemetonmethyl.

foton,† *demeton*,‡ and *meta-syslox R*.§ (See guide for use, Table I.)

Dimethoate affords excellent control of many insect pests on some of our ornamentals. It is registered for sale to the home gardener because of its comparatively low toxicity. Recently, *dimethoate* was approved for use on several commercial vegetable crops, also on apple and pear trees in the first and second "cover" sprays.

While *disulfoton*, *demeton*, and *oxydemetonmethyl* are rated as highly toxic, formulations are available that, while toxic, may be used but must be used with great care by the home gardener.

Obviously, the home gardener is interested in insecticides and pesticides that will do a better job without increasing the danger to himself and his family. At the present time, manufacturers and those responsible for registration and recommending insecticides avoid all insecticides that will be hazardous to our health in handling or will leave a toxic residue on our food crops. We can no longer make available highly poisonous materials with a warning statement and expect the untrained person to take the necessary precautions.

Home Use of Systemics

To use systemics effectively, the home gardener needs to know the kinds, how to apply them, and methods of control for the various kinds of plants—trees, shrubs, and flowers. (See guide for home use of systemics, Table I.)

People in pesticide regulatory work and in research are busy trying to find the best way to use systemics, the insects they will control, and other safeguards necessary to comply with state and federal regulations. Since these steps delay the release or approval of some kinds of systemic materials, some gardeners are inclined to do a little experimenting on their own. Sometimes circumstances force people to seek an answer to practical problems. For example, *dimethoate* will control borers in white Florida dogwood. A band of *dimethoate* painted on the bark is effective in controlling

TABLE I
GUIDE FOR USE OF SYSTEMICS ON ORNAMENTAL PLANTS
Dimethoate (CYGON 2E)

<i>Ornamental Plants</i>	<i>Pest Controlled</i>	<i>Amount per 1/2 Gal. Water Dimethoate Insecticide</i>
Azaleas (Outdoor grown)	Lace Bugs, Leaf miners, Mites, Tea Scale, Whiteflies	1 teaspoon
Camellia	Aphids, Camellia Scale, Mites, Tea Scale	1 teaspoon <i>Foliar Spray:</i> Apply 2 sprays 6 weeks apart the first year fol- lowed by annual applications soon after first growth begins in the spring. <i>Soil Drench:</i> Apply Cygon 2E Insecticide as a soil drench around the base of plants in early spring at rate of 4 table- spoons per gallon of water per plant up to 6 ft. tall. Increase this rate proportionately for larger plants.
Carnations (<i>Dianthus</i>)	Aphids, Thrips, Mites	1 teaspoon <i>Soil Drench:</i> Apply as a soil drench at the rate of 4 fluid ounces per 500 sq. ft. of bed or bench (5 qts. per 1/2 acre) in sufficient water for even dis- tribution. Water thoroughly after application.
Cypress (<i>Cupressus</i> spp.)	Bacteria Moth Larvae	1 teaspoon Apply as a drenching spray.
Daylilies (<i>Hemerocallis</i>)	Aphid, Thrips	2 teaspoons
Roses (Outdoor grown)	Aphid, Leafhoppers, Mites, Thrips	1 teaspoon
Arborvitae (<i>Thuja</i> spp.)	Aphids, Bagworms, Mites	1 teaspoon
Birch (<i>Betula</i> spp.)	Aphids, Leaf miners	1/2 teaspoon For leaf miners, apply when leaves are expanded (about mid-May) and repeat in early July.
Boxwood (<i>Buxus</i> spp.)	Leaf miners, Mealybugs, Mites	1 teaspoon For leaf miners, apply in spring when leaf miner flies first ap- pear, or in early summer for control of larvae in the in- fested leaves.
Cedar (<i>Cedrus</i> spp.)	Mites	2 teaspoons
<i>Euonymus</i> spp.	Aphids, Scale	2 teaspoons
<i>Gardenia</i> spp.	Tea Scale, Whiteflies	1 teaspoon
<i>Gerbera</i> spp.	Thrips	1 teaspoon
<i>Gladiolus</i> spp.	Aphids, Thrips	1 teaspoon
<i>Iris</i> spp.	Aphids, Iris Borer, Thrips	2 teaspoons For borer control, spray when new leaves are 5-6 inches tall.
Poinsettias (Outdoor grown)	Mites, Whiteflies, Mealybugs, Aphids	1 teaspoon
<i>Ficus nitida</i> (Outdoor grown)	Thrips	1 teaspoon

<i>Ornamental Plants</i>	<i>Pest Controlled</i>	<i>Amount per 1/2 Gal. Water Dimethoate Insecticide</i>
Holly: English (<i>Ilex aquifolium</i>) American (<i>I. opaca</i>) Chinese (<i>I. cornuta</i>) but not Burford (<i>I. cornuta</i> 'Burford')	Leaf miners, Mites, Soft Scale	1 teaspoon For leaf miners, apply in spring when leaf miner flies first ap- pear or in early summer for control of larvae in infested leaves.
Hemlock (<i>Tsuga</i> spp.)	Mites, Scale	2 teaspoons
Juniper <i>Juniperus</i> spp.	Aphids, Bagworms, Midges, Mites	2 teaspoons
Oak (<i>Quercus</i> spp.)	Golden Oak Scale	2 teaspoons
Pine (<i>Pinus</i> spp.)	Aphids, Bagworms, European Pine Shoot Moth, Nantucket Pine Tip Moth, Zimmerman Pine Moth	2 teaspoons
Yew (<i>Taxus</i>)	Fletcher Scale, Mealy Bugs, Mites	2 teaspoons

Recommendations for di-syston, meta-systox R, and systox approved for home garden use do not carry as much detailed information as for dimethoate. However, we do have the approved list of insects which they will control as well as the recommended dosages. Detailed directions are available on the manufacturers label.

DI-SYSTON

Di-syston may be used to control the following pests on ornamentals: aphids, birch leaf miner Colorado potato beetle, flea beetle, Hessian fly, lace bug, leafhoppers, leaf miners, mealybug, Mexican bean beetle, mimosa webworm, mites, pine tip moth, potato psyllid, root maggot, root worms, southern potato wireworm, thrips, and whiteflies.

The material approved is a 2 percent granular, and it should be used at the rate of 1 ounce per foot of height of treated plant. If necessary, it may be repeated at six week intervals.

META-SYSTOX R

Meta-systox R may be used to control the following on ornamentals: aphids, birch leaf miner,

holly leaf miner, leafhoppers, mites, thrips, and whiteflies.

The material approved is a 5 percent granular and should be used at the rate of 1 tablespoonful per 4 square feet of area. This should be applied as a band over the row or worked into the soil about the shrubs. It should be cultivated into the soil and watered thoroughly.

SYSTOX

Systox may be used to control the following: aphids, foliar nematodes, holly scale, lace bugs, leafhoppers, leaf miners, mealybugs, mites, rhododendron scale, soft brown scale, tea scale, unspotted tentiform leaf miner, and whiteflies.

Available as a 2 percent granular material. Follow label as to dosage and precautions. This material should not be used less than 5 days before hand picking, transplanting or other hand work which will bring the gardener into contact with the plants.

It is important in using these materials that they be watered into the soil, that contact is not made with sprayed foliage until after it is dry.

(Text continued from page 15)

aphids on large trees of tulip poplar (*Liriodendron tulipifera*) to prevent the shower of honeydew on objects below. Yet neither of these uses has been approved by the regulatory agencies. It is doubtful that *dimethoate* will be approved for tulip poplar, since the manufacturers are not likely to spend the money to have this use approved. Consideration should be given to provide adequate protection to people and pets who might come into contact with *di-*

methoate before it is completely absorbed into the bark.

In another example, a wholesale nurseryman was confronted with rather heavy losses of birch trees (*Betula* spp.) infested with bronze birch borer. It was too expensive to pull and burn them, and the annual spread to other trees caused serious losses. The nursery manager recalled seeing a bulletin published by the Canadian Department of Agriculture advising the painting of bands of undiluted *dimethoate* on the trunks of

young birch trees. Since starting this protective program, the birch trees have suffered no further trouble with the bronze birch borer.

We have other examples of the effectiveness of systemics for the home gardener and commercial producer. Disyton, for example, applied in the furrow before the planting of lily bulbs protects the plants from sucking insects that spread serious diseases through the flowering period. In Ghana where mealy bugs are a serious pest on cacao trees, capsules of the systemic *dimefox* buried in the soil, prove an effective control of this pest.

Experiments have been made using several kinds of systemic materials to control insects in trees by use of a band of systemic chemical painted on the bark. (Fig. 2) Systemics, until absorbed

into the bark are toxic, therefore efforts have been made to provide a protective cover. This practice only invited examination by the curious, even though held in place with a padlock. Consequently, protective banding has been given up.

In 1968 experiments were conducted in Ohio to determine the effectiveness of three systemic materials (*phorate*, *disulfoton*, and *demeton*), all extremely toxic to humans, to control the mimosa webworm on thornless honeylocusts (*Gleditsia triacanthos* var. *inermis*). A single application of each was made in the spring or very early summer in a 24-inch band on both sides of each tree row. Protective clothing, including a face mask, was used when handling the systemics, when treating the nursery row, and when cultivating after treatment. Label precautions on use were strictly followed. The applications were most effective in controlling the webworm.

Application

As indicated above, systemic chemicals may be absorbed through (1) leaves (2) bark, and (3) roots. Generally speaking, foliage spray is preferable since there is very little loss of material compared to soil application. However, when spraying there is always danger to the operator and to others. Extreme caution should prevail to prevent any contact of the chemical with the skin. For this reason, bark and root application is advisable.

The home gardener has good reason for an interest in systemic insecticides. *Dimethoate* has simplified control of iris borer and euonymus scale. Hopefully, other systemics will become available soon for the control of other pests. For example, we would like to have a cure for obscure scale now killing many pinoaks (*Quercus palustris*), and affecting the willow oak (*Q. phellos*) and other trees and shrubs in the Washington, D.C. area. The *Ceroplastes* wax scale is extremely injurious to a great many of our ornamentals. A systemic that would aid in the battle with these pests would be most welcome.



Fig. 2. A band of systemic chemical painted on the bark of a tree for control of aphids that suck sap from the leaves. These chemicals are extremely toxic, therefore extreme caution must be used by the person handling these systemics and every precaution should be taken to prevent contact with the skin and inhalation of fumes.

PHOTO J. SILVERMAN, WASHINGTON STAR

The home gardener is rarely qualified to do experimental work with systemics. It is doubtful if he is in a position to do much if anything in the way of testing them. Therefore, it is suggested that the home gardener take his problems on systemics to his horticultural agent, a chemical company representative, or someone at his experiment station. These people are equipped to take the necessary precautions and are qualified to accurately evaluate the materials for use with highly toxic systemics. Rather than try to do experimental work ourselves, we should be very thankful for the research that has brought to us the present benefits from systemics. We hope that the various agencies involved will continue their research to bring us materials which will help to solve other problems. Certainly we are all looking forward to the day when we can control scale insects with a systemic. We even hope to control blackspot on our roses.

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Excerpt From Peter J. Van Melle

On *Anemone nemorosa* (in part) 1933

Not until lately have I known how good it is to have a garden. If in past years, in the joy of giving freely of my affections, I scarcely counted the returns, this spring it is the garden that tears the tassels of her purse, and I who accept, humbly, her gifts of beauty, of peace and recreation. And not the least of these gifts is that of *Anemone nemorosa*—spirit-breath of the Woods.

The International Peace Garden

JOHN A. STORMON

The International Peace Garden was created "as a memorial to the peace that has existed between the United States of America and the Dominion of Canada."

It is situated atop the Turtle Mountains of Manitoba and North Dakota, on the border line between the United States and Canada, midway between the Atlantic and the Pacific, and near the geographical center of the North American continent.

Its purpose is to perpetuate and commemorate the long standing friendship and pleasant relationship between two nations, for all time to come, by the establishment, development and maintenance of a living garden of flowers, shrubs, plants and trees on the longest unfortified border in the world.

Such a garden was proposed in 1928 by Henry J. Moore, of Ontario, Canada, as a place "where the people of the two countries could share the glories found in a lovely garden and the pleasures found in warm friendships." In 1929 Mr. Moore, at a meeting in Toronto of the National Association of Gardeners, again proposed the ideal of such a garden. The proposal was accepted, and a committee appointed to accomplish the ideal.

International Peace Garden, Inc., was incorporated under the membership corporation laws of the State of New York on September 17, 1930. A committee consisting of Henry J. Moore, Joseph R. Dunlop, and Robert B. Brydon was appointed to select the site of the proposed garden. When viewing the site from the



Formal Area, International Peace Garden, from Highway Entrance.

PHOTO N. D. STATE SOIL CONSERVATION COMMISSION

air Mr. Moore declared: "What a sight greeted the eye! Those undulating hills rising out of the limitless prairies are filled with lakes and streams. On the south of the unrecognized boundary, wheat everywhere; and on the north, the Manitoba Forest Reserve. What a place for a garden!"

A cairn of native stone was constructed, and on July 14, 1932 dedicated in the presence of one of the largest groups of people ever to gather in the mid-North American continent, with representatives of Canada, the United States, Manitoba, and North Dakota. The inscription on the plaque on the cairn reads: "To God In His Glory we two nations dedicate this Garden and Pledge ourselves that as long as men shall live, we will not take up arms against one another."

The International Peace Garden comprises 2,339.3 acres, of which 1,451.3 acres are in the Province of Manitoba, Canada, and 888 acres are in the State of North Dakota. A Civilian Conservation Corps Park Camp was installed at the site in 1934, and commenced to develop the Peace Garden. In the 36 years since the dedication of the cairn, it has been developed with funds appropriated by the U.S. Congress, the Canadian House of Commons, the North Dakota Legislature, the Manitoba Legislature, and with contributions made by organizations and individuals interested in the project.

The general design for the construction of the formal area on the border line was presented by Hugh Vincent Feehan, a landscape architect, acting for the American Society of Landscape Architects. Later, a master plan for the development of the Garden in both countries was prepared with the cooperation of the National Park Services of both the United States and Canada, the Manitoba Park Service, and the North Dakota State Historical Board, cooperating with the Peace Garden Board of Directors.

Some of the more plentiful native trees in the Peace Garden are white poplar (*Populus tremuloides*), white birch (*Betula papyrifera*), and bur oak

(*Quercus macrocarpa*). The more plentiful native shrubs are: hazelnut (*Corylus americana*), chokecherry (*Prunus virginiana*), dogwood (*Cornus* spp.), hawthorn (*Crataegus* spp.), saskatoon or serviceberry (*Amelanchier alniflora*), rose (*Rosa* spp.), and willow (*Salix* spp.).

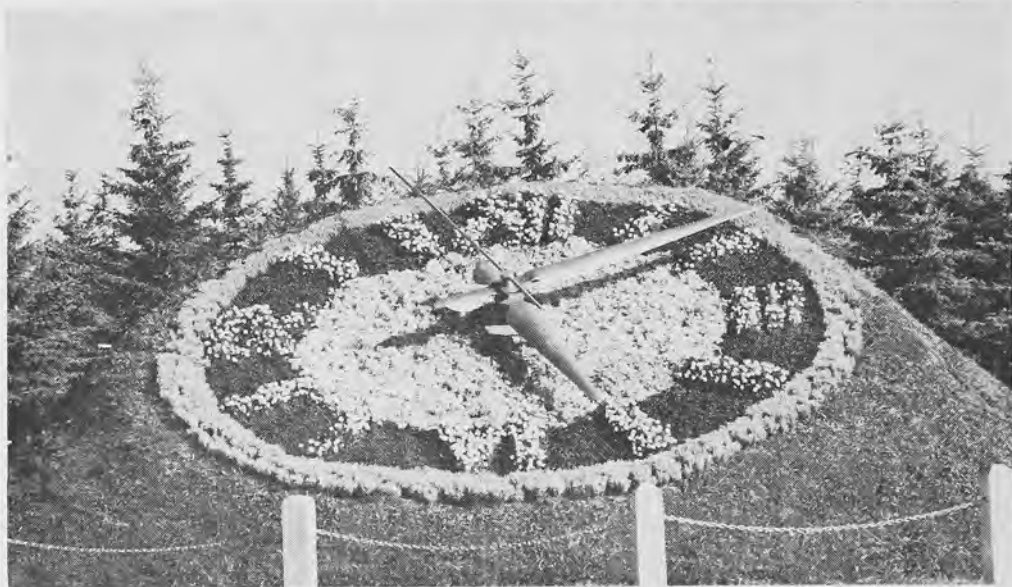
Evergreens are not native to this area and for this reason special emphasis was placed at first on planting conifers on the cleared area, which had been farmland. Several large plantings were made with about two hundred evergreens to an island. The materials used were: blue spruce (*Picea pungens*), Black Hills spruce (*Picea glauca* 'Densata'), Siberian larch (*Larix siberica*), and ponderosa pine (*Pinus ponderosa*).

Plantings in the Peace Garden have preserved most of the native deciduous species, with additions of many exotic species for added color and texture. A large proportion of the exotics are native to Siberia, Manchuria, Korea, North, and Western China. Among the materials used in the many and varied locations are:

- Acanthopanax (*Acanthopanax sessiliflorus*)
- Alpine currant (*Ribes alpinum*)
- Amorpha leadplant (*Amorpha canescens*)
- Amur maple (*Acer ginnala*)
- Arbor-vitae (*Thuja occidentalis*)
- Shubert chokecherry (*Prunus virginiana* var. *melanocarpa* 'Shubert')
- Cotoneaster (*Cotoneaster tomentosa*)
- European cotoneaster (*Cotoneaster integerrima*)
- Ornamental crabapple (*Malus* hybrids)
- Siberian dogwood (*Cornus alba* 'Siberica')
- American elm (*Ulmus americana*)
- Siberian elm (*Ulmus pumila*)
- Winged euonymus (*Euonymus alata*)
- Euonymus (*Euonymus nana*)
- Green ash (*Fraxinus pennsylvanica* var. *subintegerrima*)
- Tatarian honeysuckle (*Lonicera tatarica*)
- Korean barberry (*Berberis koreana*)

Bulova Floral Clock, International Peace Garden.

PHOTO N. D. STATE SOIL CONSERVATION COMMISSION



Siberian larch (*Larix siberica*)
Lilac (*Syringa vulgaris*, in variety)
Mockorange (*Philadelphus*)
Mongolian cherry (*Prunus fruticosa*)
Mountain ash (*Sorbus*)
Sand cherry (*Prunus besseyi*)
Oak (*Quercus mongolica*)
Russian olive (*Elaeagnus augustifolia*)
Sea buckthorn (*Hippophaë rhamnoides*)
Spiraea (*Spiraea chamaedryfolia* 'Transiens')
Sumac (*Rhus glabra*)
Ussurian pear (*Pyrus ussuriensis*)
Viburnum (*Viburnum dentatum*)

Some of the more colorful shrubs are used in spot plantings along the seven miles of driveways. These are smaller plantings placed at strategic locations on curves so that they may be viewed from either direction. Contrasting as they do in size, color and texture and against the backdrop of native material these plantings are a real feature of the Peace Garden.

Roses are used extensively and for the most part are hardy cultivars developed in the Great Plains. The hybrid tea roses do not grow well, although 'Peace' rose does quite well. Some of the hardy roses raised are: 'Dr. Markley', 'Hansa',

'Laxa', 'Wasagaming', 'Haidee', 'Prairie Youth', 'Therese Bugnet', and 'Betty Bland'.

Plantings are masses of solid colors planned to give an undulating effect and additional contrast of texture. In more prominent locations, tulips for early color and geraniums are used extensively. Along the streams *Iris*, daylilies and *Lythrum* are used effectively.

Over the years we have had a fine collection of lilies, notably a donation from the University of Saskatchewan. Dr. C. F. Petterson, head of the Department of Horticulture, had, during his tenure, developed a great many lilies, and in his memory the University donated a collection containing all of the cultivars Dr. Petterson had named, twenty-one altogether. Other lilies are from famous breeders, including the late Dr. F. L. Skinner of Manitoba.

A favorite perennial with a long blooming season is the Morden lythrums from the Canada Department of Agriculture, Experiment Station, Morden, Manitoba, named 'Morden Pink', 'Morden Rose', and 'Morden Gleam'.

In 1968 the Bulova Floral Clock was planted with the following:

Outside ring: *Alternanthera* (Bronze).

Long point triangles: *Alternanthera* (Red).

Short point triangles; *Santolina* (Silver) Lavender-cotton.

In-between sections: *Mesembryanthemum* (Ice Plant).

Clock numbers 12—3—6—9: *Sempervivum globularia* — Hen-and-chickens or houseleek.

An imposing arboretum has been contributed and is being maintained by the Manitoba Horticultural Association. It has some 90 to 100 different species of trees and shrubs and provides a good example of the type of material that can be grown in this area.

The aim is to preserve the natural beauty of this lovely spot in the center of the continent, and to glorify it with thriving garden plants from far as well as near, making it truly international.

In presenting the flora of the International Peace Garden and its area, I have had the cooperation of Dr. W. R. Leslie, long time Superintendent of the Canada Department of Agriculture Experiment Station, at Morden, Manitoba, and now landscape consultant in Winnipeg, and Chairman of the Board of Directors of International Peace Garden, Inc., and of Fred C. W. Rice of Winnipeg, one of our directors, and a long time horticulturist and former Executive Director of International Peace Garden, Inc.

The corporation has twenty directors, ten residents of Canada, and ten of the United States, who are elected for three year terms. They are elected by the voting members at meetings held in September of each year. The directors meet semi-annually, and further administration is by a president, an executive committee of three directors, elected by the Board, and by a resident superintendent.

This large area has been substantially developed over the years, and has now become a tourist attraction in the mid-continent, drawing into the Garden approximately 200,000 visitors during the summer season. It is home for the International Music Camp, which has completed 13 successful years under the direction of Dr. Merton Utgaard, its found-

der and director. In 1968, in seven weekly camps, 2,508 boys and girls received instruction in band, twirling, piano, organ, chorus, orchestra, chamber music, musical drama, ballet, modern dance and art. The facilities at the Music Camp complex are among the best and most modern on the continent. The Music Camp Complex has been developed with money appropriated by the North Dakota Legislature, and with money provided by the corporation and by the Music Camp Corporation. Other major developments are the main entrance, provided by the Sovereign Grand Lodge, Independent Order of Odd Fellows of the World. The Errick F. Willis Memorial Centennial Pavilion, completed in 1967 was provided by Canada and the Province of Manitoba. The Bulova Watch Company provided a large floral clock imported from Switzerland, now located near the entrance. The Knights of Columbus, Fourth Degree, of North Dakota and Manitoba, have provided an outdoor theater and shell in the amphitheater area. The General Grand Chapter, Order of the Eastern Star have



Cairn and Flags, International Peace Garden.

PHOTO N. D. STATE SOIL CONSERVATION COMMISSION

funded for construction of the chapel in the formal area of the Garden. Legislation approved by the Bureau of the Budget is pending in Congress for further development of the Garden in accordance with the master plan.

The International Peace Garden has become a mighty monument to the dedication pledge appearing upon the cairn and to the dreams of its founders. It has become a major attraction of the North

American continent, a living garden of flowers, plants, shrubs, and trees to symbolize the philosophy of brotherhood among peoples and nations, a major institution in the development of the young people of the mid-continent, rendering an outstanding service to our American and Canadian way of life, with its freedoms and its rule of law.

The author is President, International Peace Garden, Inc., Rolla, North Dakota.

Excerpt From Peter J. Van Melle

A Talk on Foundation Plantings (1949)

Since the turn of the century the old mode of (symmetrical, orderly, and essential-to-the-value) scheme of landscaping has undergone a number of minor changes. A vastly greater number of people have been building and planting smaller houses on smaller plots; and the plant materials employed have varied from time to time, and run, for some thirty years past, largely to coniferous evergreens. Essentially, the popular mode is now the same as it was. People still build, buy and plant mainly from all manner of motives other than artistic. They still go for results that are acceptable not only to themselves but to potential buyers as well; and, though houses now hug the ground more closely than did those of long ago, and though continuous foundation groupings are needless and wasteful today, people persist in continuous, solid plantings that are as scrupulously symmetrical as they ever were. . . . If there ever were to be a substantial change, I should expect it to result rather from increased horticultural knowledge and from such influences as relative price trends in plant materials, than from education in artistry.

Useful California Natives for Gardens —PART II*

MARJORIE G. SCHMIDT

Fremontia

There are instances where one or more species of a genus remain unknown, even though others of the same genus have become familiar cultivated subjects.

In the genus *Fremontia*, *F. mexicana* is a popular garden plant used extensively in central and southern California, while *F. californica* remains relatively unknown. Both species are noted for their felted foliage, thus the common name of "flannel bush," and for their abundance of bright-yellow, saucer-shaped flowers. The fremontias are well distributed in foothills, generally in dry, chaparral-type communities. The southern fremontia, *F. mexicana*, occurs in San Diego County and into Lower California. *Fremontia californica* occurs in widely separated areas of the Sierra Nevada and Coast Range hills. The Napa fremontia (*F. californica* subspecies *napensis*) has a more restricted distribution, being found only in several counties of the Coast Ranges north of San Francisco.

The individuality of *Fremontia californica* remains relatively unknown to the average gardener. However, it was very well described in the March 1968 issue of *Flower and Garden Magazine*, where its author, L. E. Hoffman, called it the Pathfinder's Shrub in honor of John C. Fremont. Plant specialists consider the California fremontia to be more amenable to garden conditions than some species, accepting moderate amounts of water as long as the soil is well drained. It is a medium sized shrub

four to ten feet tall, loosely branched and with short, spur-like branchlets. Dark olive-green leaves are scalloped, rough with stellate pubescence above and densely tawny-stellate beneath. In early spring the fuzzy, ovoid, dark-green flower buds become balloon-like as they expand. The two-inch, fully-expanded flowers consist of a 5-lobed petaloid calyx, subtended by three involucre bractlets. The petal-like calyx lobes are a clear yellow. Five stamens have united filaments for about half their length, and for this reason resemble a mallow flower. Blossoms are short-stemmed and solitary but eye-catching because of their abundance and glowing color. When unopened flower buds are in various stages of development along with the bright yellow blossoms, the entire shrub is a delightful medley of colors and shapes.

It is interesting that the subglobose seed capsules of the California fremontia are about the same size and shape as the expanded flower buds. These capsules are extremely rough to the touch because of a solid coating of bristly hairs. When ripe, some time in September, the capsules split into five sections, revealing the oblong black seeds. Seed vessels are apt to hang on the shrub intact for the remainder of the season. I have collected seeds as late as the last week in October.

Propagation of the California fremontia has not been difficult in my experience, due perhaps to the fact that it is native in my area. Seeds generally require some pretreatment, such as immersion in hot water or rubbing between pieces of sandpaper to break the thick seed coat. Cold stratification is also recommended and is the method I have followed. I place the seed in moist

* See *The American Horticultural Magazine*, Fall 1968 for Part I.

sphagnum moss enclosed in an aluminum foil packet, and keep it on the bottom shelf of the refrigerator for about six weeks. Following this stratification I plant the seed in pots containing a mixture of one-half creek sand and one-half soil from beneath pine and oak trees. Seeds begin to sprout within a few weeks. It is a thrilling day when the round, bright green seed leaf first appears, to be followed by the characteristic scalloped ones. Seedlings are slow growing and apt to make more root than top growth, which is typical of many wild plants. By the end of their first year the young fremontias are barely six inches high, but sturdy and healthy, a condition more pleasing to me than rapid growth. Seedlings are subject to damping-off and should be treated with a fungicide.

The colony of *Fremontia californica* which I visit frequently is in the northern Sierra Nevada foothills of Shasta County, at an elevation of about 1000 feet. It is a chaparral-like community where many of California's distinctive shrubs and trees mingle, with the angular digger pine, *Pinus sabiniana*, towering over them. The evergreen interior live oak, *Quercus wislizenii*, and the deciduous blue oak, *Quercus douglasii*, abound here, forming a common denominator for the area. Several members of the genus *Rhamnus* are plentiful,

especially *R. californica* subsp. *tomentella* with its gray-green, leathery, veined foliage and large berries in late summer. The ubiquitous buck brush, *Ceanothus cuneatus*, appears here as it does in most such areas along with other kinds of California wild lilac (*Ceanothus* spp.). Of frequent occurrence is *Rhamnus crocea* subsp. *ilicifolia*, a pleasing shrub noted for thick textured holly-foliage and small, bright red berries. Another interesting companion is the rare hop tree, *Ptelea crenulata*, whose greenish white flowers have the scent of jasmine. Its drooping clusters of papery, elm-like seeds are in evidence when I collect the fremontia pods. Poison oak, *Rhus diversiloba*, is part of this company and its distressing toxicity is generally forgiven when its foliage becomes bright flame in autumn. An occasional clump of purple milkweed, *Asclepias cordifolia*, is apt to be present among the shrubs, and sometimes a colony of a yellow flowered species of *Thermopsis*. In this select company of natives the fremontia provides a contrast with its olive-green leaves and open branching.

Fremontia californica subsp. *napensis* has a restricted distribution, being native to brushy slopes of the north-central Coast Range foothills. It is a slender shrub, well branched throughout, with fine, rather pliable twigs, all producing generous quantities of flowers. Small

***Fremontia* × 'California Glory' (*F. californica* × *F. mexicana*)**

PHOTO P. C. EVERETT
Rancho Santa Ana Botanic Garden



dark green leaves are shallowly lobed, about one-half inch long, with pale felting on the reverse.

This Napa fremontia grew in my dry border for many years, making slow progress, and began its generous flower display during its fourth year of growth. Flowers of clear, lemon-yellow were two inches wide, larger than is generally recorded for this subspecies. Eventually it reached twelve feet and was a glorious sight during May when in full flower, appearing from a distance to be solid yellow. After about eight years my plant formed two more slim trunks a few feet from the main one, a trait which sometimes occurs in the species. The Napa fremontia always set a multitude of capsules but these seldom contained any seed, a habit of this subspecies, noted by others, for which there seems to be no explanation. Most heartily do I admire this slender fremontia for its free flowering tendencies and pliable growth habit.

Of great interest to gardeners is the recent appearance of a hybrid between *Fremontia mexicana* and *F. californica*, called *F.* \times 'California Glory'. It is a product of the Rancho Santa Ana Botanic Garden of Claremont, California. The plant grows as a tree with large, two to three-inch flowers of bright yellow on each branch. Fast growing and free flowering, it appears to have the best traits of both parents. Its main

flowering period is April and May, but it is known to bloom intermittently at other times. This hybrid roots from cuttings so that its vigor and superior qualities are assured. Tip cuttings are taken from late May to July and treated with a rooting compound. Planted in a mixture of perlite and peat moss and kept under intermittent mist, approximately 60 per cent rooted. *Fremontia* \times 'California Glory' received the Award of Merit from the California Horticultural Society in 1966, and from the Royal Horticultural Society in 1967.

Cultural methods are the same for all fremontias, and include full sun, well drained soil, with no water once plants become well established. A few problems may stem from lack of attention to these requirements. The most serious one is caused by watering when soil is washed against the trunks, so that they are susceptible to attacks of fungi. This problem is discussed in *Native Plants for California Gardens* by Lee W. Lenz, along with other excellent cultural directions. When used correctly and with compatible companions, these shrubs with their glowing flowers will give the gardener a hardy and easily maintained border. With the Napa fremontia I grew woolly-blue-curls, *Trichostema lanatum*, whose intense blue flowers were set off by woolly rose-crimson stems and buds; the tall St.



Fremontia californica,
Flannel Bush

PHOTO FREDA WERTMAN

Catherine's lace, *Eriogonum giganteum*, with spectacular lacy, white compound, flower sprays; and several California lilacs, including the compact *Ceanothus impressus* which has rich, dark green foliage and spikes of deep cobalt blue flowers. Fremontias should be more generally used to enrich and enliven western gardens.

Ceanothus

It is a never ending source of wonder to me that certain genera such as *Ceanothus* reach a high stage of development among native plants within the state of California. One of these is the genus *Ceanothus* comprising some forty-three species and many varieties, with a wide range of size and growth habit, leaf shape and texture, several types of inflorescence with flower colors in shades of blue, purple, and in white. In common with most native plants of arid, hilly regions, species of *Ceanothus* are apt to be touchy about drainage, and sometimes resent garden cultivation. It

is encouraging, however, that there is a trend toward the professional propagation and selection of native shrubs, and these tested cultivars are generally quite amenable to garden conditions. Frequently they have an increased vigor and adaptability, and an abundance of flowers beyond those of the species. Of these cultivars I have chosen to describe *Ceanothus griseus* 'Louis Edmunds', not only because it honors the man for whom it was named, but also because it has for me been a satisfactory and delightful garden subject.

The outstanding cultivar *griseus* 'Louis Edmunds' was discovered by Mr. Edmunds among a colony of seedlings which had been planted in Tilden Park, near Oakland, California. He noted the superior qualities of a particular plant and took cuttings for propagation. Subsequently it was produced in quantity by the Saratoga Horticultural Foundation and soon became a popular garden subject. In 1956 this ceanothus was officially named for Louis Edmunds, and was given the Award of Merit by the California Horticultural Society. It is fortunate for gardeners that this variant was discovered as the original plant has since been destroyed.

Ceanothus griseus 'Louis Edmunds' is a vigorous, spreading shrub growing to a height of six to eight feet with a spread of ten feet or more. It is densely branched with green branchlets, and glossy, oval, deep green leaves. In mid-spring it bears large, compound clusters of sea-blue flowers on the main and side branches, a spectacular sight when in full bloom. The shrub remains colorful over a long period as side branches continue to bear flower spikes. Against the split-rail fence in my dry garden its growth was luxuriant, with the dark green foliage retaining its richness through the seasons. A fast growing type, its cuttings are reported to flower in pots during the first year. A well-drained soil is essential, with full sun to high shade, and moderate amounts of water. To be well groomed, most kinds of ceanothus will benefit from pinching of tip growth, a practice which helps to form a compact



Ceanothus griseus 'Louis Edmunds'

plant. All forms of *C. griseus* require light pruning throughout their life.

Some other ornamental aspects of *C. griseus* seldom mentioned are the early flower bud expansion and color of the seed capsules. As I have recorded in some detail in "Ceanothus—an Appreciation," in the *Garden Journal* of the New York Botanical Garden, (September-October 1963), these features prolong the shrub's seasonal attraction. In *C. 'Louis Edmunds'*, the flower bud scales are triangular and faintly purple tinted, subtending the tiny, dark blue, spherical flower buds. With close scrutiny and a little imagination, one can detect a strong resemblance to clusters of miniature grapes. By late summer the seed vessels become conspicuous, subglobose capsules of jet-black, an unusual color in *Ceanothus* where seed vessels are more often russet or brown.

Ceanothus griseus is of restricted distribution, being native to coastal areas both north and south of San Francisco. It is generally called the Carmel ceanothus, as it is abundant near that town on the Monterey Peninsula, often

carpeting the ground under Monterey pines.

Ceanothus × *'Mills Glory'* was produced by a planned cross of *C. gloriosus* × *C. purpureus*. Its originator was the late Howard E. McMinn of Mills College, Oakland, California, a professor of botany at that institution. His enthusiasm for native plants is apparent in everything he has written, and his *Illustrated Manual of California Shrubs* meets the needs of both student and novice.

In attempting to find a low subshrub for garden conditions, and one also attractive in foliage and flowers, two species were chosen. The first was *Ceanothus gloriosus*, the Point Reyes Creeper, having dark green, toothed leaves and lavender-blue flowers, but having a distressing tendency to die out in watered gardens. It is of restricted distribution, native to bluffs and lightly wooded regions adjacent to the coast north of San Francisco. The other parent was *Ceanothus purpureus*, the holly-leaf ceanothus, also of rare occurrence on dry, brushy slopes of Napa County



Ceanothus 'Mills Glory'

north of San Francisco. This is a distinctive upright, rigidly branched shrub, four feet or less in height, with many rounded clusters of light-purple flowers occurring among the dark green, glossy foliage. Although several types resulted from the cross, testing for water tolerance was the important factor, and eventually one seedling was chosen. The name 'Mills Glory' was bestowed in honor of Mills College, and the parent, *Ceanothus gloriosus*. After thorough testing it proved to be amenable to both watered and dry situations.

Ceanothus 'Mills Glory' is a low, widely spreading shrub about two feet in the center, and spreading in all directions for eight feet or more. Foliage is holly-like, dark green with a waxy texture, closely resembling *C. purpureus*. Flowering is during March, preceded by bud expansion when the tight, spherical, grayish buds show bits of intense violet-blue as the petals begin to emerge. These expand into rounded, short-stalked clusters of violet-blue blossoms freely borne on long, arching, flexible branches. Plants are in full flower by mid-March and may continue to be colorful until late April. Eventually my plant filled a space twelve feet square at

the juncture of the split-rail fence and a pergola. Some of the long branches poked through the fence, and these, receiving full sun, always flowered a week or more ahead of the main plant. Propagation of *Ceanothus* 'Mills Glory' is by cuttings of which 75 per cent are reported to root. It may also be grown from seed, although the characteristics of both parents as well as those of the hybrid may appear in the progeny.

It is tragic that many of our native California plants are threatened with extinction, and for this reason, horticulturists of the coming generation may not have at hand all species with which to produce new ornamentals. Native plants threatened with extinction should be in arboretums or botanic gardens, and information about them recorded and catalogued for easy reference. The recently organized California Native Plant Society is dedicated to the preservation of wild plants, and eventually from their activities will come further knowledge of their distribution, as well as their value in landscaping. Only through sympathetic consideration and thorough investigation can these garden-worthy wild plants become part of the horticultural scheme.

Excerpt From Peter J. Van Melle

On Gardening with the Seasons in mind (talk 1952)

I think in these Northern parts of the country, garden effects are timed too exclusively for the spring—that is, for floral effects. If we are to favor any one season, I suggest that the autumn would be the logical one. But even then charitable provision should be made for the poorer seasons: for comfort and restfulness in summer, and for beauty in the winter scene. Spring will take care of itself—let us provide, rather, for summer, autumn, and winter.

The American Horticultural Film Festival— After Five Years

R. J. SEIBERT

In 1964 The American Horticultural Film Festival was organized by The American Horticultural Society. The objective was to select and present for showing to the horticultural public, the outstanding new horticultural films being produced in this country and abroad.

So as to assure that high quality films were submitted for selection, certain minimum standards were required. In addition to opening eligibility only to horticultural films which are educational and instructional in scope, it was necessary that the films be 16mm, with optical sound track (24 frames per second) and in color. The presence of any obvious promotion or advertising of commercial products or services was sufficient grounds upon which to bar any film from qualifying for an award, or from being chosen to be shown.

An entry fee of \$25. for each film (\$15. for members of AHS) has further assured quality entrants, as well as furnishing the necessary funds for producing the AHS Award of Merit Certificates accorded those films selected for showing to the registrants of the annual American Horticultural Congress.

A deadline date of approximately one month prior to the Horticultural Film Festival showings has been mandatory to assure time for previewing, selecting, and preparing the program of the films to be presented. This time has also been required to have the certificates prepared for presentation at the President's Banquet in conjunction with each American Horticultural Congress.

At its 19th American Horticultural

Congress in 1964, held in New York City, AHS presented the First American Horticultural Film Festival consisting of eight films (see page 32).

The 20th Congress was held at Callaway Gardens at Pine Mountain, Georgia in 1965, during which time three films were shown. During this Second Film Festival the magnificent film, "This Garden England," was presented as a special feature for the Congress. This film was sponsored by International Minerals & Chemicals Corp., Administrative Center, Old Orchard Road, Skokie, Illinois.

During 1966 the AHS 21st Congress met in conjunction with the XVII International Horticultural Congress held at the University of Maryland, College Park, Maryland. It was decided on this occasion to organize the Third Horticultural Film Festival as the 1966 International Horticultural Film Festival¹ and to encourage entrants from other countries. A total of eight films was selected for showing. In addition, the film, "This Garden England," was shown to Congress registrants on two occasions by popular request as a "film festival supplement."

The Fourth Horticultural Film Festival was held in Cleveland, Ohio, during the 22nd American Horticultural Congress and was made up of six films for 1967.

San Francisco became the 1968 site of the Fifth Horticultural Film Festival and saw six films presented during the 23rd American Horticultural Congress.

Several problems are in evidence, not the least of which is knowing where to draw the line on the matter of advertis-

Director of Longwood Gardens, Kennett Square, Pennsylvania 19348; Chairman of the Society's Annual American Horticultural Film Festival Committee, 1964-1968.

¹Proceedings of the XVII International Horticultural Congress. Vol. II: lxxlv, 1967.

ing of commercial products and services. The educational horticultural film done in best taste completely eliminates all evidence of the presence of name brand products within the body of the film. Needless to say, the credits as a part of the opening and closing of the film clearly state who sponsors and produces the film, and so they should. The matter of obvious, repeated inclusion of name brand products and services is one which frequently provokes considerable objection on the part of the viewing public. It is therefore suggested that producers and sponsors of such horticultural films eliminate what our viewers term "sneaky

advertising" and confine their promotion to the title section at the beginning and/or end of the films.

Our experience thus far has indicated that the quality of horticultural films as an educational tool still has much room for improvement, but that the potential is unlimited, especially for use on color TV programs, in the classroom, and for the group and organizational audience.

Those who are interested in arranging showings of the award-winning films should write to the films' sponsors regarding their availability, identifying themselves as members of the American Horticultural Society.

THE AMERICAN HORTICULTURAL FILM FESTIVAL

Winners of Awards—1964-1968

1964

"Budget Flower Arrangement"

Sponsor: Department of Floriculture and Ornamental Horticulture
New York State College of Agriculture
Cornell University
Ithaca, New York

"The Easier Way"

Sponsor: Elanco Products Company
640 South Alabama
Indianapolis, Indiana

"European Spring Garden Tour"

Sponsor: Jean Berke Travel Service, Inc.
40 E. 49th Street
New York, New York 10017

"The Gardens of Winterthur"

Sponsor: Winterthur Museum
Winterthur, Delaware

"Magic Carpet of Tulip Land"

Sponsor: Netherlands Flower-Bulb Institute, Inc.
29 Broadway,
New York, New York

"Safe Use of Pesticides"

Sponsor: U. S. Department of Agriculture
Motion Picture Service
Washington, D. C. 20250

"Trees and Their Care"

Sponsor: International Shade Tree Conference
1827 Neil Avenue
Columbus, Ohio 43210

"Waterlilies At Longwood Gardens"

Sponsor: Longwood Gardens
Kennett Square, Pennsylvania 19348

1965

"Arranging Flowers in Your Home"

Sponsor: New York State College of Agriculture
Department of Floriculture
Cornell University
Ithaca, New York 14850

"Colonial Naturalist"

Sponsor: Colonial Williamsburg, Inc.
Williamsburg, Virginia 23185

"Learning About Gardening"

Sponsor: Chicago Horticultural Society
116 South Michigan Avenue
Chicago, Illinois 60603

1966

"And So It Grows"

Sponsor: Mississippi State University
Public Information Division
State College, Mississippi 39762

"Black Bean Aphid"

Sponsor: Ministry of Agriculture and Fisheries
Ic Van den Boschstraat 4
The Hague, Netherlands

"Greenbelt-USA"

Sponsor: Red Cedar Shingle and Handsplit Shake Bureau
5510 White Building
Seattle, Washington 98101

"Life in the Balance"

Sponsor: Standard Oil Company (New Jersey)
Public Relations Department
Room 1612, 30 Rockefeller Plaza
New York, New York 10020

"The Living Gardens of Longwood"

Sponsor: Longwood Foundation, Inc.
Longwood Gardens
Kennett Square, Pennsylvania 19348

"Mechanical Harvesting of Fruits and Vegetables in California"

Sponsor: University of California
Department of Agricultural Engineering
Davis, California 95616

"Pruning Practices at the Brooklyn Botanic Garden"

Sponsor: Women's Auxiliary of the Brooklyn Botanic Garden
1000 Washington Avenue
Brooklyn, New York 11225

"Water in Biology"

Sponsor: Unilever, Ltd.
Lever Brothers Company
390 Park Avenue
New York, New York 10022

1967

"The Belgian Begonia"

Sponsor: Belgian Growers Association
101 Park Avenue
New York, New York 10017

"Fruits for the North"

Sponsor: University of Minnesota
Department of Horticultural Science
St. Paul, Minnesota 55101

"Gardens by the Sea"

Sponsor: City of Norfolk
248 N. Blake Road
Norfolk, Virginia 23505

"New Guidelines for the Well Landscaped Home"

Sponsor: American Association of Nurserymen
835 Southern Building
Washington, D. C. 20004

"The Seasons of Old Westbury Gardens"

Sponsor: Old Westbury Gardens
Box 265
Old Westbury, L. I., New York 11568

1968

"And On the Third Day"

Sponsor: National Council of State Garden Clubs
St. Louis, Missouri 63110

"The Annual Miracle"

Sponsor: Pan-American Seed Company and Jiffy-Pot Company of America
P. O. Box 438
West Chicago, Illinois 60185

"Community Action for Beauty"

Sponsor: National Council of State Garden Clubs
4401 Magnolia Avenue
St. Louis, Missouri 63110

"The National Arboretum"

Sponsor: U. S. Department of Agriculture
Agricultural Research Service
Office of Information
Washington, D. C. 20250

"The Lawns of America"

Sponsor: National Council of State Garden Clubs
4401 Magnolia Avenue
St. Louis, Missouri 63110

"She Planteth a Vineyard"

Sponsor: National Council of State Garden Clubs
4401 Magnolia Avenue
St. Louis, Missouri 63110

1969

All-America Selections

Aimed at "inspiring the gospel of better gardening," the All-America Selections have brought to the gardening public the world's leading new introductions in vegetable and flower seeds annually for some 37 years.

All-America Selections result from open trial-grounds competition in Canada, the United States, and Mexico. The AAS program is the only authentic pre-introductory testing and comparative rating of new flower and vegetable seed varieties for North America. Entries come from private, commercial, and public institution plant breeders from around the free world.

Sponsored by the garden seed industry, AAS is a non-profit, educational institution. One hundred judges serve in 54 trial grounds and 46 flower demonstration gardens located throughout North America. It is estimated that some 1,000 people are involved in various phases of the annual selections.

AAS is the one generally accepted authority on new garden varieties. Presented here are some of the 1969 All-America Selections which the editors believe will be of special interest to Society members.

For complete information, write to Mr. W. Ray Hastings, Executive Secretary, All-America Selections, P.O. Box 1341, Harrisburg, Pennsylvania 17105.



**Left—High quality, semi-vining Buttercup-type Winter Squash 'Kindred'.
Right—Big heading Hybrid Cabbage 'Harvester Queen'.**



(Above): Upper left—Hybrid Turnip 'Tokyo Cross' for fastest growth. Upper right—Gold Medal for the best Hybrid Broccoli 'Green Comet'. Lower left—earliest of all Hybrid Cauliflower 'Snow King'. Lower right—Early, small Silver Medal Hybrid Cabbage 'Stonehead'. Finest home garden quality vegetables to date.



Top left—Giant Rose Cactus Flowered Hybrid Zinnia 'Rosy Future'. Bottom left—Fiery Orange Giant Hybrid Zinnia 'Torch'. Top right—Dwarf Pure White Double Cornflower 'Snow Ball'. Middle Right—White with bright red eye creeping Periwinkle, *Vinca rosea procumbens* 'Polka Dot'. Bottom right—Highest Awarded 1969 Flower, 15-inch Bushy Zinnia 'Cherry Buttons' gets the Silver Medal, a beautiful performer.

Advances in Horticulture

Cornell Peat-Lite Mixes for Commercial Plant Growing

JAMES W. BOODLEY AND RAYMOND
SHELDRAKE, JR.

(From *Cornell Extension Bull. 1104*.
1967. *New York State College of Ag-
riculture, Ithaca, New York*)

Artificial soils offer the home gardener a convenient means of starting flower and vegetable seedlings, rooting cuttings, forcing bulbs, and growing other flowering plants. Many bedding plant growers and florists are turning to artificial soils as an aid in mechanizing their production. English workers have published detailed directions for modifying and standardizing existing soils for special purposes. In the United States, the UC Mix is widely used by West Coast growers. Similarly, the peat-lite mixtures developed by Boodley and Sheldrake have general acceptance.

The authors point out: "Good top soil is increasingly difficult to find. Its nutrient content, drainage characteristics, and disease organism or weed seed content are often difficult to determine. Unless top soil is sterilized, poor crop growth may result from its use.

"Artificial soils, on the other hand, offer the grower several advantages. Two basic artificial soil mixes, referred to as peat-lite mixes, have been evolved from several years of research at Cornell. Basically composed of sphagnum peat moss and horticultural vermiculite or perlite, peat-lite mixes are readily available, easy to handle, and produce uniform plant growth from one year to another. Sterilization of peat-lite mixes is usually unnecessary provided reasonable care is taken during mixing and handling. Nutrients are added according to formulae for controlled nutrition of crops from plant-

ing to selling. The cost of peat-lite mixes compares favorably with the cost of good top soil.

"Primarily investigated as a medium for starting flower and vegetable transplants, the versatility of the mixes has enabled growers to utilize them in other areas where controlled plant growth is desired."

As the name implies, peat-lite mixtures are composed of medium to fine, horticultural type, imported sphagnum peat moss, and expanded vermiculite or perlite. Azaleas and other seeds germinate and grow well in sphagnum alone, provided suitable nutrients are applied. Mixing shredded sphagnum with expanded vermiculite or perlite makes it somewhat more versatile and also easier to handle.

Vermiculite is classed as a hydrated magnesium aluminum silicate. The ore as mined is laminated—has many compressed plates—that expand when it is heated so that it weighs only 4 to 10 pounds per cubic foot. Horticultural grades of expanded vermiculite are



PHOTO FROM H. M. CATHEY

Fig. 1. Marigold 'Yellow Nuggets' grown in composted soil (left) and peat-lite (right). Liquid feeding was applied to both plants.

Departments of Floriculture and Ornamental Horticulture and Vegetable Crops, respectively, Cornell University, Ithaca, New York 14850.

available at garden supply houses. Avoid the grades recommended for insulation—they may have an additive or be of unsuitable quality for plants.

Perlite is a volcanic rock that is somewhat more stable than vermiculite. Both products are neutral or slightly alkaline in reaction and require addition of lime and phosphorus as well as other nutrients to provide for good growth. (Figure 1)

The authors recommend the following amounts of ingredients for preparation of 2 bushels of peat-lite:

- Shredded sphagnum peat moss—1 bushel
- Horticultural vermiculite #2, 3, or 4—1 bushel
- Ground limestone—10 level tablespoons
- Superphosphate, 20% powdered—5 tablespoons
- 5-10-5 fertilizer—15 tablespoons
- Iron (chelated, such as NaFe 138 or 330—1 level teaspoon
- Nonionic surfactant—1 level teaspoon in 1 gallon of water (wetting agent)

The ingredients need to be thoroughly mixed. The authors advise that for seed sowing only, ammonium nitrate may be substituted for (not added to) the 5-10-5 fertilizer. Use it at 4 level tablespoonsful per 2 bushels of mix. Make sure that seed flats and transplants are kept adequately watered at all times.

The mixes can be stored indefinitely in plastic sacks or cans. Details of use are discussed by the authors in Bulletin

1104, which is free to residents of New York State; additional copies are 10 cents each. Home gardeners should keep watch on commercial developments with artificial soils. New products and procedures will make gardening easier and more rewarding (Fig. 2).

New African Violets from Colchicine-treated Cuttings

TORU ARISUMI AND L. C. FRAZIER

Adapted from an article on Cytological and Morphological Evidence for the Single-Cell Origin of Vegetatively Propagated Shoots in Thirteen Species of Saintpaulia Treated with Colchicine. From Proceedings of the American Society for Horticultural Science 93: In press, 1968

The familiar African violet, (*Saintpaulia ionantha* and hybrids) growing in countless thousands of homes around the world, will be improved in years to come, thanks to treatment with a drug, colchicine. The effect of the medicine (colchicine is an old treatment for gout, and physicians still prescribe it for some forms of arthritis) is to double the chromosomes in the violet plant cells. The resulting plants are termed polyploid, in this instance, tetraploid.

The method of application of the colchicine is simple. Arisumi and Frazier immersed $\frac{1}{4}$ inch of the cut ends of the petioles of leaf cuttings in a water solution of 0.2% colchicine for 2 hours. Then they rinsed the cuttings in water and set them in perlite to root. The authors obtained their best results when the cuttings were allowed to callus in the perlite for 6 days before treating with colchicine. The cuttings were rooted and grown in a greenhouse maintained at 65° to 75°F. and shaded to allow a maximum of 1,000 foot candles of light.

Growth of each new plantlet is from a single cell of the petiole of the cutting. It is not surprising, therefore, that the



PHOTO FROM BOOBLEY AND SHELLRAKE

Fig. 2. "Jiffy strips," peat-lite mix, and melon plants two weeks after sowing.

Crops Research Division, U.S. Department of Agriculture, Beltsville, Maryland 20705.



Fig. 3. *Saintpaulia* cultivar 'Nature Boy'. Left, normal diploid. Right, tetraploid.

colchicine did not affect all of the plantlets that emerged from the treated leaves. The drug causes some "shock," delayed growth, thickened leaves and stems, and changes in leaf shape. They are the indicators of polyploidy. Normal, unaffected plantlets must be removed to promote the development of the affected shoots.

At maturity the affected plants have thicker leaves, flower buds, and petals than the controls. The leaves are often broader and the lobes accentuated (Fig. 3). Unfortunately, the leaves tend to be somewhat brittle. The flowers of the colchicine-affected plants are also larger and have deeper colors than the controls. The authors found that the

stomates of the leaves and the pollen grains of the flowers were larger in the tetraploid plants than in the normal diploid ones. Chromosome counts of the root tips of affected plants further confirmed their tetraploid condition.

Horticultural plant breeders have produced tetraploid lilies, snapdragons, marigolds, carnations, poinsettias, and azaleas. The *Saintpaulia*, too, belongs in the list of these select plants. In time we can expect many improved African violet cultivars, products of breeding and selection at the tetraploid level. Many plantmen who would like to experiment on their own are hampered at present by the scarcity of colchicine, said to be another of the war's casualties.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

(Act of October 23, 1962; Section 4369, Title 39, United States Code)

1. Date of filing: March 21, 1969
2. Title of publication: AMERICAN HORTICULTURAL MAGAZINE.
3. Frequency of issue: Quarterly.
4. Location of known office of publication: 2401 Calvert St., N.W., Washington, D. C. 20008
5. Location of headquarters or general business offices of the publishers: 2401 Calvert St., N.W., Washington, D. C. 20008
6. Names and addresses of publisher, editor, and managing editor:
 Publisher: American Horticultural Society, Inc., 2401 Calvert St., N.W., Washington, D. C. 20008.
 Editor: Elizabeth G. Eastburn, 2401 Calvert St., N.W., Washington, D. C. 20008.
 Managing Editor: Elizabeth G. Eastburn, 2401 Calvert St., N.W., Washington, D. C. 20008.
7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.): American Horticultural Society, 2401 Calvert St., N.W., Washington, D. C. 20008.
8. Known bondholders, mortgagees, and other secu-

rity holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None.

9. For completion by nonprofit organizations authorized to mail at special rates (Section 132.122, Postal Manual)

The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes have not changed during preceding 12 months.

10. Extent and nature of circulation:

A. Total no. copies printed (Net Press Run)	6,440*	5,200**
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and counter sales	0*	0**
2. Mail subscriptions	4,603*	4,735**
C. Total paid circulation	4,603*	4,735**
D. Free distribution (including samples) by mail, carrier or other means	0*	0**
E. Total distribution (Sum of C and D)	4,603*	4,735**
F. Office use, left-over, unaccounted, spoiled after printing	1,837*	465**
G. Total (Sum of E & F—should equal net press run shown in A)	6,440*	5,200**

*Average no. copies each issue during preceding 12 months.

**Single issue nearest to filing date.

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JANE PAGAN for MRS. ELIZABETH EASTBURN
Executive Director & Editor

Gardeners' Notebook

LOOKING FOR THE LOST FRANKLINIA

In their travels about Georgia, the Bartrams, father John and son William, were both partial to the Altamaha River. This is a beautiful black water rising from the old Indian town of Altama, where the Oconee and the Ocmulgee meet to form the main river. Rising swiftly between wooded banks, its course is slowed between the cypress swamps, until it flows placidly on toward the sea.

William Bartram wrote, "How gently flow thy peaceful floods, O Alatomaha! (*sic*). How sublimely rise to new, on thy elevated shores, yon magnolia groves, from whose tops the surrounding expanse is perfumed by clouds of incense, blended with the exhaling balm of the liquidambar, and odors rising from aromatic groves of *Illicium*, *Myrica*, *Laurus* (*Persea*), and *Bignonia*."

Both the Bartrams were botanists, and through their explorations has come the Altamaha's chief claim to fame, the lost *Franklinia* that once grew near its shores. John Bartram first discovered this in 1765 and wrote in his journal, "On drawing near the fort (Barrington), I was greatly delighted at the appearance of two new beautiful shrubs in all their blooming graces. One of them appeared to be a new species of *Gordonia*, but the flowers are larger, and more fragrant than those of the *Gordonia lasianthus*, and are sessile; the seed vessel is also very different."

He described the situation: "The soil was very sandy near the surface, and the timber poor for about a mile from the lowland, which is often overflowed with the river."

Later he wrote, "On first observing the fructification and habit of this tree, I was inclined to believe it a species of *Gordonia*, but upon stricter examination, and comparing its flowers and fruit with those of the *Gordonia lasianthus*, I

found striking characteristics abundantly sufficient to establish it as the head of a new tribe; which we have honored with the name of the illustrious Dr. Benjamin Franklin: *Franklinia alatomaha*.

Plants were taken back and planted in the Bartram Botanical Garden at Philadelphia, whence have come the *Franklinias* in cultivation.

William Bartram again saw the *Franklinia* in the wild in 1773, and wrote of it, "it is a flowering tree, of the first order for beauty and fragrance of blossoms." He goes on to explain the intricate structure of blossom and seeds, and concludes, "We never saw it grow in any other place, nor have I ever seen it growing wild, in all my travels, which must be allowed a very singular and unaccountable circumstance; at this place there are two or three acres of ground where it grows plentifully."

In 1790, a cousin of William Bartram, named Moses Marshall, also saw the *Franklinia* growing in apparent abun-



PHOTO MARIE B. MELLINGER

The Altamaha River at Fort Barrington, Georgia where John Bartram first discovered *Franklinia* in 1765.

dance in its limited range; after that there is a time lapse until 1929, when G. S. Schultze of the U.S. Department of Agriculture supposedly again saw the *Franklinia* in the wild.

Many eminent botanists, including J. K. Small, and Dr. Roland Harper, have searched in vain for the *Franklinia*. The late Walter Harmer had a theory that the *Franklinia* was not a true species, but a sport, or clone, but it will produce viable seeds, as evidenced by trees growing in botanical gardens. *Franklinia* trees, advertised in nursery catalogs thrive with varying success. It seems to do better in the gardens of Washington, D.C. or Philadelphia than in its native south, for residents of Brunswick and Savannah have difficulty getting it to blossom.

Part of the mystery surrounding the *Franklinia* was its apparently limited habitat. Why would it be found in only one isolated locale, when other swamps and woodlands all through south Georgia were very similar? Have the searchers been looking in the wrong place? Some historians place Bartram's route to Fort Barrington along the little Altamaha, rather than the main river. One statement of his travels tells of going up the "northeast side of the Altamaha River and crossing on a ferry near the fort."



PHOTO BROOKE MEANLEY

Franklinia alatamaha, the Franklin tree, in cultivation.

William Bartram went up the Altamaha fifty miles by boat, and he made several overland trips from Savannah.

Perhaps finding the lost *Franklinia* isn't really too important, for one needs a goal, and searching for this beauty gives an added impetus and excitement to field trips. I have been on several such trips, with good botanists and naturalists, and every trip has been an outstanding experience. On one, we met a forester who was sure he had found a *Franklinia* seed capsule and dashed home to get it, but it proved to be the capsule from the Georgia fever-bark (*Pinckneya pubens*).

On one trip, following a suggestion that the *Franklinia* might not grow directly in the swamps but on the sloping perimeters on the adjoining sand hills, we thoroughly explored the sand ridges near Fort Barrington. We did not find the *Franklinia*, but we did find the sand *Selaginella* in exactly the same spot where Dr. Harper had discovered it during his Altamaha grit studies in 1903.

There is one place the *Franklinia* certainly is not to be found, and that is where the marker (one of the few to a flower) was placed along the highway between Jesup and Ludiwici. This marker was put up by the Long County Garden Club and dedicated in 1941. The area surrounding the marker is now a state park.

Who will find the lost *Franklinia*? Has its habitat been destroyed, and the tree along with it? Does it still blossom, hidden in some quiet backwater of an Altamaha tributary?

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CONTROL OF DODDER IN HOME GARDENS

Dodder (*Cuscuta spp.*) is a yellow, stringlike parasitic weed that infests many valuable crops including ornamentals. It is appearing with increasing frequency in home garden plantings and especially in chrysanthemums. These infestations seem to be related to the increased use of animal manures that have



PHOTOS U.S. DEPT. AGRICULTURE

Fig. 1. Chrysanthemum plant on the left is dodder-free. Center plant was infested by dodder in the mid-vegetative stage, resulting in stunting of growth and production of misshapen, small blooms. Plant on the right was infested by dodder in the early vegetative stage resulting in death before blooming.

not been fumigated or heat-sterilized.

There are many species of dodder. Most are annuals, but there also are perennial forms. Each species grows well enough on many nonspecific hosts to produce enough seed to insure survival in the absence of the principal hosts.

Dodder differs from other higher plants mainly in that it contains no chlorophyll and thus must parasitize other plants to complete its life cycle. It belongs to the morningglory family (*Convolvulaceae*). It reproduces from seed that range in size from clover seed downward among the various species. The emerging hairlike dodder seedlings must attach to a host plant in about 8 days after emergence, or die from exhaustion of food reserves.

The stems of the emerging dodder seedlings perform a circular sweeping motion that brings them in contact with host plants. The dodder tendrils twine around the host stems, petioles, and leaves and attach to them by rootlike organs, called haustoria, that penetrate the host tissues. These haustoria obtain nourishment from the host for the parasite.

The root system of dodder withers

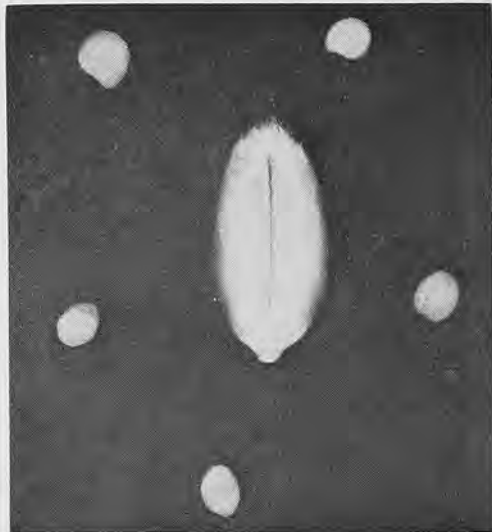


Fig. 2. Size and shape of dodder seed compared to a grain of wheat.

and disappears after attachment to the host has been achieved. The dodder plant then lives entirely as a parasite and spreads rapidly from one host plant to another by the growth and continual sweeping motion of its tendrils. The branching growth of a single dodder plant can produce 2,400 feet of stems in 4 months.

Dodder is spread by inclusion of its seed with crop seed. The seed are also spread by rain, wind, in top soil, and in soil accompanying plants in transplanting. As mentioned earlier, the most common source of new infestations in home gardens is animal manures that have not been heat-treated or fumigated. Hay infested with dodder seed is used in cattle and sheep feedlots in the West; manures from the feedlots contain viable dodder seed. Large quantities of these manures are used to enrich vegetable and ornamental garden soils throughout the United States.

Dodder can be controlled by insisting on high quality, weed-free seed, and by purchasing only fumigated or heat-treated animal manures. This will minimize introduction of dodder seed.

Where dodder seed is present in garden soils due to infestation in a previous season, fumigate the soils with methyl bromide if there are no perennial plants in the area. Methyl bromide kills exist-



PHOTO U.S. DEPT. OF AGRICULTURE

Fig. 3. Dodder in bloom on clover.

ing plants. Dodder in planted areas can often be safely controlled by treating the soil in the early spring with herbicides such as dimethyl tetrachloroterephthalate [DCPA] or isopropyl *m*-chlorocarbamate [chlorpropham] before dodder germinates. Many crops are tolerant of these herbicides and are listed on the herbicide labels. Methods and rates of application are also described on the label. These herbicides are applied before emergence and kill germinating dodder seedlings. Treatment of the soil in late March or early April is usually satisfactory in most areas. In the warm or semitropical areas, the time of treatment must be determined locally by contacting the county extension representatives.

All chemical uses described in this report should be applied in accordance with the directions on the manufacturer's label as registered under the Federal Insecticide, Fungicide, and Rodenticide Act.

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Cryptomeria japonica A Distinctive Coniferous Evergreen

In the spring of 1947, I purchased for the College of William and Mary at Williamsburg, Virginia, four specimens of *Cryptomeria japonica*, from Greenbrier Farms near Norfolk, Virginia.



PHOTOS THOMAS L. WILLIAMS

Fig. 1. *Cryptomeria*. A handsome tree from seed of 1950.



Fig. 2. *Cryptomeria*. This tree has an open, distinctive habit, with branches more or less parallel to the ground.



Fig. 3. *Cryptomeria*. From seed of Japanese origin. The plant is so weighted down with cones that it has a weeping aspect.

I have grown many seedlings and cuttings from the original trees and have given most of the propagates to individuals in Williamsburg. Several seedlings, photographed February, 1967, by Thomas L. Williams, are illustrated here.

Cryptomeria is highly variable. My judgment is that it will occupy a greater and greater place in horticultural plantings in this country. And, perhaps, because of its rapid growth in certain situations, this species will come to have real importance as a timber tree in some areas.

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THE HYBRID CHERRY 'HALLY JOLIVETTE'

An attractive flowering cherry 'Hally Jolivette' is notable for a long flowering



PHOTO ARNOLD ARBORETUM

Prunus × 'Hally Jolivette'

season. It is three-quarters Higan cherry (*Prunus subhirtella*) and one quarter Yoshino cherry (*Prunus* × *yedoensis*.) The semi-double flowers are pale pink, deeper in the center. In general aspect, the broad-topped trees resemble the Higan cherries.

Fortunately, this lovely cherry is available from a number of nurseries, so it should not be hard to obtain. It was introduced by the Arnold Arboretum of Harvard University where it was developed by Dr. Karl Sax, geneticist and past director of the Arboretum. He gave it the maiden name of his wife.

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The editors of The American Horticultural Magazine welcome similar items from the knowledge and experience of AHS members for sharing in this section.

Book Reviews

Wild Flowers of North Carolina and Surrounding Areas

William S. Justice and C. Ritchie Bell. The University of North Carolina Press, Chapel Hill. 1968. 200 pages, 400 color photographs. \$7.75.

"Wild Flowers of North Carolina" is an excellent compilation of wild flowers native not only to North Carolina, but also for the most part to the adjoining southeastern states. Concise, accurate, and informative descriptions accompany each of the full-color photographs. Although this book deals primarily with herbaceous plant materials, many woody trees, shrubs, and vines are also included.

Arranged according to families in phylogenetic order, the choice of genera and species is a good representation. For more advanced study it is coordinated with the technical key, "Guide to the Vascular Flora of the Carolina" by A. E. Radford, H. E. Ahles, and C. R. Bell. This picture book guide is handy for field study as well as for general browsing. Since increased interest in native flora coincides with our decreasing natural areas, the authors state that the purpose of this collection is "to make easier the recognition of some of these flowers and thereby to stimulate a greater interest in these beautiful resources and accent the need for its preservation."

Designed primarily for wild flower enthusiasts, this book is also helpful to plantmen and naturalists. This picture guide would be a fine supplement to anyone's collection of books on native flora.

MRS. PATRICIA COLLINS

McCall's Garden Book

Gretchen Fischer Harshbarger. Published by Simon & Schuster, Inc., 630 Fifth Avenue, New York, N.Y. 10020. 1968. 500 pages. Illustrated. \$6.95.

Planned for beginners rather than for experienced gardeners, this book is intelligently laid out and completely filled with practical, easy-to-understand information. The 500 how-to-do-it drawings and "idea" photographs convey much knowledge in graphic form, supplementing the text in a most understandable and pleasing manner. From "Climate, Key to What You Can Grow," through landscaping, lawns, groundcovers, vines, trees and shrubs, to "Gardening in

Your Own Region," the reader is made aware of correct and proven garden practices. Annuals, biennials and perennials, bulbs, roses, shade gardens, vegetables and herbs, small fruits, indoor gardening—they're all included. Also, starting and propagating, pruning, disease and pests, rock gardens, container gardening, and even a comprehensive piece on "How to Pick, Condition and Preserve Flowers." The book contains a tremendous amount of information on all these subjects.

Dr. Robert Scherv contributed material on lawns, soils and plant foods; Dr. Cynthia Westcott provided valuable and up-to-date information on diseases, pests and their control; and a host of experts, including Fred C. Galle for the "Upper South," gave liberally of their practical knowledge of regional gardening. Of particular value in planning a year-round garden, this guide covers nine climatic regions in detail, with charts of what-blooms-when for all-season beauty.

If a beginning gardener were limited to one book, this should be it; a better choice would be difficult to find.

FRANK E. SOSEBEE

Science for Better Living

The Yearbook of Agriculture 1968. United States Dept. of Agriculture. Published by the U.S. Government Printing Office, Washington, D. C. 20402. 386 pages. Illustrated. \$3.00. (Library).

This 1968 Yearbook of Agriculture is the latest in the series begun in 1936 to report to the public in an informative manner the research of the U.S.D.A. and its cooperative work with the Agricultural Experiment Stations of the several states. The emphasis in this yearbook is on the results and rather direct influence of agricultural research on the general population of the country. The book is made up of many short articles on such topics as a discussion of ways to more efficient and economical farm production, methods of use and conservation of our natural resources, the influence of modern methods of marketing agricultural products, and ways of helping smaller nations and world trade. The influence of agricultural research on better living is illustrated by articles on better plants and animals, improved fabrics, more nutritious foods, and methods of disease and insect control.

CONRAD B. LINK

America's Great Private Gardens

Stanley Schuler. The Macmillan Co., 866 Third Ave., New York, N.Y. 10022. 1967. 219 pages. Illustrated. \$17.50 (Library).

The author has chosen 36 private gardens from all sections of the United States including Hawaii which illustrate a wide range of types. Although most appear to be relatively large, there are included some smaller gardens, and at least one small, city garden. Good examples of formal and informal design, both traditional and contemporary, may be seen. Each garden is well illustrated with large clear photographs, some in color, and a brief description. The text emphasizes soil and climatic factors as they have influenced the design and selection of plant materials.

I found the photographs the most valuable feature of the book since they illustrate many interesting uses of plant materials, water, paving and other elements of landscape design.

ROBERT L. BAKER

Gardening from the Ground Up

Stanley Schuler. The Macmillan Co., 866 Third Ave., New York, N.Y. 10022. 1968. 308 pages. Illustrated. \$6.95 (Library).

This book is designed to help the beginning gardener, first in the design and layout of the landscape around the home, and then with suggestions and help on general gardening practices. The text is written in non-technical language that is easily understood. For example, in discussing soils, fertilizers and pest control materials the commonly accepted names are used and a brief description of their chemical content, use, and limitations are given.

Specialized chapters are devoted to topics such as lawns, bulbs, vegetables, fruits, trees and shrubs, with general practices and culture to be followed in growing such plants. Summary lists of plants with tabulated cultural information are included where it is appropriate.

While experienced gardeners might not completely agree with certain recommendations, there are often several ways of doing gardening, so the book will well serve the less experienced gardener as a general reference.

CONRAD B. LINK

Easy Gardening With Drought-Resistant Plants

Arno and Irene Nehrling. Hearthsides Press, Inc., 381 Park Avenue South, New York, N. Y. 10016. 1968. 325 pages. Illustrated. \$6.95. (Library).

This is a very useful book. The recent severe droughts in the east coupled with a growing shortage of water in many localities make it a useful addition to any gardener's library. Full of up-to-date information on how to garden under

low moisture conditions with minimum maintenance and expense, the book has been written to solve these basic problems: soil preparation and improvement, selection and care of drought-resistant plants—from ground covers to trees—and the most effective and efficient use of water by the home gardener. In doing this the authors develop a strong case for dry gardening, not only as a means of coping with water shortage but also as a satisfying, time-saving method for people with busy schedules. Gardening and busy people aren't always compatible, but this book shows how they can be by solving the problem in numerous delightful ways.

This is also an attractive book, full of illustrations that genuinely supplement and embellish the text. The authors have made use of the latest authoritative knowledge and practice throughout the country and have presented it in a clear, concise way that is appealing and useful to both amateur and professional.

Perhaps the book's chief value is that for the first time a subject of increasing importance has been well handled in a single handy volume. Some single pieces of information may seem familiar but they take on added, new significance in the hands of these authors.

ROBERT C. RINKER

Fruits for the Home Garden

Ken and Pat Kraft. Published by William Morrow and Company, Inc., 425 Park Ave. South, New York, N. Y. 10016. 1968. 287 pages. Illustrated. \$6.95. (Library).

"And we think fruit trees also have feelings, and tempers, and they do better for people who appreciate them." On this keynote two obviously accomplished gardeners have written a most useful book for the back yard fruit grower. Written in an often humorous, always refreshing style this book is at the same time a reference, a how-to-do-it and a brief but in-depth story of the fruit world, with special emphasis on the dwarf fruit tree. It includes a liberal sprinkling of good sketches showing detail and techniques, and color photographs of the finest professional quality to match the lure of any nursery catalog.

The early chapters of the book introduce the reader to the dwarf fruit tree, to well written details of planting, culture, and pest control with modern pesticides. Excellent detail on pruning is included, together with a section on espaliers and how to create them. In covering the range of deciduous fruits, the book provides brief information on history, culture, cultivars, and problems of all important deciduous tree fruits, berry fruits, grapes and nuts. Citrus and other sub-tropical fruits, such as the fig are not included.

The technical detail on fruit trees is well organized and presented. The focus on the dwarf apple trees falls short in making but a single casual reference to the Malling-Merton

rootstocks which in the United States and Europe now occupy an ever more dominant position in projections of all tree nurseries. Too much emphasis is given to the dwarf interstock technique used by a single nursery. Cultivar listing for tree fruits are skewed too much to the offerings of this same nursery. There are many other excellent nurseries in the United States offering cultivars or strains of merit, often exclusively, and the reader would be well advised to consult local experts for cultivar advice before buying. In dealing with problems of the pear, the book fails to emphasize sufficiently the importance of the bacterial disease, fireblight, a disease which has imposed severe limitations on pear production east of the Rockies for more than 150 years.

An unusual closing section of the book deals with some interesting stories on sharing fruit from the home garden. Entitled "Sharing the Bounty-Beautifully," this short chapter has the woman's touch and a good one.

Well written and well illustrated, this book will be a useful addition to the library of home gardeners throughout the United States.

ARTHUR H. THOMPSON

Roots: Miracles Below

Charles Morrow Wilson, Doubleday and Company, Garden City, New York, 1968. 234 pages. \$5.95. (Library).

The author has blended the technical facts of root growth and development with the story of scientific studies on plants, their roots and the environment in which they grow. To this he has added the history and folklore of roots to make a most interesting book. This story of roots becomes the story of plant growth. The use of roots for food. The role of the root in plant growth and the soil conditions under which roots will grow their best. The inter-relation of the root and the soil microorganisms. These are examples of the topics that are covered. This book is not intended as a text nor as a reference but to give the general reader a greater appreciation of roots. For those wishing additional information a bibliography is provided.

CONRAD B. LINK

The Gardens of Winterthur In All Seasons

Harold Bruce, The Viking Press, 625 Madison Ave., New York, N.Y. 10022. 1968. 196 pages. Illustrated. \$12.95. (Library).

This is truly an elegant volume, devoted to one of America's great gardens. The large format, fine paper and typography, and superb

photographs reflect the high level of quality characteristic of other Winterthur publications.

The gardens at Winterthur, near Wilmington, Delaware, were developed during a period of over fifty years by Henry Francis duPont, Mr. duPont, while building up his incomparable collections of early American decorative arts, also collected rare plants through his association with such plantmen as C. S. Sargent and E. H. Wilson. The history of the gardens is told in a chapter by Gordon Tyrrell, the present director.

The main body of the book describes the gardens of Winterthur through the seasons. The text by Harold Bruce includes valuable observations on the performance of plants at Winterthur, notes on their culture, and descriptions of the careful planning which has gone into the creation of the garden. The photographs, many in color, are remarkable for their clarity and indicate the diversity of plant materials and landscape effects at Winterthur. It is good to see some of the lesser-known plant materials illustrated and described and to see how they may be used successfully in landscape. For example, plants such as *Styrax obassia*, *Lobelia cardinalis*, the fothergillas, and fall-flowering crocuses are fine garden plants but unfortunately are not readily available to the public. Although noted primarily for their spring display, the gardens are also open to the public in the autumn, and the section on this season should provide many good ideas for development of autumn interest through foliage, flowers, and fruit.

ROBERT L. BAKER

Trees for Architecture and the Landscape

Robert L. Zion, Reinhold Book Corporation, 430 Park Ave., New York, N. Y. 10022. 1968. 284 pages. Illustrated. \$25.00.

Good references are available on the identification, culture and selection of trees for specific uses and situations. However, this may well be the first book on trees which has been written by a landscape architect for the members of his profession, for architects, and for those who are primarily concerned with trees from a design standpoint. Certainly this is the most ambitious and in many ways the most readable production of its kind.

The author is a partner of Zion and Breen Associates, and much in this book derives from the design and planning experiences of this firm whose interests have centered, chiefly, in site development projects of the northeastern states.

Subject matter is divided into four parts. Part I is pictorial and consists of full-page, black and white habit illustrations of some 36 well known trees, showing the same specimen of each with and without summer foliage. There are additional page-size portraits of evergreen trees and 12 illustrations in color. The photography throughout is excellent. Part II, also well illus-

trated, provides a discussion of the tree as a living organism and of the problem of its purchase, handling, training, and maintenance. Part III, Design Data, supplies a variety of information on height, spread, texture, hardiness, etc., for the specific trees and tree groups of Part I (illustrations of notable characters and balled nursery specimens are especially good), while Part IV (67 pages of fine type) is devoted to listings of recommended trees for every state excepting Alaska and Hawaii. The various genera, species, or forms of this Part are arranged within some 36 character or use categories, and may represent the most comprehensive assemblage of its kind ever attempted.

In a book which contains so much good information it is unfortunate that a few statements were not better checked. In one so well presented, it is also a pity that many typographic errors were allowed to creep in. A plant physiologist, we are afraid, may experience some difficulty with such statements as: "The leaf traps the sunlight and then by means of chlorophyll manufactures food from the minerals absorbed by the roots"; or, again, "Since the minerals of the soil can be used by the roots only in the form of vapor, it is essential that the moisture be deep in the soil . . . so that it will be absorbed as it rises, laden with mineral particles." A morphologist might similarly question: "The leaf also contains tiny breathing pores or *lenticels* [sic] that evaporate moisture . . ." And a taxonomist may find diverse frustrations among a number of misspelled botanical names; and generic names in lower case (such as *prunus cerasus*, *salix nigra*, etc.), or missing genus names (as *Camaldulensis rostrata* instead of *Eucalyptus camaldulensis rostrata*), or with clonal names set off in double rather than single quotes. He may be intrigued by the use of a disease name as if it were the scientific name of a pathogen (see frontispiece). Perhaps the proofreading gem is the one that occurs in this statement. "The symbol 'pH' is used to indicate the hydrogen iron concentration of the soil."

In dealing with the many kinds of trees, it was perhaps inevitable that a few long-standing misconceptions would persist. For instance, description of the "variety" *Platanus orientalis* as of "much greater size" than the hybrid *P. × acerifolia* is an echo of name confusions which have persisted for a long time. To credit red and sugar maples with spectacular or even showy fall foliage color, without suggesting sources or varieties, is akin to implying that all Romans had Roman noses. So many planted specimens of both species have never yet been, and need never be, expected to produce fall colors more exciting than a dirty greenish yellow. But there are pitfalls of many kinds in this problem area of tree selection. Honey locust may have the many merits ascribed to it, but we find no warning that it should be by-passed, completely, where mimosa webworm is rampant. No homeowner can cope with the control problem. Fortunately, the author suggests that tree selections be

checked with local professionals. This is sound advice.

The more there is in a book, the more a reviewer can find to criticize. In this case, however, such criticism should not be taken too seriously. This book is well done, and it will fill a long-standing need, particularly in the design profession. It will find a place in most horticultural libraries, for it contains much of instructive interest for all who are concerned with these items which comprise the main structural and decorative elements of our gardens and of our landscapes.

HENRY T. SKINNER

The Folk-Lore of Plants

T. F. Thiselton-Dyer. Singing Tree Press, Detroit, Mich. 1968. 328 pages. \$11.00. (Library).

This 1968 reprint of a book originally published in London in 1889 is a compilation of the folklore and practices involving plants. These have been collected from all parts of the world and represent various cultures. The author has divided the book into 23 chapters, with titles such as Plant Worship, Plants in Witchcraft, Love-Charms, Plant Proverbs, Plant Superstitions, Plants in Folk-Medicine, and Mystic Plants. For the person interested in this phase of plant lore, this book will serve as a reference. In many cases the author cites his source of information with perhaps notes suggesting other areas of study. It is not a horticultural book.

CONRAD B. LINK

Irish Gardens

Edward Hyams. The Macmillan Company, 866 Third Ave., N. Y. 1967. 160 pages. Illustrated. \$17.50. (Library).

To those who have never visited Ireland, it may come as a surprise to learn how many plants native to Australia, New Zealand, and other warm regions may be grown in Ireland. In this book, Edward Hyams describes 13 great gardens of Ireland representing a variety of styles and a great wealth of interesting plant materials.

Unfortunately the book is not in the same class as the gardens it describes. It is not clear to me for what audience it is intended. The author writes in a highly subjective and casual style and although many plants and landscape effects are noted, little really useful information is given. As a picture book far too many photographs are out of focus and have useless captions. In addition, the book is too bulky and heavy for comfortable use. Large print, wide margins and fuzzy photographs could have been eliminated in favor of a more easily handled volume.

ROBERT L. BAKER

March 24, 1969

THE AZALEA BOOK

Second Edition

by FREDERIC P. LEE



This handsome book tells everything there is to know about azaleas, incorporating the most recent developments in cultural practices, the latest methods of treating diseases and pests, and the best of the new imported and domestic azalea varieties.

Here is botanical and historical information of immense interest to the scientific expert as well as complete know-how for enthusiastic amateurs on selecting, planting, fertilizing, and pruning azaleas—whether they be evergreen or deciduous, 6-inch dwarf or 10-foot giant.

The vast knowledge of plant explorers, government specialists, and foreign collectors is embodied in this authoritative book. Sponsored by the American Horticultural Society and successor to its Azalea Handbook, this volume reflects world experience with azaleas, and also contains the considerable practical knowledge of Frederic Lee, who himself continually tests some 500 azalea plants in his Maryland garden.

Part I is a complete garden guide, with information on planting and care, hardiness, companion plants, propagation, indoor culture, and directions for bonsai plants. In addition, plant hardiness has been keyed to the new Plant Hardiness Zone Map of the

United States Department of Agriculture.

Part II thoroughly covers basic horticultural—plant structure, growth factors, soils and nutrition, with step-by-step procedures for hybridizing.

Part III considers the place of azaleas in the plant world: relationship to rhododendrons; distribution and classification, with detailed descriptions of Ghent, Mollis, Kurume, Belgian and Southern Indicas, Gable, Glenn Dale, and many other azalea groups, together with their origins and history. There is also a revised classification and description of some of the American and Japanese species and a thorough revision of the Satsuki group.

Part IV offers a complete index of deciduous and evergreen azaleas, with notes on habit, blooming period, flower type, size, and color. The list of azalea breeders and nurserymen in America, and their contributions to azalea culture has been fully updated. International registration proceedings are discussed, and the list of trade sources extended. A table cataloging registered azaleas is also included, as well as several lists of recommended varieties.

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