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science
and america's
beauty

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science and america's beauty

When you add beauty to your surroundings by planting trees or shrubs, you have help in your work: Science works with you.

Plant explorers and breeders help you by providing better ornamental plants. Horticulturists and physiologists help you by making plants easier to grow successfully. Quarantine inspectors, entomologists, and pathologists help you by protecting your plants against destructive pests.

better plants . . .

For 70 years, plant explorers of the U.S. Department of Agriculture have ranged over the whole world searching for plants useful to our country. Among the many ornamental plants they have found for America—and for your yard—are the famous Japanese cherry trees, zoysia lawngrass, and scores of rhododendrons and azaleas.

What may be one of our best ornamental trees came to us as a result of a destructive disease of fruit trees, fire blight.

In the early days of this century, outbreaks of fire blight wiped out pear orchards in the San Joaquin Valley and southern California and threatened the pear-growing industry in the Sacramento Valley. One way to conquer the disease: Find a tree resistant to fire blight and pass its resistance on to orchard trees through a breeding program.

Frank Nicholas Meyer, USDA's pioneering plant explorer, found in China a wild pear tree that was resistant to fire blight. He collected seeds of the wild pear and sent them back to the United States. The seeds were grown into trees to furnish, through their pollen, the gene for fire blight resistance. And for many years this was the tree's main value—as a source of pollen.



Many of our best decorative plants have been found in odd corners of the world by USDA plant explorers.

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CURRENT SERIAL RECORDS



Then times changed. Agricultural research helped to increase the productivity of American farms more than fourfold, to reduce the labor needed for survival, to give us time to enjoy our lives. And with this change in times came a change in outlook.

At the Plant Introduction Station at Glenn Dale, Md., a researcher looked at one of the Chinese wild pear trees and saw not only a source of blight resistance but also a potentially valuable ornamental tree.

He saw a tree that bloomed abundantly in early spring, grew with upswept branches, had foliage that turned color brilliantly in fall. It showed promise of being an excellent street tree.

The wild pear was propagated and tested under conditions which challenged its ability to grow as a street tree. More than 100 trees were set out along the curbing in University Park, Md. They were watched closely to see how well they would withstand heat reflected from paving, to see if they could survive in the fumes of a suburban automobile culture.

The pear tree passed all its tests. It was then released to nurserymen for propagation and sale as 'Bradford Pear.'

Frank Meyer's wild pear tree may yet help us conquer fire blight—the disease is still with us, kept under control by sprays and dusts. But meanwhile you have an excellent ornamental tree for your street and your yard.

One of the chief aims of plant improvement—breeding as well as exploration—is to extend the geographic range of ornamentals.

Bradford Pear, brought from China for fruit breeding, may be one of our best decorative trees for street plantings.

- A plant explorer, looking for coldhardy plants, collected seeds of a privet from the dry, barren hills near Sarajevo, Yugoslavia. After being tested in this country, the privet was named 'Cheyenne' and was released for use in the northern prairie and eastern Great Plains States—an area where few other hedge plants are sufficiently coldhardy and drought tolerant to survive.

- USDA scientists at Cheyenne, Wyo., have developed carnations and chrysanthemums that survive the biting cold of our western mountain States.

- Breeders at USDA's National Arboretum are developing hardier crapemyrtles. Through much of the South, these shrubs add brilliant color to yards and parks during midsummer and into fall when few other ornamentals are in bloom. Now the researchers hope to extend this summer color to many more gardens, northward and westward. As a result of their work they have released the hardier crapemyrtles 'Catawba,' 'Conestoga,' 'Potomac,' and 'Powhatan.'

Breeders also are trying to improve the appearance of ornamentals we now have in our gardens. A plant breeder at the National Arboretum, for example, is trying to add together the good features of a number of hollies to produce better hollies: Plants with glossy spined leaves and red berries, plants that hopefully are hardy in the North yet tolerant of heat and drought and able to grow in alkaline soils.

The breeder is helped in his program by the vast collection of hollies maintained at



Vast collections of plants at the National Arboretum furnish plant breeders with a pool of characteristics they can use in custom breeding new kinds of ornamentals.

the National Arboretum—a pool of holly characteristics he can use in custom breeding new kinds of hollies.

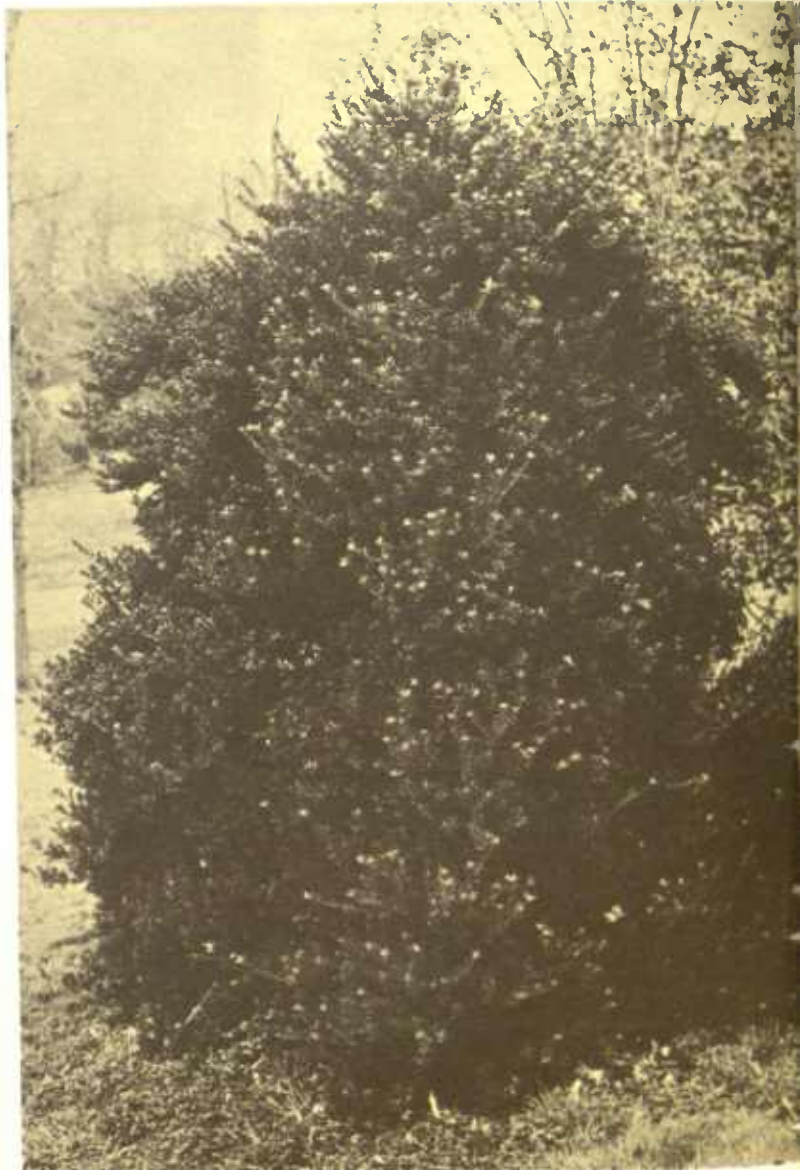
Ornamentals researchers sometimes help to improve plants for our gardens just by keeping their eyes open. While a horticulturist at the Arboretum was looking for the name tag on a large old Japanese holly plant, he noticed an odd shoot growing from the base of the plant. Leaves on the shoot were finer and grew closer together than leaves on the rest of the plant.

The horticulturist cut the top from the holly plant, allowing the odd shoot to grow by itself. It grew into a billowy, conical plant 10 feet tall and 8 feet wide. It was named 'Highlight' for the highlight-and-shadow appearance of sun on the foliage.

In addition to Bradford, Cheyenne, Highlight, and the new crapemyrtles, other new breeds are on the way for your garden:

- Tetraploid daylilies, larger than the usual daylilies, and blooming, not just one day, but for several.
- New improved native hollies, mountain-laurels, and azaleas from the Appalachians.
- A fragrant pink camellia, a cross between a white camellia that is fragrant but not showy and a pink camellia that is showy but not fragrant.

Highlight, a new selection of Japanese holly, is available because a sharp-eyed horticulturist at the National Arboretum spied an odd and attractive shoot growing from the base of an old holly plant.



easier care . . .

Remember last winter when you looked through the nursery catalog and thought of the improvement to your yard that a few more shrubs could make? Somewhere in the catalog was probably a map of the United States divided into 10 plant hardiness zones. And the descriptions of the shrubs referred you to one of the 10 zones.

From the map and the descriptions of the shrubs, you were able to tell how far north the shrubs could be planted safely—whether they could live through the winter in your backyard without special care.

The map and the coldhardiness ratings were prepared by USDA's National Arbo-

retum in cooperation with the American Horticultural Society.

The National Arboretum was established in Washington, D.C., ". . . for purposes of research and education concerning tree and plant life." The plant hardiness map is one of the Arboretum's "education" projects. Another is the series of demonstration plantings within the Arboretum.

Perhaps you are one of the many thousands of persons who have visited the Arboretum in April or May to see the azaleas in bloom—more than 70,000 plants displayed in appropriate groups and settings.

Or maybe you have been there to see the demonstration plantings of street trees, or the crabapples, hollies, magnolias, camellias, dogwoods, boxwoods, or the many other



Can you grow camellias
in your backyard?
The Plant Hardiness
Map, with the aid of
a nursery catalog,
will tell you if you can.

groups of ornamental plants that are found in the Arboretum. And maybe these plantings helped you decide what to plant in your own yard.

Thousands of gardeners have used the plant hardiness map, and the Arboretum's demonstration plantings, to help them choose the best ornamental plants for a particular area and setting. But sometimes we can't seem to find any ornamental plant that will do the landscaping job that we want it to.

What can we do about it? Plant physiologists of ARS have found that plant germination, growth, flowering reproduction, and dormancy all depend on the color and intensity of light that falls on the plant; that these responses can be changed by changing the plant's exposure to light.

And they've found that many plant responses also can be triggered by treatment with chemicals that regulate plant growth. Plant-growth regulators can hasten rooting of vegetative cuttings; they can retard the growth of a plant; they can slow down blooming; they can even cause the plant to grow itself to death. The growth regulator that you probably are most familiar with is 2,4-D, the weed killer used on lawns.

Light management, growth regulators, and other practices developed by agricultural researchers have made gardening less expensive for you in addition to making it easier. They made it less expensive by making it easier for nurserymen, who have to charge their customers for the work they do.

Chances are you bought some ornamental plants last spring—a flowering crabapple,

some rose bushes, an azalea, some evergreens, or maybe just a tray of petunia plants or a packet of zinnia seeds. If you did, you helped support an agricultural enterprise worth more than \$500 million a year. And it's still growing.

Agricultural research helps it grow by finding ways for nurserymen to meet an increasing demand for planting stock and by providing the nurserymen with labor-saving processes that make it possible to keep their prices low.

If you are like other gardeners, you want to see a flowering shrub in bloom before you buy it. In the past this has meant that several years might pass between the time a cutting of the shrub was rooted and the time it came into bloom. But by using controlled light exposure and growth regulators, physiologists have been able to hasten this blooming time. Now, for example, you can see a rhododendron in bloom the next season after it's rooted; and you don't have to pay for several years' care of the plant until it reaches blooming size.

Other ways research has found to help nurserymen produce large numbers of plants at low prices:

- Many kinds of cuttings that are normally difficult to root will root readily if they are first treated with a growth regulator.
- Losses during rooting can be kept low if cuttings are wet constantly by a fine mist.
- Many kinds of tree seedlings can be forced to put on several seasons' growth in a single year if they are lighted for part of the night during fall and winter.

After treatment with controlled light and growth regulators, a year-old rhododendron plant blooms and shows its colors to a prospective buyer—years ahead of schedule



Another help likely to be available soon: Chemical pruning.

Many kinds of ornamental plants have to be pinched or pruned while they are growing to make them bushy. Already we have materials that you can add to the soil to make your chrysanthemums remain compact without pinching.

Suppose we had a spray that would selectively kill just the tips of the stems of plants that you spray it on, that would not harm side shoots, foliage, or stems of the plants. And suppose the material worked quickly, so you could see within 15 minutes which stem tips had been pruned. This would mean a considerable saving in hand pruning and savings in expense of raising nursery stock.

Such a material has been found. It won't be ready to market, however, until researchers have found all the answers to possible

questions of safety and effectiveness of the material.

Though a chemical pruner would be most valuable to nurserymen, it also would be useful to you in your home garden. Here it would join other products that have made gardening more enjoyable by making it easier:

- Weedkillers that control broadleaf weeds in your lawn—plantain and chickweed, among others—without damaging the lawn.
- Herbicide-treated cloth used to cover soil under plants; it destroys weeds as they emerge from the soil, and you don't have to pull them by hand.
- Long-lasting and high-potency fertilizers that can keep your lawn green all season with one application; they release nutrients a little at a time, rather than all at once—and with no danger of burning your lawn.

Plant quarantine inspectors intercept foreign insects, diseases, and nematodes at ports of entry before the pests can attack your garden.



protecting plants . . .

One evidence of science's success in protecting your ornamental plants is the insects and diseases that are *not* in your garden. Protection begins far from your flower beds; it begins at the ports of entry into this country from abroad.

Plant quarantine inspectors keep watch at ports of entry for foreign insects, diseases, and nematodes and for products that may harbor these pests. They are successful, too. On an average of once every 16 minutes around the clock each year, inspectors intercept a potentially dangerous pest—a pest that does not make it to your yard.

State and Federal quarantines within this country also help keep your yard free of pests. If, for example, you are among the fortunate minority of the country's gardeners who do not now have to worry about Japanese beetle, quarantines are helping to insure that you won't become troubled by it.

Before plant material can be shipped to your home from an area infested with Japanese beetle, the shipper must comply with regulations ensuring that no live beetle eggs, grubs, or adults will be shipped with it. Thus far, quarantine has kept the beetle out of the West.



A come-hither odor lures male gypsy moths to a trap. If we can do away with most of the males, we should be able to wipe out a troublesome pest.

If you are among the unfortunate gardeners who have to combat Japanese beetle, you may be using milky spore disease—developed as a beetle control by agricultural research—to reduce the damage to your garden. This disease kills larvae of the beetle in the ground. And you know that milky spore has several drawbacks: It's expensive to use (\$24 an acre) and just about everyone in a community has to apply it to his property for the control to be effective.

Agricultural research is doing something about these drawbacks.

Scientists at USDA's Northern Utilization Laboratory, Peoria, Ill., now are searching for a way to mass produce milky spore material at low cost. These researchers are specialists at producing biological materials by using industrial fermentation processes. They are the scientists who developed the process for mass producing the lifesaving drug penicillin. With their success in manufacturing a cheap milky spore material, the Japanese beetle should be eliminated as a threat to every eastern rose garden.

Milky spore is effective against Japanese beetle, yet harmless to all other forms of life. Entomologists are looking for ways to control other destructive insects without harming beneficial or "innocent" organisms.

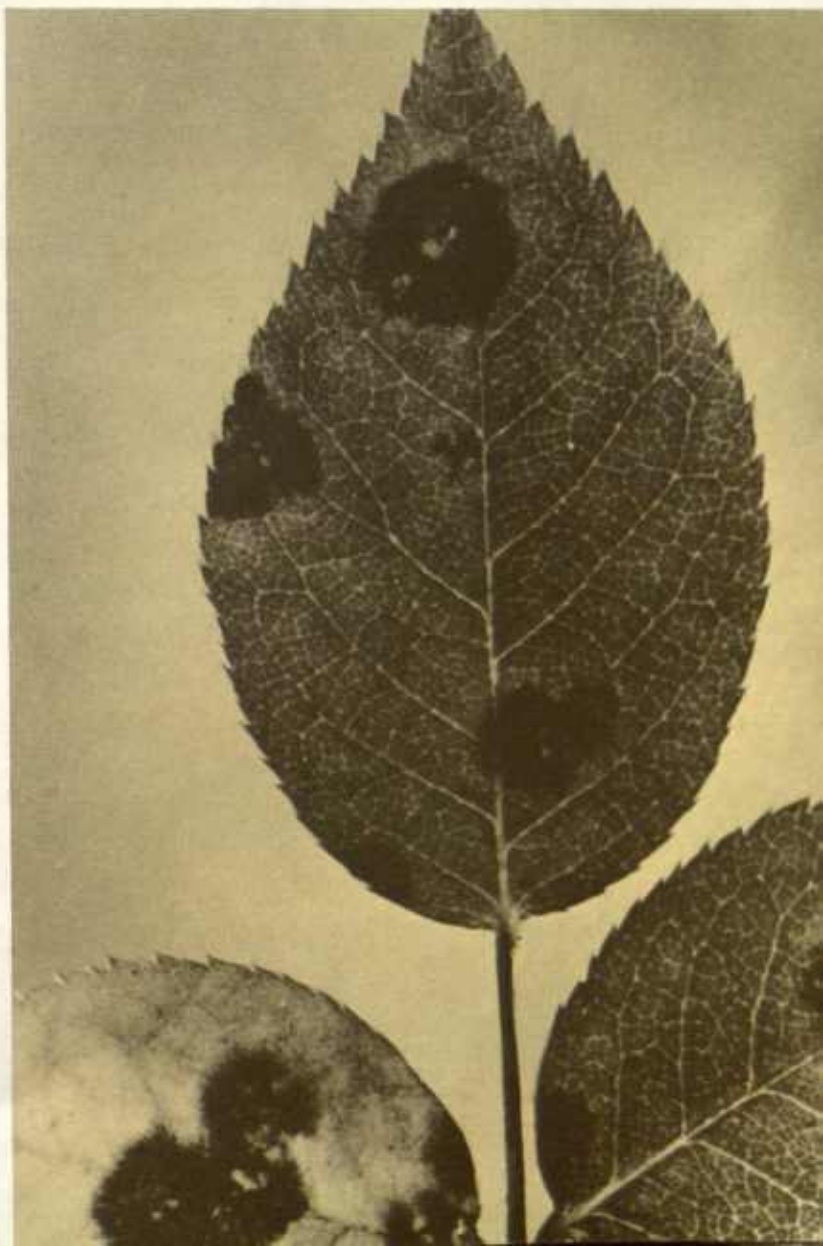
One possibility: Use of a sex lure and a chemosterilant. The sex lure attracts male adults of the destructive insect; the chemosterilant makes them reproductively sterile.

If the sex lure is successful, most of the males of an insect population are sterilized. Females that mate with sterile males produce infertile eggs, and the destructive population is reduced, finally destroyed.

Plant pathologists also are looking for preventives or cures for plant diseases. They have been able to turn black spot of roses from a major destructive disease to a minor annoyance. And breeding programs now underway may develop garden roses that are entirely free of black spot, as well as other rose diseases.

But pathologists have not always been successful. Dutch elm disease, for example, has defied control. It may finally fall, however, before a combination of better fungicides to protect against infection and better insecticides to kill insect carriers of the disease. And then you'll once again be able to shade your home with American elm trees.

Black spot, a destructive disease, attacks garden roses but not hedge roses. Scientists have learned how to cross the two kinds of roses. Their hope: A garden rose that is resistant to black spot.



tomorrow . . .

Tomorrow's developments in ornamentals research probably will be aimed principally at solving problems—problems such as smog; problems such as a nightless environment in brightly lighted gardens and shopping centers; problems such as recurrent droughts, with no water to spare for ornamentals; problems such as a demand for planting stock that far exceeds our present capacity to produce.

And Researchers will solve the problems:

- Breeders will come up with new varieties of ornamentals that are smog resistant and drought tolerant.
- Physiologists will find growth regulators that will make brightly lighted plants go dormant in winter, rather than remain active and be killed by cold.
- Horticulturists will find ways of quickly increasing production of our best ornamental plants.

Tomorrow agricultural research also will be aimed at convenience:

- Growth retardant sprays that limit growth of lawn grasses, so you need cut the lawn just once a season.
- Better, safer, easier, more selective control of weeds.
- Systematic insecticides that keep your plants free of insects all season with just one application.
- Rapid-growing trees and shrubs that quickly beautify newly built homes.

Plant explorers, plant breeders, plant physiologists, plant pathologists, entomologists, quarantine inspectors—all are agricultural scientists using their green magic to bring us better ornamental plants and better ways of gardening. Scientists working together to bring American gardeners many pleasant hours of recreation and . . . Tomorrow . . . a more beautiful America.

information

Agricultural research helps in America's beautification by making public the results of its work. You can help to assure America's beautification by making use of this information.

The following publications contain information that may be useful to you in beautifying and maintaining your home grounds. The publications are available, at the indicated price, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Please include your ZIP Code when ordering.

Title	Price
G25, Roses for the Home.....	\$0.15
G51, Better Lawns.....	.15
G53, Lawn Insects: How To Control Them.....	.15
G61, Lawn Diseases.....	.15
G65, Growing Chrysanthemums in the Home Garden.....	.05
G66, Growing Iris in the Home Garden.....	.05
G71, Growing Azaleas and Rhododendrons.....	.05
G76, Growing Ornamental Bamboo.....	.05
G79, Controlling Lawn Weeds With Herbicides.....	.10
G80, Home Propagation of Ornamental Trees and Shrubs.....	.10
G81, Maple Diseases and Their Control.....	.05
G83, Pruning Shade Trees and Repairing Their Injuries.....	.10
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G117, Trees for Shade and Beauty.....	.10
G120, Growing Boxwoods.....	.10
G126, Growing Peonies.....	.10
G130, Growing Hollies.....	.10
G135, Growing Flowering Crabapples.....	.10
G136, Spring Flowering Bulbs.....	.10
PA791, Color It Green With Trees.....	.20
AB237, Controlling Insects on Flowers.....	.40