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APRIL COVER ILLUSTRATION

*Lilium szovitsianum*

(Courtesy Jan deGraaff and Herman V. Wall)

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E. M. MEADER

This plant, often mistakenly called "Flowering Kale", is the Ornamental-leaved Kale, *Brassica oleracea* var. *acephala* DC.

The White Tokyo type of Ornamental Kale field grown at the University of New Hampshire, Durham, New Hampshire.

E. M. MEADER





# Ornamental Kale

BY EDWARD G. CORBETT

Among the many horticultural gifts that the Japanese have given to the world there is one that has never achieved the popularity that it deserves. Perhaps its name is to blame, or the established cultural preferences, or possibly the prevalent belief that ornamentals and vegetables are separate entities and should be treated as such. Most likely it is a combination of these factors, plus the general public's dedication to the commonplace in the home garden. This plant, mistakenly called "Flowering Kale", is the Ornamental-leaved Kale, *Brassica oleracea* var. *acephala* DC.

Ornamental Kale is another of the horticultural forms of a prolific wild ancestor, *Brassica oleracea* L., which has given rise to cabbage, kale, broccoli and Brussels sprouts. This single species has produced innumerable edible cultivars and, with the help of Japanese horticulturists, several ornamental forms.

Apparently there are no references to kale in Japanese literature before 1709, although Ihei Ito in his "Chikinsho-Furoku," published in 1773, presumed that "Flowering Kale" was introduced into Japan between 1624 and 1627. In "Yamato Honzo" by Ekhen Kaibara, published in 1709, the first reference to kale appears under the name "Oranda-Na" (Dutch Herb). This name indicates that the original introduction was probably a green-leaved form of kale from Holland.\*

Introduction into Japan during this period must have been accomplished on Hirado Island, the only place in Japan open to the Dutch East India Company. Subsequent diffusion throughout Japan is apparently not known, although it must have been quite rapid and extensive.

Japanese literature indicates that by the early 1800's these plants were being widely grown for ornamental purposes.

The name "Kanran-Habotan" (Kanran-Cabbage, Habotan-Flowering Kale) was used in the early 1800's in an illustrated herbal "Honzo-Zufu" by Gan-en Iwasaki. The plant was described as one to two feet in height with a shape like the flower of a tree peony. The leaves were reported to be green in the summer but turning purple with the advent of cool weather. In 1851 S. Nakayama's "Senkao-Den", a classical book on Japanese flower arrangement, carried an illustration of "Habotan" and noted in detail its use in arrangements, also including information on its culture.

In view, especially of the centuries of horticultural history which preceded its introduction, Ornamental Kale enjoyed a remarkably rapid rise to popularity in Japan. Within a span of about 50 to 75 years, without benefit of promotional advertising, and in a country noted for its horticultural sophistication, kale was elevated from a pot herb to a popular ornamental item.

Japanese plant breeders, located primarily in and around Tokyo and Nagoya, have made selections of Ornamental Kale for many years. White variegation occurs with some frequency in cruciferous material and the Japanese were quick to select for this characteristic. However, the very nature of this variegation, which results from a lack of chlorophyll, generally leads to a weaker type of plant requiring intensive care for maintenance. This led the Japanese to develop a method of asexual propagation in which the terminal was removed to induce the growth of axillary shoots. These axillary shoots were then used to perpetuate the selection. Thus the breeders were able to select and maintain outstanding variegated forms for use in breeding a sturdier, seed-propagated, white-leaved Ornamental Kale.

The years of intensive breeding and selection have led to four main types of Ornamental Kale. The White and Red Tokyo types are relatively smooth-

\*Search of Japanese literature by Mr. Kaname Kato, Tokyo.





J. L. CREECH

Ornamental Kale growing in a municipal planting near the U. S. Embassy in Tokyo, Japan.

leaved, with either a white (creamy color) or a reddish tinge to the leaves. The Nagoya types combine crinkled leaves with the white or reddish colors. There are, in addition, many other forms based on color variation or changes in leaf texture. Most of these have not been selected to relatively true-breeding seed stock, as seems to be the case with the Tokyo and Nagoya types.

Today, Ornamental Kale is sold as a pot plant, is used in many floral arrangements, is planted in large beds in parks and other public places, and is generally a major source of color in the late fall and early winter in Japan. The Japanese have long prized Ornamental Kale because it provides a mass of color in the garden at a time when there are few if any flowers and many of the trees are bare.

The wild form of the parent species of *Brassica oleracea* is native along the

sea cliffs of Western and Southern Europe. It was probably collected for food long before recorded history, as evidenced by the fact that it was already in cultivation at the dawn of written history. Several distinct races were recognized during Pliny's (23-89) A.D.) time. The various forms of kales, cabbages, Brussels sprouts and cauliflowers have all apparently been derived from the wild form. Green-leaved and reddish-leaved forms are known to occur in the wild. Leaf texture is also highly variable. There is, however, no record of Europeans ever having selected this material for ornamental purposes.

The USDA first introduced Ornamental Kale into the United States in 1929. It was procured in Japan under the name "Hanahabotan" (ornamental cabbage flower) and was reportedly grown there in pots or small dishes. Further introductions of seed of the Tokyo and Nagoya types were made by the USDA in 1956.

Plants of the Tokyo and Nagoya types have been grown in several parts of the eastern and northeastern United States

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with great success. The plants do best when planted during middle to late July to produce mature plants just as the weather begins to cool in the fall. Plants may be started in seed flats or pots, or they may be seeded directly where they are to grow. There are those who say that better plants are produced if the seedlings are transplanted, but this contention remains to be fully tested. The best color usually develops after the first frost and will persist. As a garden item, Ornamental Kale makes the best display when grown in masses of one color and leaf texture, although individual specimens often make a striking appearance. As the focal point in flower arrangements, Ornamental Kale has on several occasions "stolen the show."

Botanically, Ornamental Kale is a biennial, that is, it will "go to seed" the second season. Seed production is best accomplished where the winters are mild enough for the plants to be left in the garden. However, in areas with cold winters, the plants are removed from the field and planted in containers of sufficient size to provide adequate space for root development. The plants should then be stored in a cool (40°F) area with adequate light to prevent excessive etiolation and enough water to maintain turgidity. Good ventilation and frequent observation will be necessary to prevent the development and spread of soft rots. If a greenhouse is available the plants may be forced into

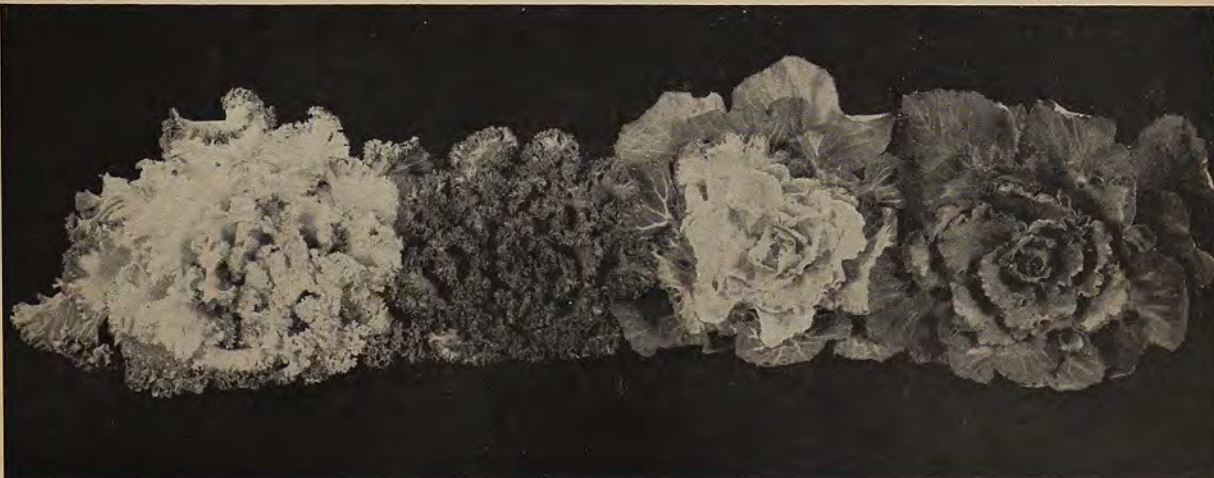
bloom during the latter part of December or early January. Allow adequate head room as the inflorescence may grow as tall as six feet. In the greenhouse the yellow flowers will have to be hand-pollinated. Mass pollination within a variety rather than self-pollination of the individual blossoms is the better procedure. Without a greenhouse, the plants should be moved out-of-doors as soon as the danger of freezing is past. The plants can be flowered in the pots and bees will take care of the pollination. There is a risk of cross-pollination with the latter technique unless some form of isolation is provided. The fruit is a silique similar to the fruit of cabbage and it should be collected as soon as ripe.

There are several seed companies in the United States currently offering "Flowering Kale" in their catalogues. One seed company reported that they first listed "Flowering Kale" in 1936. The seed was obtained directly from Japan and until a color insert was included in the catalogue, it sold poorly. Another seed company first offered seed of "Flowering Kale" in 1947. They also reported that the seed was imported from Japan.

From the reports of those who have tried Ornamental Kale in their gardens and arrangements, it would seem that this striking and unusual ornamental merits far wider use than it now enjoys.

**Ornamental Kales and Cabbages—'White Nagoya', 'Red Nagoya', 'White Tokyo', 'Red Tokyo'. Seeds from T. Sakata and Company, Yokohama, Japan.**

U.S.D.A.





# Taxonomy of Ornamental Kale and Cabbage

BY CLYDE F. REED

Botanist, Crops Research Division,  
Agricultural Research Service, U.S.D.A.

H. Takeda. Systematic List of Economic Plants of Japan. Gen. Headquarters, Supreme Commander for the Allied Powers, Natural Resources Section, Rept. 121, p. 26. 1949.

*Brassica oleracea* var. *acephala* forma *tricolor* Hort.

Yotaro Tsukamoto. Coloured Illustrations of Garden Flowers. II. Annual and Biennials. Ornamental Trees and Shrubs. 1955.

*Brassica oleracea* var. *acephala* DC. forma *tricolor* Hort., p. 5, fig. 14 (in color). 1955. (Descr. in Japanese).

Parey's Blumen Gartneri, 1: 689. 1958.

*Brassica oleracea* var. *acephala* DC. —Ornamental Cabbage or Kale. 'crispa'; 'prolifera'; 'laciniata'; 'palmifolia'. All described.

A. B. Graf's Exotica II, p. 492 (illus.), 964 (descr.). 1959.

*Brassica oleracea* *acephala* *crispa*, Flowering Kale.

*Brassica oleracea* *acephala*, Flowering Cabbage.

A. B. Graf's Exotica III, p. 698 (illus.), 1959 (descr.). 1963.

*Brassica oleracea* *acephala* *crispa*, Miniature Flowering Kale.

*Brassica oleracea* *acephala*, Flowering Cabbage White.

*Brassica oleracea* *acephala*, Flowering Cabbage Red Crown.

*Brassica oleracea* *acephala* *fimbriata*, Flowering Kale.

## Available Seed Sources

Parks Flowers Book, 1964. Greenwood, S. C.

1078A—Flowering Kale. An extra select strain from the Orient; red or white with green leaves. Illus. in color, p. 14.

0842—Flowering Cabbage. A miniature cabbage; red, white, rose, and pink shades, p. 15.

Vaughan's 88th Anniversary Catalog, Spring 1964. Downers Grove, Illinois. Kale Flowering, p. 24. Large fringed leaf in various color tones that include ivory, rose, green, as well as deep purple. Also as a winter pot plant.

Thompson & Morgan, Ltd. Ipswich, England. Catalog for 1964. Choice flower and vegetable seeds, p. 109, color illus. opp. p. 112. 1964.

Borecole or Kale: 'Kale, variegated silver'; 'Kale, variegated purple'; Flower (Cabbage) Kale, Round leaved white; Flower (Cabbage) Kale, round-leaved red.

Watkins & Simpson, Ltd. Pound Hill, Crawley, Sussex, England. Wholesale Seed Catalog, 1964. (Oct. 1963).

'Borecole, variegated' — Ornamental for decorative purposes; being hardy, supplies color for winter flower arrangements.

Jisaburo Takii & Co., Ltd. 180 Umekoji-Inokuma, Kyoto, Japan.

Flower Kale—A beautiful ornamental leaved Kale, originated in this country and very popular during winter months for indoor foliage plant and flower arrangement. When winter advances, their center leaves turn to white or pink to purplish red. Leaves either round or heavily fringed at edge. Takii Seed Catalog to the Trade, Export Edition, p. 83, illus. 1962.

'Christmas fringed white', 'Christmas fringed red'; Osaka Round Leaved Midget'.

T. Sakata & Co. Yokohama, Japan.

Ornamental Kale — 'White Nagoya' and 'Red Nagoya'.

Ornamental Cabbage—'White Tokyo' and 'Red Tokyo'.



# Lawn Seed, and What's a Weed

BY ROBERT W. SCHERY  
*Director, The Lawn Institute*

As horticultural pursuits go, the lawn and its tending is a fairly recent innovation. There have been meadows and pastures managed to some extent throughout history, but until the 20th Century grass turf was for the most part merely adjunct to an essentially rural way of life. Such mowing as was done was usually the accomplishment of livestock. Even within our memory "lawn seed" and "grass seed" have been synonymous, with seed for the home grounds as likely as not the leftover sweepings from the haymow. And those of us who remember well the dreaded weekly chore

of pushing those pre-power reel mowers with wheels of cast iron—which couldn't be set to clip much higher than an inch—also realize that our dads couldn't have cared less what kind of grass was in that turf we were weekly cropping. Grass was grass, and whether seed for the occasional bolstering came from a local hay field or a distant pasture was of scant concern.

How profound has been the evolution—almost revolution—into the present era of a specialized lawn seed industry, catering to neatly kept urbanized homes that today house 9 out of 10 Americans!

What a "lawn" would look like if left to a volunteer assortment of weeds. Old-time "grass seed" frequently contained contaminants such as these.

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Traffic in lawn seed depends upon seed analysis by registered seed technologists, such as in the commercial seed testing laboratory pictured here (Seed Technology).

What the seed technologist sees under his lens. This is a lot of Kentucky bluegrass.

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Indeed, as we shall see, the rules governing this industry have not yet caught up with the change—nor has general understanding of what constitutes good lawn seed, and why. This resume is intended to provide some documentation about lawn seed as it reaches market in this day and age. Though charts make tedious reading, data should be recorded from which to assess the strength and weaknesses in packaged lawn seed, now so widely used and so much in the public's eye. Surprisingly, its purchase and sale is often predicated upon unrealistic considerations, while very real ones may be ignored. Outstanding in this respect is weed content; just exactly what is a weed in lawns and lawn seed? It's not as easy a question to answer as you might imagine!

*Of Rules And Regulations*—Lawn seed was for so long part of the farm seed business, that it is no wonder its commerce inherits agricultural "rules" that in many ways are not appropriate to the sophisticated use and merchandising having developed particularly since World War II. Agronomists are rightly concerned about weeds in the fields. And in an age when "grass seed" was harvested from those same fields, no wonder certain weeds were declared "noxious," to be restricted (or not permitted at all) in the transporting and sale of seed, lest they create new infestations a bane to local agriculture. Lawn seed growers still find the same weeds under legal sentence, even though the seed may now be for planting mowed suburban lawns (where some of these troublesome weeds could not possibly survive).

So, because the respective state seed laws were enacted, mostly years ago, with agricultural usage in mind, lawn seed has inherited the strictures devised for an agricultural product. It must be devoid of certain weed types, and others must be listed on the label. This can be much to the discomfiture of the industry, for the consumer is appalled by any weed listing even if the species is no problem at all in the lawn. Even weeds once quite a pest are readily eliminated from the lawn nowadays, thanks to an excellent arsenal of herbicides.

On the other hand, many species can be included in lawn seed without "weed"





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The way a planting of clean Kentucky bluegrass, such as shown in the previous photo turns out. Note the uniform fine texture of this outstanding lawn species.

identification, because they were harmless in the agricultural fields. These are mostly rough grasses, good for forage, but too coarse for modern lawns. A few such seeds in a hay field makes absolutely no difference; but the same few seeds, in a good bluegrass lawn blend, are truly "weeds." There are several haygrass culprits sometimes accompanying lawn seed produced less responsibly, that need be identified only as "crop" (if they occur in less than 5%, according to most state laws). But even a very small percentage of "crop" such as tall fescue or timothy, in a fine-textured lawn seed blend, can be a thorough source of irritation, worse than most weeds that must be declared!

*For Whom And From Whence The Seed*—As indicated, the lawn seed industry has become highly sophisticated in recent decades. So has many a consumer. The horticultural public is increasingly better informed, more demanding of the product purchased. The burgeoning demand is for "luxury" turf

(as compared to earlier standards), if only to keep up with the Joneses of the neighborhood. After all, a good lawn is something of a status symbol! There is no dearth of product offerings, many of them rather far-fetched miracles claiming to assure a fine lawn with almost no effort or understanding. Even the well-informed homeowner becomes confused by the plethora of choices available. It's hard to know what is fundamentally important.

Good lawn seed in the package goes all the way back to good grass in the seed fields. The fields are customarily weeded, sprayed for pests, rogued of unwanted types, and otherwise given meticulous attention. Bluegrass, fescue, or bentgrass as it is brought from the better-tended growing fields contains scarcely enough foreign seed to warrant subsequent cleaning. Nevertheless, there is routine combining, threshing, and seed cleaning operations. The latter involve the blowing, screening or disking out of unwanted chaff, dust or foreign matter.





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Unless the lawn seedbed is sterilized, there are always some weed seeds present. But even these can often be eliminated in the lawn with present-day herbicides.

Considerable equipment and technical know-how is involved. In such growing and cleaning operations is the basis for quality in lawn seed laid—today a far cry from the once casual gathering of leftover seed from the haymow.

But the horticulturist's concern is the end product of all these skills, the lawn seed as found on the dealer's shelf. What is its status as it comes from the producing fields and goes into the myriad lawns around the country? Is the consumer really getting a good buy? (He usually is if he doesn't buy by price alone.) What should he look out for to be certain that he is getting full value, rather than problems and frustration should his lawn seed be contaminated by even traces of "weeds" (whether termed this legally, or not)?

*Checking Seed In Commerce*—To get some answers, we borrowed, through the generosity of Seed Technology Inc., a commercial seed testing firm in Marysville, Ohio, a random sampling of back records for tests run for the firm's diverse clientele. The records represent actual lots of seed bought and sold on the market, and which eventually were planted to American lawns. The tests indicate exactly what weeds are carried, and in what proportions. This should consti-

tute a good representation of seed entering commerce, and the conclusions drawn should hold generally (although it is possible that the Seed Technology clientele is a little "above average," in that mass marketers notorious for their "cheap" seed mixtures are perhaps less apt to utilize an independent laboratory's service frequently).

The records also show viability (germination percentage); but this factor is hardly germane to our particular discussion, since it depends so much upon storage and handling conditions. One can take for granted that lawn seed sold under reliable brand will sprout adequately; in any even the law requires listing of germination percentage on the box. If sampling by seed control officials indicates that this guarantee is not being met, the seed is subject to stop-sale and withdrawal.

Our tables, then, reflect what weeds and "crop" are carried in several major lawn seeds going into the blending of consumer products, as determined by registered seed technologists. The grasses under scrutiny are necessarily those with northern-flavor: Seed Technology, geographically in a northern region, receives little lawn seed for the South. However, since many southern lawns are vegetatively planted (to sprigs and plugs), the



greater proportion of the industry is represented by Kentucky bluegrasses, fine fescues, bentgrasses, and the various "hay-grasses" that are regular bill-of-fare for Seed Technology.

*The Sheep And The Goats*—Within the last year a new system of labeling lawn seed has become accepted by most packagers and most states. This groups lawngrasses into two major categories, "fine-textured" and "coarse kinds." The "fine-textured grasses" must be listed ahead of the "coarse kinds" on the seed box. In the fine-textured group are the Kentucky bluegrasses (including named varieties such as Merion, Park, etc.); the fine or red fescues (including Chewings, Illahee, Pennlawn, Rainier, etc.); the bentgrasses (of which Colonial types such as Highland are most used for lawns); and a few specialty sorts, mostly *Poa*. Everything else ends up "coarse kinds," including tall fescue, brome, timothy, orchardgrass—even the frequently used nursegrasses such as ryegrass and redbtop.

This listing scheme was developed to make the content of quality grass types readily apparent. The premise is that the "fine-textured grasses" are superior for lawn purposes to the "coarse kinds." Turfs which we dignify as "lawns" these days are show-place enough to merit fine-textured species, ordinarily considered more attractive than coarse, clumpy bunchgrasses. This does not mean that the fine-textured types necessarily grow better than the coarse kinds; in some situations perhaps the opposite would be true. We must presume that the buyer chooses lawn seed appropriate to his climate and soil.

Our main concern in the following tables is how much "coarse kinds" of grass as well as recognized weeds get into lawn seed normally purchased for its "fine-textured grasses" content. Fortunately, the record is better than might be expected, an attestation to responsible seed production, especially by the domestic lawn seed industry.

The kind of trouble befalling many a homeowner who plants a poor grade of lawn seed, blended to intentionally contain some tall fescue, or having some tall fescue seeds carried along with the wanted grasses.

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The Kentucky Bluegrasses, *Poa pratensis*—Table 1 indicates “weeds” found in Kentucky bluegrass. Note that nearly half the lots contain no weeds whatsoever, and that most of the remainder carry less than 1/10th of one percent foreign seeds on a seed count basis.

The kinds of “weeds” are of considerable interest. Their importance varies with where and how the seed is to be planted. Annual bluegrass, for example, would not be particularly objectionable if a minor contaminant of lawn seed sold in the Northeast where *Poa annua* is already abundant; on the other hand, a customer should be able to purchase Kentucky bluegrass free of *Poa annua*, certainly a mean weed almost impossible to eliminate once started, for sowing to soils that have been sterilized or where *Poa annua* has not volunteered.

*Poa trivialis* is a similar case, except that this stoloniferous colony-forming bluegrass has not naturalized so widely through the United States as has *Poa annua*. While quite useful in seed mixtures devised for moist shade (and intentionally mixed in such blends), a consumer should be able to buy Kentucky bluegrass free of *Poa trivialis* if that is his wish (*Poa trivialis*, especially in wet years, may form dense patches of contrasting color and texture in a Kentucky bluegrass sward, which brown out in the heat of summer).

Actually, neither annual bluegrass nor *Poa trivialis* would appear so abundantly in the bluegrass of Table 1, were it not for the great amount of Kentucky bluegrass imported these days from north Europe. Scrutiny of the records on a dozen imported bluegrass lots showed all of them to contain *Poa annua*, and two-thirds of them *Poa trivialis* (often in very high percentages). Domestic seed seldom contains *Poa annua*, and almost never *Poa trivialis*.

Of the other frequently found “weeds,” Canada bluegrass is unimportant; it looks and behaves much like Kentucky bluegrass, and soon gives way to Kentucky bluegrass in tended lawns. Chances are not even an expert would spot Canada bluegrass in a Kentucky bluegrass lawn.

Sedges, including nutgrass, are found in slightly more than 10% of the bluegrass lots. However, their total number, when found, is low, and their likelihood

of becoming a pest is probably limited to moist locations.

No one wants to introduce broadleaf weeds, such as chickweed, shepherd's purse, and others even less frequent than these. But if an occasional plant is introduced, and not squeezed into submission by the more voluminous lawngrasses, there are rather painless ways these days of removing the dicots from the lawn with herbicides.

Many other weeds on the list would not persist under mowing, in competition with the bluegrass—things like water foxtail, windgrass, sleepy catchfly, bedstraw and many of the others showing up only very infrequently.

More serious would be the “coarse kind” haygrasses, often able to fight a pretty stiff battle in competition with the finer-textured lawngrasses. It is of some concern that timothy shows up in over 5% of the lots, brome grass occasionally. Fortunately, other troublesome grasses are quite infrequent, especially tall fescue (present only three times in over 300 lots).

In recent years there has been a lot of alarmist publicity about bentgrass becoming a patchy pest in bluegrass lawns. Almost invariably this is volunteer creeping bentgrass of uncertain origin that has naturalized in humid climates, such as around the Great Lakes. Lawn Institute trials indicate that less aggressive Colonial bentgrasses such as Highland (*Agrostis tenuis*) are not likely to be a problem. But nonetheless it is reassuring for those having heeded the anti-bentgrass warnings, that *Agrostis* of all types showed up only 7 times in 309 lots—hardly a drop in the bucket compared to seed already in the soil where volunteer creeping bents have become a problem!

While familiar broadleaf weeds such as plantain and dandelion do occur once in a great while, these are already so abundant in the soils of most lawns that it's hard to become alarmed about a few seeds in the bluegrass. Such weeds are easily controlled by 2,4-D, use of which is a standard lawn care procedure from time to time with most people.

All in all, there seems not too much to be concerned about with bluegrass entering commerce, especially when domestic seed is specified. Certainly one can find really high quality seed in abun-



dance, noting that 42% of the lots contained no contaminants at all. In those instances where weeds are serious, it is probable that downgraded lots were purchased at considerable discount, for use in the less reliable brands.

**TABLE I**  
**Kentucky Bluegrass, *Poa pratensis*, including Merion, Park and other varieties**

Number of lots checked—309

Number which contained no weeds—130—42%

Number of lots that contained less than 1/10th of one percent weeds—238—77%

Lots with more than 1/2 percent weeds (highest 2.39%)—11—4%

|  | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|--|-------------------|--------------------------------------|------------------------|
| Canada bluegrass, <i>Poa compressa</i>           | 52                | 2-5900                               | 800                    |
| Annual bluegrass, <i>Poa annua</i>               | 50                | 25-950                               | ca. 200                |
| Sedges, <i>Cyperaceae</i>                        | 38                | 1-113                                | 28                     |
| Chickweed, <i>Cerastium</i>                      | 33                | 1-283                                | 36                     |
| Rough bluegrass, <i>Poa trivialis</i>            | 31                | 28-7300                              | 1000                   |
| Water foxtail, <i>Alopecurus geniculatus</i>     | 25                | 1-57                                 | 10                     |
| Shepherd's purse, <i>Capsella bursa-pastoris</i> | 22                | 2-510                                | 58                     |
| Windgrass, <i>Apera</i>                          | 19                | 1-425                                | 54                     |
| Pennycress, <i>Thlaspi</i>                       | 18                | 1-7                                  | 2                      |
| Timothy, <i>Phleum pratense</i>                  | 17                | 28-227                               | 100                    |
| <i>Sisymbrium</i>                                | 16                | 2-113                                | 28                     |
| Sleepy catchfly, <i>Silene antirrhina</i>        | 16                | 1-57                                 | 10                     |
| Bedstraw, <i>Galium</i>                          | 14                | 1-238                                | 60                     |
| Hairgrass, <i>Deschampsia</i>                    | 14                | 4-374                                | 65                     |
| Mayweed, <i>Anthemis cotula</i>                  | 13                | 1-170                                | 28                     |
| Sorrel, <i>Rumex acetosella</i>                  | 13                | 1-28                                 | ca. 4                  |
| <i>Puccinellia</i>                               | 12                | 28-6200                              | 1240                   |
| <i>Erysimum</i>                                  | 11                | 3-397                                | 57                     |
| Plantain, <i>Plantago</i>                        | 11                | 1-340                                | 20                     |
| Bromegrass, <i>Bromus</i>                        | 10                | 1-57                                 | 10                     |
| Rat-tail fescue, <i>Festuca myuros</i>           | 10                | 1-57                                 | 23                     |
| Ryegrass <i>Lolium</i>                           | 10                | 28-255                               | 70                     |

Miscellaneous dicots (55): Dandelion, *Taraxacum officinale* (9), Tansy ragwort, *Senecio* (8), Peppergrass, *Lepidium* (6), Speedwell, *Veronica* (6), Henbit, *Lamium amplexicaule* (5), Clover, *Trifolium* (4), Cinquefoil, *Potentilla* (2), False flax, *Camelina* (2), Sowthistle, *Sonchus* (2), Burnet, *Sanguisorba* (1), Fiddleneck, *Amsinckia* (1), Ladythumb, *Polygonum persicaria* (1), *Oxalis* (1), Ox-eye daisy, *Chrysanthemum leucanthemum* (1), Scorpion-weed, *Allo-carya* (1), Pigweed, *Amaranthus* (1), Vervain, *Verbena* (1), White campion, *Lychnis alba* (1), Wild lettuce, *Lactuca scariola* (1), Yarrow, *Achillea mille-folium* (1)

Miscellaneous monocots (81): Needlegrass, *Stipa* (9), Red fescue, *Festuca rubra* (9), Orchardgrass, *Dactylis glomerata* (8), Bentgrass, *Agrostis* (7), Spikerush, *Eleocharis* (7), *Poa palustris* (6), Junegrass, *Koeleria* (5), Slender fescue, *Festuca* (4), Velvetgrass, *Holcus lanatus* (4), Bulbose bluegrass, *Poa bulbosa* (3), Six-weeks fescue, *Festuca octoflora* (3), Tall fescue, *Festuca arundinacea* (3), Mannagrass, *Glyceria* (2), Big bluegrass, *Poa ampla* (2), Redtop, *Agrostis alba* (2), *Calamagrostis* (1), Goosegrass, *Eleusine indica* (1), Hair fescue, *Festuca capillata* (1), *Poa nemoralis* (1), *Poa scabrella* (1), Poverty oatgrass, *Danthonia spicata* (1), Vernalgrass, *Anthoxanthum* (1)





LAWN INSTITUTE

The new labeling scheme groups lawngrasses as fine-textured and coarse kinds. Representative of the fine-textured types, superior for show lawns, are the Kentucky bluegrass (top left) and fine fescue (bottom left) specimens shown here, contrasted to the coarse tall fescue (right).

*Fine Fescues, Festuca rubra*—Table 2 gives the same type of listing for 135 lots of fine fescue, that Table 1 showed for bluegrass. Here, too, a remarkably large number of lots—46%—contain no weeds at all. Only three lots contained as much as  $\frac{1}{2}$  of 1% weeds.

Although several of the weeds proved the same for fine fescue as for bluegrass, it is notable that coarse grasses are relatively more important as contaminants. The fairly frequent rat-tail fescue is of little concern; it is an annual species introduced from Europe, slender and not objectionable in appearance, disappearing from the lawn should it even gain a start. Farther down the list, Kentucky bluegrass, typically mixed with fine fescues in seed blends, would certainly offer no concern.

However, brome grass, orchard grass and tall fescue might all be "crop" of concern. Fine fescue free of these would certainly be preferable, even though their incidence is not high. Velvet grass can be a serious weed. Slender wheat grass is not the pest some agropyrons are, being among the species that lack creeping rhizomes. Ryegrass, though a "coarse kind," would likely not persist in eastern lawns.

Pennycress, sorrel and dandelion are controllable with 2,4-D and dicamba

herbicides, and most of the miscellaneous dicots are not apt to persist in a mowed lawn. It is notable that fine fescue seed is so relatively free of serious dicotyledon pests.

In the Seed Technology records, there is no way of noting place of origin for most seed lots. However, it is reasonable to suppose that much of the "Creeping red" fescue is imported from western Canada. Often this is of lesser quality than named varieties (which come only from Oregon). The Canadian seed is mostly gathered from volunteer meadows receiving little attention, while Oregon grass is typically grown as a cultivated crop—is fertilized, weeded and rogued by attentive growers. But whatever its origin, fine fescue free of tall fescue (and other haygrasses) should certainly merit greater package acceptance, and would seem worthy of a premium over run-of-the-mill fine fescue.

*Bentgrass, Agrostis tenuis and A. palustris*—The lots of bentgrass available for Table 3 were limited in number. Nevertheless, it is indicative of the pains taken in growing bentgrass for seed in Oregon, that 50% of the lots contain no weeds at all, 80% less than  $\frac{1}{10}$ th of one percent weeds, and only a single lot had more than  $\frac{1}{2}$ % weeds.

The weeds showing up most frequently are really more pests of the seed fields,



**TABLE 2**  
**Fine Fescue, *Festuca rubra***

Number of lots checked—135

Number which contained no weeds—62—46%

Number of lots that contained less than 1/10th of one percent weeds—105—78%

Lots with more than 1/2 percent weeds (highest .75%)—3—3%

|   | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|---|-------------------|--------------------------------------|------------------------|
| Rat-tail fescue, <i>Festuca myuros</i>            | 40                | 1-255                                | 40                     |
| Slender wheatgrass, <i>Agropyron trachycaulum</i> | 30                | 6-57                                 | 20                     |
| Bromegrass, <i>Bromus</i>                         | 29                | 6-43                                 | ca. 14                 |
| Ryegrass, <i>Lolium</i>                           | 28                | 5-354                                | 50                     |
| Orchardgrass, <i>Dactylis glomerata</i>           | 19                | 2-99                                 | ca. 37                 |
| Pennycress, <i>Thlaspi</i>                        | 13                | 1-5                                  | ca. 1                  |
| Velvetgrass, <i>Holcus lanatus</i>                | 11                | 1-105                                | 16                     |
| Sorrel, <i>Rumex acetosella</i>                   | 10                | 1-14                                 | 5                      |
| Kentucky bluegrass, <i>Poa pratensis</i>          | 9                 | 2-184                                | 57                     |
| Tall fescue, <i>Festuca arundinacea</i>           | 9                 | 2-28                                 | 17                     |
| Dandelion, <i>Taraxacum officinale</i>            | 8                 | 1-28                                 | ca. 10                 |
| Foxtail barley, <i>Hordeum jubatum</i>            | 6                 | 2-14                                 | ca. 10                 |
| Sedges, <i>Cyperaceae</i>                         | 6                 | 2-14                                 | ca. 12                 |

Miscellaneous dicots (31): Catsear, *Hypochoeris* (5), Alsike clover, *Trifolium hybridum* (4), Flax, *Linum* (4), Avens, *Geum* (3), Camomile, *Anthemis* (3), Cinquefoil, *Potentilla* (3), Sweet clover, *Melilotus* (3), Chervil, *Chaerophyllum* (2), Burnet, *Sanguisorba* (1), English catchfly, *Silene anglica* (1), Shepherd's purse, *Capsella bursa-pastoris* (1), White clover, *Trifolium repens* (1)

Miscellaneous monocots (25): Annual bluegrass, *Poa annua* (5), Bentgrass, *Agrostis* (3), Hairgrass, *Deschampsia* (3), Chess, *Bromus* (2), Foxtail, *Alopecurus* (2), *Puccinellia* (2), Vernalgrass, *Anthoxanthum* (2), Wild barley, *Hordeum* (2), Needlegrass, *Stipa* (1), Redtop, *Agrostis alba* (1), Rough bluegrass, *Poa trivialis* (1), Timothy, *Phleum pratense* (1)

**TABLE 3**  
**Bentgrass, *Agrostis tenuis* and *A. palustris***

Number of lots checked—30

Number which contained no weeds—15—50%

Number of lots that contained less than 1/10th of one percent weeds—24—80%

Lots with more than 1/2 percent weeds (highest .52%)—1—5%

|   | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|---|-------------------|--------------------------------------|------------------------|
| Silver hairgrass, <i>Aira caryophylla</i> | 9                 | 28-1420                              | 100                    |
| Chickweed, <i>Cerastium</i>               | 3                 | 28-113                               | 60                     |
| <i>Juncus</i>                             | 3                 | 113-170                              | 130                    |

Miscellaneous dicots (6): Shepherd's purse, *Capsella bursa-pastoris* (2), Black seed plantain, *Plantago rugelii* (1), *Erysimum* (1), Hawkweed, *Hieracium* (1), *Sisymbrium* (1)

Miscellaneous grasses (7): Kentucky bluegrass, *Poa pratensis* (2), Velvetgrass, *Holcus lanatus* (2), Annual bluegrass, *Poa annua* (1), Rough bluegrass, *Poa trivialis* (1), Windgrass, *Apera* (1)



TABLE 4  
RYEGRASS, *Lolium multiflorum* and *L. perenne*

Number of lots checked—90  
 Number which contained no weeds—8—9%  
 Number of lots that contained less than 1/10th of one percent weeds—37—41%  
 Lots with more than 1/2 percent weeds (highest 2.03%—5—6%)

|   | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|---|-------------------|--------------------------------------|------------------------|
| Rat-tail fescue, <i>Festuca myuros</i>  | 71                | 6-693                                | 56                     |
| Velvetgrass, <i>Holcus lanatus</i>      | 38                | 6-147                                | 20                     |
| Bromegrass, <i>Bromus</i>               | 25                | 1-28                                 | 10                     |
| Annual bluegrass, <i>Poa annua</i>      | 15                | 1-28                                 | 3                      |
| Foxtail, <i>Alopecurus</i>              | 11                | 2-17                                 | 8                      |
| Tall fescue, <i>Festuca arundinacea</i> | 8                 | 6-60                                 | 25                     |
| Sorrel, <i>Rumex acetosella</i>         | 8                 | 1-11                                 | 6                      |
| Vernalgrass, <i>Anthoxanthum</i>        | 7                 | 6-113                                | 30                     |
| Dock, <i>Rumex</i>                      | 7                 | 1-6                                  | 4                      |

Miscellaneous dicots (21): Buttercup, *Ranunculus* (5), Corn cockle, *Agrostemma* (4), Hedge parsley, *Torilis* (3), Cresses, *Cruciferae* (2), Burnet *Sanguisorba* (1) Chervil, *Chaerophyllum* (1), Fiddleneck, *Amsinckia* (1), Flax, *Linum* (1), Hop clover, *Trifolium* (1), Vetch, *Vicia* (1), White clover, *Trifolium repens* (1)

Miscellaneous monocots (25): Kentucky bluegrass, *Poa pratensis* (6), Foxtail barley, *Hordeum jubatum* (4), Red fescue, *Festuca rubra* (3), Bristly dogs-tail, *Cynosurus* (2), Hairgrass, *Deschampsia* (2), Orchardgrass, *Dactylis glomerata* (2), Bentgrass, *Agrostis* (1), Rough bluegrass, *Poa trivialis* (1), Redtop, *Agrostis alba* (1), Slender fescue, *Festuca* (1), Timothy, *Phleum pratense* (1), Windgrass, *Apera* (1)

than of the lawn. Velvetgrass and annual bluegrass seem to appear infrequently, fortunately. With most other contaminants bentgrass should be able to dominate the population readily, or have the weed eliminated from the lawn rather easily with herbicides.

Ryegrass, *Lolium multiflorum* and *L. perenne*—Table 4 indicates weeds accompanying ryegrass, judged from 90 lots checked. Foreign seed in ryegrass is not unusual, attested to by a mere 9% of the lots which contained no weeds at all. But this is not so serious as it might superficially seem, since ryegrass itself is used for rough turf, where coarseness is not so much of consequence.

Nevertheless, where ryegrass is used as a nurse species in some seed mixtures, or for winterseeding bermuda in the South, it obviously can bring in unpleasant contaminants. Rat-tail fescue is no great hazard to lawns, of course, although the next three weeds listed (velvetgrass, bromegrass and annual bluegrass) can all be serious. Perhaps even more so would be the sixth most fre-

quent weed, tall fescue, a persistent, coarse clumpgrass through most of the United States.

Compared to the other frequently used nursegrass, redtop (to be reviewed in a moment), ryegrass is relatively clean. Nevertheless, its addition to seed blends of bluegrass, fine fescue and bentgrass can downgrade their quality, not only because ryegrass itself is of questionable value, but for the greater incidence of weeds it may carry in contrast to the fine-textured species.

Redtop, *Agrostis alba*—Table 5 shows a weed sampling of the second familiar nursegrass, redtop (ryegrass being the other). The weed situation with this "coarse kind" grass is even more serious than with ryegrass, judged by how many lots contain contaminants. However, except for timothy, the contaminants are not apt to be too serious.

It will be noted from Table 5 that yar-row appeared in every lot of redtop checked, and that timothy (which can be a rather serious "coarse grass" pest) occurred in the majority of them. It is evident that when redtop is mixed in





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A carefully tended, agriculturally-grown fine fescue field in Union County, Oregon. Note the uniform rows of grass, in fields kept free of weeds or off-types.

**TABLE 5**  
**REDTOP, *Agrostis alba***

Number of lots checked—55

Number which contained no weeds—none

Number of lots that contained less than 1/10th of one percent weeds—2—3%

Lots with more than 1/2 percent weeds (highest 6.82%)—22—40%

|   | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|---|-------------------|--------------------------------------|------------------------|
| Yarrow, <i>Achillea millefolium</i>             | 55                | 57-46036                             | 2000                   |
| Timothy, <i>Phleum pratense</i>                 | 41                | 57-2550                              | 800                    |
| Kentucky bluegrass, <i>Poa pratensis</i>        | 24                | 28-2183                              | 300                    |
| Black-eyed susan, <i>Rudbeckia hirta</i>        | 22                | 28-567                               | 120                    |
| Sneezeweed, <i>Helenium</i>                     | 18                | 28-1700                              | 120                    |
| Deptford pink, <i>Dianthus armeria</i>          | 16                | 57-397                               | 100                    |
| Sedges, <i>Cyperaceae</i>                       | 14                | 57-567                               | 100                    |
| Fleabane, <i>Erigeron</i>                       | 12                | 57-567                               | 190                    |
| <i>Juncus</i>                                   | 11                | 57-2835                              | 570                    |
| Cinquefoil, <i>Potentilla</i>                   | 9                 | 28-851                               | 210                    |
| Plaintain, <i>Plantago</i>                      | 9                 | 1-686                                | 28                     |
| Canada bluegrass, <i>Poa compressa</i>          | 6                 | 57-3180                              | 270                    |
| Ox-eye daisy, <i>Chrysanthemum leucanthemum</i> | 6                 | 1-85                                 | 25                     |

Miscellaneous dicots (13): Strawberry clover, *Trifolium fragiferum* (4), Chickweed, *Cerastium* (3), Hop clover, *Trifolium* (2), Klamath weed, *Hypericum* (1), Mullein, *Verbascum* (1), Sleepy catchfly, *Silene antirrhina* (1), Speedwell, *Veronica* (1)

Miscellaneous monocots (3): Rat-tail fescue, *Festuca myuros* (2), Rough bluegrass, *Poa trivialis* (1)



with finer-textured grasses in seed blends, that it brings in a rather wide assemblage of contaminating "weeds" not likely to be present at all in the basic grasses.

*Tall Fescue, Festuca arundinacea*—Table 6 reflects examination of 46 lots of tall fescue, which, although hardly a lawn species, is being spread widely these days throughout the eastern United States for the seeding of highway berms. Isolated clumps of tall fescue are one of the worst and most difficult weeds in finer-textured lawns, and seem to be becoming the most serious weed pest in lawns over a large section of the Midwest. In that it itself is so objectionable in finer-textured turfs, it perhaps can be argued that contamination with other coarse haygrasses is of little concern. It is unfortunate that tall fescue is sometimes put in "lawn" seed mixtures intentionally, both because of its own objectionable characteristics, and because other serious coarse grasses can be introduced, too.

In keeping with the other "coarse kind" grasses reviewed here, as contrasted to the three "fine-textured" spe-

cies, tall fescue, too, is relatively weedy—only 24% of the lots being entirely free of contaminants. With the remaining 76% of the samples checked, the weeds were largely of a serious sort—coarse grasses that persist, and several non-grasses that can be hard to get rid of (viz. sorrel, wintergrass, wild onion, etc.).

*Crabgrass, Digitaria* has overwhelmingly the worst reputation among lawn seeds. Less astute homeowners tend to call any coarse grass crabgrass (and frequently blame crabgrass preventers for not working when applied to such pests as tall fescue). Similarly, it is a common misconception to blame a crabgrass lawn on the lawn seed sowed.

The foregoing tables certainly point out that this cannot be the case. Among the more than 600 seed lots examined, not even a single crabgrass seed was found. When crabgrass turns up in the lawn it is almost surely there from residual seed in the soil, or newly tracked in from a neighbor's stand. It is well known that crabgrass seed can endure

TABLE 6

TALL FESCUE, *Festuca arundinacea*

Number of lots checked—46

Number which contained no weeds—11—24%

Number of lots that contained less than 1/10th of one percent weeds—22—48%

Lots with more than 1/2 percent weeds (highest 3.81%)—5—11%

|   | Times<br>Appeared | Range of<br>Frequency<br>(Seeds/oz.) | "Average"<br>Frequency |
|---|-------------------|--------------------------------------|------------------------|
| Orchardgrass, <i>Dactylis glomerata</i> | 36                | 6-9780                               | 200                    |
| Chess, <i>Bromus</i>                    | 21                | 1-370                                | 46                     |
| Ryegrass, <i>Lolium</i>                 | 20                | 6-45                                 | 16                     |
| Bromegrass, <i>Bromus</i>               | 16                | 1-289                                | 65                     |
| Dock, <i>Rumex</i>                      | 12                | 1/2-11/2                             | 1                      |
| Sedges, <i>Cyperaceae</i>               | 11                | 1-62                                 | 30                     |

Miscellaneous dicots (18): Sweet clover, *Melilotus* (5), Sorrel, *Rumex acetosella* (4), Ox-eye daisy, *Chrysanthemum leucanthemum* (2), Bitter wintercress, *Barbarea vulgaris* (1), Camomile, *Anthemis* (1), Cinquefoil, *Potentilla* (1), *Lespedeza* (1), Peppergrass, *Lepidium* (1), Plaintain, *Plantago* (1), White clover, *Trifolium repens* (1)

Miscellaneous monocots (23): Kentucky bluegrass, *Poa pratensis* (5), Wild onion, *Allium* (4), Meadow fescue, *Festuca elatior* (3), Timothy, *Phleum pratense* (3), Rat-tail fescue, *Festuca myuros* (2), Bulbous bluegrass, *Poa bulbosa* (1), Foxtail, *Alopecurus* (1), Foxtail barley, *Hordeum jubatum* (1), *Juncus* (1), Red fescue, *Festuca rubra* (1), Velvetgrass, *Holcus lanatus* (1)



many years in the soil; in fact, only a portion from a given year's seed crop sprouts the year set, additional seeds intermittently thereafter if exposed.

There are many reasons why crabgrass is not found in lawn seed, including diligence on the part of the growers, absence of crabgrass from many seed producing regions, inability of crabgrass

to compete in the seed fields (in shade of other grass), low seed heads that would likely not be stripped, later seeding season than most lawngrasses, etc. But even should a crabgrass seed be picked up from the field, the seed is dissimilar enough compared to better lawn seeds as to be eliminated readily in the cleaning operations.

There are various methods of harvesting lawn seed. In Oregon, where the grass is grown solely for seed, ripe seeds are often swathed and windrowed in the field, then field-combined before bringing the rough seed to the centrally located cleaning plant. This scene is near Summerville, Oregon.

UNION PACIFIC RAILROAD





# History, Breeding and Cultivation of the Canna

By JOSEPH W. DONAHUE

For those of us who are old enough to remember, the word "Canna" brings to mind the tall, green or bronze-leaved plants with minuscule red or yellow flowers that cluttered our public parks, private estates and most suburban railroad stations from the latter part of the 19th century up to World War I.

Usually arranged in large masses in an oval or circular pattern, they were cherished for their large musa or banana-like foliage, reminding one of the tropics. As with all products of nature, man was not content with the status quo of the canna and proceeded to enlarge the flowers and dwarf the stalk by cross-pollinating and selection between the species.

*Canna* is a genus of erect, perennial herbs, chiefly native to tropical America and the East Indies, often tall-growing and inhabiting damp or marshy terrain. The rootstock is a tuberous rhizome and the unbranched stalk is characterized by large, alternate, broad, ornamental, entire leaves green or bronze colored. The highly colored showy "petals" are actually staminoids and give the appearance of ordinary petals. The pollen bearing anther is short and stiff and attached to the margin of an inner coiled staminodia. The style is long, single, thin, with lanceolate club or flat end.

The fruit or seed pod is a three-celled spiny capsule containing numerous, black, hard, roundish, shot-like seeds. The early name of cannas—"Indian Shot" plant—was derived from the ap-

pearance of these seeds. *Canna indica* was introduced into Europe in 1596 and grown in orangeries and sub-tropical gardens for its foliage. Its flowers are small and narrow and of red-yellow color with minute spots of red. It grows about 3-5 feet tall. Its natural habitat is the West Indies, South and Central America.

In the year 1848 Annee of France crossed *C. glauca* with *C. nepalensis* and developed a new garden type called *C. 'Annee André'*. This variety became so popular especially in Paris, that over 20,000 plants were placed in the squares and parks of Paris in 1861. Later in 1863 Annee made a cross between *C. warscewiczii* from Costa Rica and *C. iridiflora* from Peru that resulted in a dwarfer canna with larger flowers. This hybrid was named *C. × ehemannii* and although developed in Paris, it was distributed in Germany by M. Kolb, inspector of the Botanic Gardens, Munich. This canna variety although growing up to six feet tall had larger flowers than previous types and was characterized by its pendant lily-like flowers of fuchsia-red with a hint of purple. It is still possible to purchase this variety from bulb dealers.

Up to this time all canna hybrids offered were tall-growing plants and the public taste for bedding cannas demanded dwarfer types with larger flowers. Antoine Crozy, a nurseryman of Lyons, France is credited with being the first to raise garden cannas and in 1868 he exhibited many of his hybrids at the Paris Exhibition. Crozy crossed *C. warscewiczii* and *C. nepalensis* followed by *C. aureopicta*. From these crosses he obtained improved dwarf varieties of better sub-

(Note: Throughout this article when flowers or petals are mentioned, I refer to the broad petal-like staminodia of which the canna possesses usually three in addition to a narrow reflexed tongue.)



stance, rounder, broader petals and very large flower heads which were held more erect, and were early flowering. In addition they withstood rain and adverse weather better than the older varieties.

Some of Crozy's cannas such as 'Madame Crozy' and others under new names can still be purchased from dealers in this country. Antoine Crozy was so devoted to cannas that the children of Lyons affectionately called him "Papa Canna" and one of his best varieties was named 'Papa Canna.'

Crozy's success was an incentive to many other nurserymen in England, Germany, France, and Italy to start developing new varieties, for while the luxuriant tropical foliage of the canna was used for decorative purposes, the demand was for dwarfier plants, larger flowers and a greater range of colors. The race of cannas developed by Crozy, Vilmorin, Lemoine, Sisley and other French nurserymen were called "Crozy" or "French" cannas. They were mostly of the Gladioli or large-flowering type.

The greatest impact on the canna world came in 1895 when the firm of Dammann and Company of Italy placed on the market a large "Orchid-flowering" or "Giant-flowering" canna named 'Italia' which had been developed by Mr. Sprenger. Another variety named 'Austria' soon followed. These hybrids were developed by crossing 'Madame Crozy' with *C. flaccida* the wild species of Florida and the southeastern U.S. These cannas were called "Italian" or "Orchid-flowering" because the staminoids were as broad as they were long and in texture and appearance resembled orchids.

A strange coincidence occurred at this time—Luther Burbank in California independently developed and introduced a canna variety contemporaneously with 'Italia', naming it 'Tarrytown', using the same parent stock—'Madame Crozy' × *C. flaccida*. From this time on the flood gates of canna hybridizing were opened wide, with Crozy in 1895 introducing 20 new varieties and listing in his catalog 220 varieties by other nurserymen.

In Stuttgart, Germany, William Pfitzer developed in 1893 'Queen Charlotte' (Konigen Charlotte) which resembled Crozy's 'Madame Crozy'.

It may be interesting to show the genealogy of the above mentioned canna crosses—



In 1895 the U.S. Dept. of Agriculture introduced a canna named 'Black Beauty' and although the red flowers were small and insignificant, the beautiful leaves of dark, shining purple with waved and crimped edges was a novelty in cannas. This canna was used as a parent plant to produce many of our present day bronze or purple-leaved varieties.

Dr. Van Fleet of the Dept. of Agriculture who was an expert on roses, produced the first near white canna named 'Alsace' in 1894, and the first bright red canna which was named 'Fleming'. He was probably the first American plant breeder to apply scientific principles in the hybridizing of cannas and roses. Some of his work was performed in the fields and greenhouses of the Dingee and Jones Co., of West Grove, Pa., (Later reorganized as the Conard and Jones Co., in 1897 and now called Conard and Pyle Co.)

In 1894, Antoine Wintzer, a Frenchman employed by Dingee and Conrad Co., who had been breeding roses for many years, teamed up with Dr. Van Fleet in the hybridizing of cannas. In a short while Dr. Van Fleet returned to rose breeding and Antoine Wintzer started the canna breeding program which was to result in developing over 75% of the new varieties on the American market.

Wintzer was determined to produce better cannas than the European types "with the object of improving the strain and creating some new and desirable varieties suitable for our trying climate."

His first objective was to produce a pure yellow canna. Starting with 'Madame Crozy' and 'Star of 1891', his first



result was 'Golden Star' followed by an almost pure yellow 'Coronet'. By crossing these two varieties—'Buttercup' was produced. This had the desirable qualities—pure yellow color, dwarf, free blooming, dropped dead flowers, non-fading in bright sun, small, hard tubers which were ideal for pot culture.

Wintzer followed his first success by developing and introducing on the American market over 100 new varieties of cannas until his death in 1923. Most of the present day cannas offered by dealers were developed by Wintzer and very few of the French and Italian varieties are existent. Two popular groups of cannas which were largely responsible for the present renewal of interest in cannas are the "Grand Opera Series" and the "Pfitzer Dwarfs." The later group was developed in Germany prior to World War II by William Pfitzer who was the grandfather of the present William Pfitzer, nurseryman of Stuttgart, Germany. Mr. Pfitzer has informed me that he has no information on the development of these cannas, such as parentage, dates, etc. This group was placed on the market in 1950 and consisted of four—'Puck', primrose yellow, 'Perkeo', cherry-red, 'Gnom', shell-pink and 'Alberich', Chinese coral. The "Grand Opera Series" were developed and introduced by Howard and Smith, nurserymen of Los Angeles, California about 1930, but again no information as to parentage or dates is available.

The popular and only white canna presently available—'Eureka' was developed by Henry Dreer, a nurseryman of New Jersey about 1918. Incidentally—all of the various "white" cannas developed by Wintzer—'Mont Blanc', 'Montano', 'Starlight', and 'Blanche Wintzer'—have all disappeared from the scene. Other varieties were developed by amateur breeders but since no records exist as to dates, parentage, etc., it is impossible to give them credit.

The great difficulty in identifying present day cannas varieties lies in the fact that new names have been applied

to the original variety. It is only by a search of old flower catalogs, horticultural journals and garden magazines that some present day cannas may be correctly identified.

A conservative estimate of the number of canna varieties developed by all breeders both American and European would be in excess of 1000. In "Standardized Plant Names" 2nd Ed. 1942 there are listed about 600 names and of these only about 60 are available today under the original names. A few canna varieties developed by Wintzer are still available—'The President', 'Mrs. Alfred F. Conard', 'Mrs. Pierre S. duPont', 'Apricot', 'Pillar of Fire', 'Venus', 'City of Portland', 'Indiana', and 'Wyoming'.

After the first World War, the demand for cannas began to decline and by the time of the depression, most canna raisers ceased or curtailed their operations. The Second World War put the quietus on commercial canna growing. From about 1950 when the exodus of city dwellers to the suburbs took place, a resurgence of interest in cannas as decorative plants for the homestead has developed.

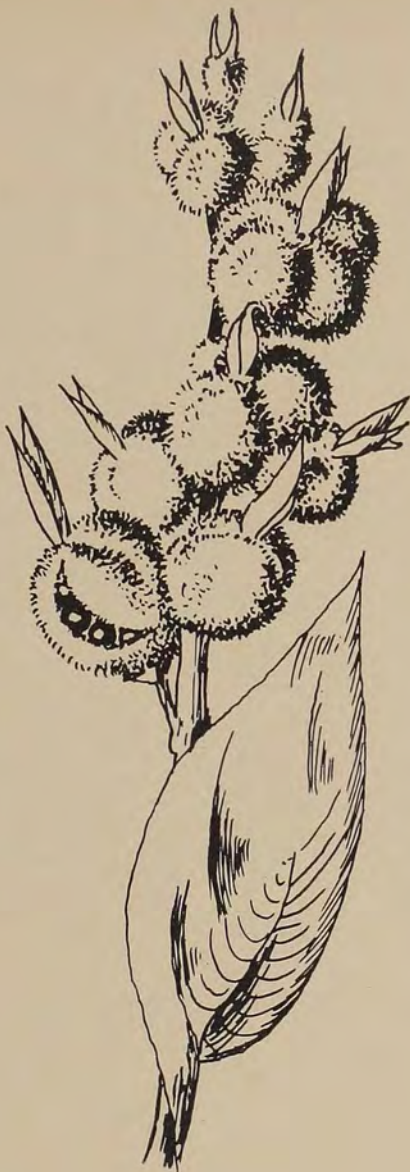
Although only about 60 canna varieties are offered by dealers, a diligent perusal of the various catalogs will unearth up to possibly 100 additional varieties. Some of these have been raised by several generations of farmers' wives in their home flower plots, but unfortunately the original name of many of the varieties has been forgotten or new names applied, so that it is possible to purchase sight unseen the same canna variety under several different names. This can be a cause of disappointment to the canna collector to purchase rhizomes from several different sources, sometimes at inflated prices and under fancy names, wait for months until they flower and then discover that they are all of the same variety. From the sources mentioned above, I have been able to collect over 150 varieties and 10 species. The Plant Buyers Guide, 6th Ed. 1958, lists about 65 varieties available from U.S., European, and Brazilian sources.

The best source of information for the canna collector in identifying varieties is from old seed and flower catalogs such as those of Conard and Jones Co., Vaughan Seed Co., and others. These catalogs may be found in a few Horticultural libraries particularly at Cornell Univer-

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Canna seed capsules

DRAWINGS BY THE AUTHOR

sity. Complete descriptions and pictures of many cannas are contained in these catalogs. Another source is in the early issues of various horticultural magazines such as *Gardeners Chronicle*, *Horticulture*, *American Gardening*, and *Revue Horticole*. With these descriptions and sometimes photographs as a guide, it is possible to identify and correctly name many of our present multi-named varieties. Although "Standardized Plant Names" lists about 600 varieties by name, there are no descriptions. From the sources mentioned above I have person-

ally compiled data on over 1000 canna varieties dating back to the early 1800's.

### Propagation of the Canna

Propagation of the canna is by planting the seeds or by dividing the rhizomes. For those who are interested in obtaining new varieties, the growing of seedlings is the only way that this can be accomplished. The blooming of seedlings can be a disappointing or happy experience with results as follows: 1. a new improved variety, 2. a variety similar or



slightly different to one of the parents, 3. a reversion to the ancestral wild species parent.

After performing many experiments aimed at germinating the largest number of seeds in the shortest period, I have found that the following procedure gives the best results. Soak the seeds in cold 5% copper sulphate solution for 30 minutes, rinse in fresh water and allow to dry, or use one part of household bleaching solution to 10 parts of water in lieu of the copper sulphate. The hard shell of the seed is scarified by grasping the smaller diameter with a pair of pliers and carefully rubbing the end of the seed on carborundum paper (#3 grit) until the white "meat" of the embryo just barely is disclosed, the other end is treated in the same manner. With experience this operation can be performed very rapidly. Place the seeds in hot water 160-180 degrees and allow to stand in a warm place for about 24 hours. Any seeds that tend to float should be discarded as they are probably not viable. Renewing the hot water periodically during the period will accelerate the absorbing of water by the seeds, causing them to swell.

The seeds are now planted in new, unused, dry vermiculite contained in plastic trays, spacing them about 2" apart and 1/2" deep. Moisten the vermiculite with warm water but do not soak. Wrap the tray with plastic sheet to keep all moisture in—this makes it essentially a miniature greenhouse. Place the tray in a warm, dark closet. In from 5 to 7 days, green shoots resembling corn will appear above the vermiculite. When the shoots have grown to about 1" high, remove the plastic wrapping and move the tray to a sunny outdoor location if in mild weather, otherwise place indoors in a sunny window. Keep vermiculite moist with warm water or a dilute solution of a soluble fertilizer until the seedlings have grown to 2-3" high. They can then be transplanted to individual pots or directly to the garden; placing them 12-15" apart in a warm sunny place.

If one is merely interested in increasing the quantity of plants then the rhizome may be divided by breaking or cutting. It is best to leave several "eyes" on the divided portion, for if divided into too small pieces it will take a much longer time for the plant to mature and

produce flowers. Cannas may be divided at any stage of growth, even when flowering with no danger of shock or setback to the plant.

### Pollinating the Canna

The majority of flowers open during the night or early morning. The pollen mass tends to drop from the style as the morning advances and becomes warmer so the best time to perform the pollinating operation is in the cool of the morning from 6 to 8.

The white or yellow pollen mass is found lightly adhering to the underside of the style about 1/2" from the stigma. This may be detached by touching with the index finger or by using a small artist's brush. To recover the maximum amount of pollen I find it expedient to use a small bottle cap held under the pollen as it is detached so that any loose pollen will drop into the cap. The cap also provides a simple container for storing the pollen for use immediately or for preserving in the refrigerator for future use. The actual act of pollinating is simple—the pollen is picked up with the index finger or the artist's brush and as much as possible is rubbed on the stigma of the flower to be pollinated. As the stigma is slightly sticky the pollen will adhere. Some canna varieties do not produce pollen while others, particularly the "Italian" or "Orchid-flowering" types are sterile. The well known variety 'The President' is sterile. The sterile varieties can usually be recognized by the broad stigma which is thick and blunt or misshapen. The non-sterile varieties usually have a narrow, pointed style. Shortly after pollinating the stigma, the flower dies and the ovary starts to swell. Inspect the ovary every few days for evidence of growth. If after 1-2 weeks the ovary is still small, one should be broken open and examined.

If many tiny white seeds are present, it is an indication that the pollen did not impregnate the ovule and fertilization has not taken place. If on the other hand the ovule was receptive, the growth of the capsule will be rapid. The capsule during growth will be green and covered with nodules and assume well defined creases externally, indicating the shape of the three internal carpels.

Ripening of the capsule will be complete in 2-3 weeks and is indicated by the nodules assuming a gray or black color.



The nodules may then be readily detached from the capsule by rubbing with the fingers, which will expose the gray colored fibrous covering of the capsule. At this point the carpels will start to split open exposing the dark brown or black seeds loosely held in the carpel. Gather the seeds by cutting or twisting off the capsule. There may be several capsules on the stem and they will ripen individually over a period of days. When the last capsule has been gathered, the stem of the plant should be cut off just above the top leaf. As a good deal of food is required from the plant in the formation of the seeds, little is available for the growth of new "eyes" on the rhizome, so if rapid growth of the rhizome is preferred, the stem should be cut off as indicated above, immediately after final flowering, and not allow the plant to develop seeds.

The number of seeds formed in each capsule vary from one to about 15 and in size from about  $\frac{1}{8}$ " to  $\frac{3}{8}$ " in diameter. Usually seeds from species are small and round while those from hybrids are large and oval shaped. The fully ripened seeds will be black but sometimes in the capsule unripe seeds which are white and soft will be found. It is best to immediately plant these seeds if possible because on keeping they will become dried out and shrivelled and lose their viability. Seeds as collected, should be placed in a cool, shady place to dry for several days, and then stored in open containers. If stored in closed containers immediately after gathering, they may become mouldy, particularly if damp.

Due to the fact that our contemporary hybrid cannas are the result of many crosses through the years in which the original parentage has been lost or is unknown, it would be necessary to breed by self-pollination through many generations to bring out any detrimental recessive characteristics before starting a scientific cross-breeding program. The serious breeder could strive toward improving the canna in various ways, viz; development of a blue, white or purple; double flowers; greater cold resistance; scented; better winter storage capability; more resistance to disease and insect damage; dwarfiness, etc.

For quicker results and less work, the cross-pollination between available varieties will result in many new and different

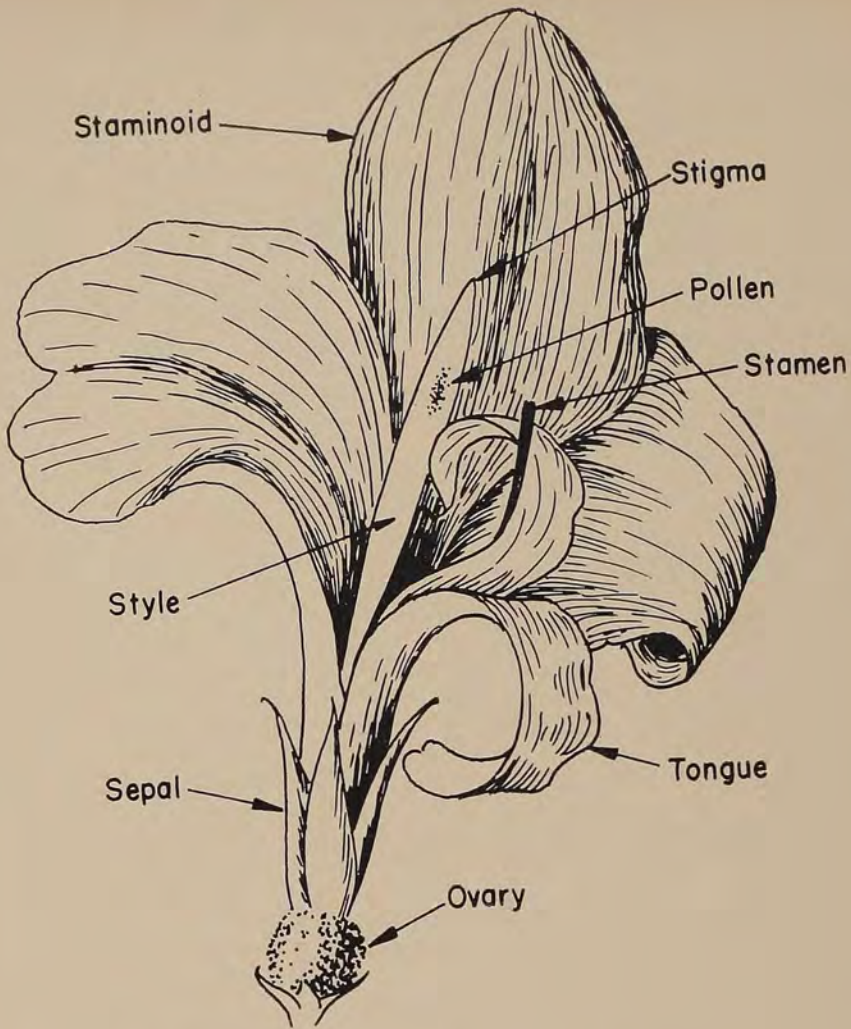
kinds. From about 250 seedlings set out in March here in Florida, I usually obtain about 35-50 new varieties differing from the parent types. A unique advantage of specializing in breeding cannas is that seeds may be planted indoors in winter, the young plants set outside in March, these will flower by May or June and can be cross-pollinated, set seed and this seed planted to flower and set seed by Sept., or Oct. Thus it is possible to see the results of two crosses in one season and if one has a greenhouse it is possible to obtain three seed crops in a year. Possibilities exist in improving the canna through the use of colchicine, which holds promise for its capability in increasing the chromosome number and the production of polyploids, which could result in larger flowers and viable pollen in some of the sterile varieties. Treating canna seeds with x-rays or atomic radiation to cause mutations might also produce spectacular results.

#### Cultivation of the Canna

As cannas are tropical plants they require planting in full sun, plentiful watering and adequate fertilizing. Although they will grow in almost any type of soil, they prefer a deep, rich, loamy soil for best results. Cannas grown in shade will put out a fine display of foliage but will flower very sparsely. To prepare a bed for cannas, start in the early spring and dig the soil out to a depth of about 12", pulverizing it well and removing all stones and weeds. To each 100 square feet of area add 5-10 pounds of sheep manure or chicken manure, 2-3 bushels of well-rotted cow manure, several bushels of garden compost, and about 3-5 pounds of a good quality fertilizer high in phosphorous but low in nitrogen such as 5-8-8. The above ingredients should be well mixed with the garden soil by spading and raking. Water the soil well and allow it to remain until the weather is warm enough to set out the cannas. As the time to set out cannas will vary in many parts of the country, no set time can be given, but they should be planted at the usual planting time of dahlias. This will be when the night air has lost its chill and the maples and oaks are starting to leaf out.

If the stored, dried tubers are used they should be planted not over 3" deep with the "eyes" up and 12-18" apart. Potted cannas should be carefully





Structure of the Canna flower showing reproductive parts.

knocked from the pots and planted to the original depth in the pot, firming the soil well around the potting soil.

Canna seedlings may be spaced 6-8" apart until grown sufficiently large to transplant, unless they are intended to remain where planted, when they should have the same spacing as the older tubers.

After planting, water, but do not soak. If it is known beforehand which plants are tall growing, then these should be set in the back so as not to shade the lower growing plants. Water sparingly to keep the soil moist, but do not soak. This is particularly important if tubers have been planted, as soggy soil will rot them.

After growth has started, water at least twice each week, wetting the foliage at the same time. A mulch of peat moss with a little bone meal and fertilizer

should be placed around the growing plant, this keeps down weeds and conserves moisture in the ground. During the growing season frequent applications of small amounts of fertilizer well watered in will be very beneficial to the growth of the plant.

After the plant has flowered the stalk should be cut off just above the top leaf unless seeds are desired. This enables the leaves to manufacture food so that the rhizomes will send up new shoots. Cannas may be transplanted or the rhizomes divided at any time even when in flower, without danger of shock or setback.

Cannas are comparatively free from diseases and insect pests. In the southern states the main pest can be the leaf roller (*Hydrocampa cannalis*). This insect is a small light brown moth about one inch



in wing spread, identified by two brown-black, narrow lines running across both wings. The moth lays its eggs within the rolled, unopen leaf. When the eggs are hatched, the small worm or caterpillar, working usually at night, proceeds to sew the unopened leaf together with strands of a very strong, silky material. They do a very efficient job as the plant is unable to break the silken bonds as it grows. The gardener should cut these strands, open the leaf and crush the worm, for if left in the leaf it will eat the inner layers of leaves and also the flower bud as it forms, thus ruining the flower and making the leaves look unsightly. In other parts of the country, the Japanese beetle is a very destructive pest to cannas. In addition to the above pests, various grasshoppers and leaf hoppers may chew on the flower heads as they open. All of these pests may be kept under control by hand picking or by use of any of the insecticides for chewing insects.

The main diseases of the canna (although rare) are bacterial bud rot and rust. Bacterial bud rot usually manifests itself in the blackening of the unopened flower buds, leaving them in a rotted condition. The stalk should be cut back to the top leaf and the removed material destroyed. If this condition is very prevalent in many plants, a Streptomycin spray may clear up the condition. To guard against this disease, the dormant rhizomes, should be soaked in a 1:1000 solution of mercuric chloride for about two hours before planting in the spring. Rust is characterized by yellowish pustules on the under side of the leaves usually only after a long spell of wet weather. This is not a serious disease and usually can be neglected, but it can be controlled by spraying with Zineb.

### Winter Storage

Now that we have enjoyed our wonderful canna blooms all summer, the inevitable approach of winter is heralded by the first frost (unless we live in the deep south) which quickly blackens and kills the foliage. At this time the stalks should be cut off several inches above the ground and the rhizomes left in the ground as long as possible before a real hard frost occurs. This helps to make the rhizomes more dormant and less likely to start new growth when stored for the winter. Dig the rhizomes carefully,

leaving most of the soil adhering to the roots. The varieties should be labeled at this time so that come spring they will be identified for replanting. The rhizomes should be stored in a cool, dry place where the temperature is maintained about 40-55 degrees. They must be kept slightly moist all winter but never wet as this would tend to cause rotting. In the spring the clumps may be divided before planting. It is best to leave several "eyes" on each portion to give strength to the plant. In California and parts of the South, cannas may be left in the ground all winter, but a mulch of leaves should be placed over them, to add some protection against the unexpected cold.

Some canna varieties readily obtainable through dealers—Pfitzer dwarfs—dwarf plants about 24-30" high, in cherry red, yellow, pink, coral.

Grand Opera Series—various shades of peach, rose, yellow.

'The President'—probably the most popular canna-dwarf, about 24" high, glowing crimson with narrow gold border.

'Striped Beauty' also called 'King of Siam' and 'Bangkok'. This is a novelty canna from Thailand—green leaves with white veins and stripes, flowers light yellow with white stripe in center of each staminoid.

'Pride of India' or 'Taj Mahal'—from India—beautiful rose color flower different from all other cannas.

'Cleopatra' also called 'Spanish Emblem'—bears yellow and red and half red and half yellow flowers on same stem. Leaves may be green, bronze or green striped with bronze.

'Eureka'—creamy white (nearest to pure white canna).

'Red King Humbert'—bronze leaves, scarlet-orange flowers.

'City of Portland'—rose pink flowers.

'Florence Vaughan'—yellow with red spots.

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# Performance of Three Privet Introductions in the Upper Midwest

BY ALBERT F. DODGE, WILLIAM L. ACKERMAN AND HAROLD F. WINTERS

Proper evaluation of plant importations introduced by the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, is a lengthy process and its ultimate outcome is difficult to predict. Thus, many years must pass between the time a newly introduced tree or shrub is first released from quarantine and grown and tested at various state experiment stations, arboreta, park, and recreational agencies, and cooperating nurseries, before its merits can be recognized by nurserymen and be known by the public. An illustration of this fact was noted in advertisements that appeared in the *American Nurseryman* (1964) for two different privet species. Widely separated wholesale nursery firms were offering hedging plants as follows:

## PRIVET

### Amur River North Privet

| Size            | per 1000 |
|-----------------|----------|
| 18 to 24 inches | \$25.00  |
| 2 to 3 feet     | \$30.00  |

### Hardy Vulgare Privet

(Recommended for North and West,  
Plant Introduction No. 107630)

| Size            | per 1000 |
|-----------------|----------|
| 18 to 24 inches | \$170.00 |
| 2 to 3 feet     | \$200.00 |

The Amur River North privet, or *Ligustrum amurense* Carr., introduced from North China in 1860, has been a satisfactory hedge plant in the milder

portions of the midwest since the beginning of this century. Although this plant can be propagated in quantity without extensive loss from anthracnose disease, there still remains the matter of hardiness to heat, drought, and cold. The Amur River North cannot maintain itself when used in the northern prairies or in the central and northern high plains. It is for these difficult localities that the search for a better privet goes on.

Writing in the Iowa Agricultural Experiment Station Bulletin 18, 1892, Professor J. L. Budd observed that "the western European privet . . . is not hardy in Iowa, but varieties from Poland and Central Russia are proving to be hardy. . . ." More recently, two introductions of the common or European privet *Ligustrum vulgare* L., from Eastern Europe, serve to call attention to his early premise. These privets are bearing up well under adverse mid-continental conditions.

In 1910, Frank Meyer, the noted U. S. Department of Agriculture plant explorer, en route to Asia, picked fruits of

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a privet on a dry rocky mountainside near Sevastopol in the Crimea. This introduction, numbered P.I. 26767 by the USDA was received with the following statement from Meyer:

"A low bushy semi-evergreen privet, perhaps a variety of *L. vulgare*. Grows on dry rocky mountainsides in somewhat shady places. May prove of value as a small ornamental garden shrub. . . ."

Plants of P.I. 26767 were sent to the North Platte Experiment Station of the University of Nebraska in 1915. Observations on this accession for a 20-year period were summarized and P.I. 26767 was described as hardy at North Platte.\*

The second introduction with which we are concerned was made in 1934 by Edgar Anderson while he was seeking ornamentals with the Arnold Arboretum Balkan Expedition. He collected a privet in the dry hills of Yugoslavia. The seed, when introduced by the USDA, was identified as P.I. 107630, *Ligustrum vulgare*. Plants of this introduction were given wide distribution in 1937.

\*McComb, H. A. Trees, shrubs and vines at the North Platte Experimental Substation. Nebr. Agr. Sta. Bul. 310, 1937.

After only two years in trial, reports on the performance of this introduction then growing at Sioux Falls, South Dakota; Boise, Idaho, and Sheridan, Wyoming were favorable. Observers hoped that this plant would prove to be a hardy and useful hedge plant for all parts of the country where privets generally had not been successful.

In May 1953 Dr. A. C. Hildreth, then superintendent of the U. S. Horticultural Field Station, Cheyenne, Wyoming, pointed out plants of P.I. 107630 to the senior author. This plant was the only privet introduction which had been able to withstand the local (6100 feet altitude) environment successfully for an extended period of years.

At about the same time, Mr. Darrell Holmes, long associated with the nursery industry at Shenandoah, Iowa, obtained a start of the "hardy privet," P.I. 107630, following a visit to the Station at Cheyenne. Since then two southwestern Iowa wholesale nursery firms have been growing and marketing Dr. Anderson's introduction, to satisfy their customers' needs for a hardy privet. (Fig. 1).

Figure 1. A planting of *Ligustrum vulgare*, P.I. 107630, maintained as a low hedge since 1954 at the Regional Plant Introduction Station, Ames, Iowa.

PHOTOS BY THE AUTHOR







Figure 2. Amur River North privet and common privets P.I. 26767 and P.I. 107630 (left to right above), growing in trial plantings at the Horticulture Farm, Iowa State University, Ames, Iowa.

With the initiation in 1954 of regional trials of woody ornamental and shelter plants by several north central state agricultural experiment stations, cooperating with the North Central Regional Plant Introduction Station, Ames, Iowa, and the Crops Research Division, ARS, USDA, it was possible to make comparative adaptation plantings of specific trees and shrubs over a large part of the mid-west.\*

Included in the 1956 trials, through the generosity of L. R. Sjulín, Inter-State Nurseries, Hamburg, Iowa, were sufficient plants of the Amur River North privet and the two common privet introductions (P.I. 26767 and P.I. 107630) for comparative planting at 27 trial sites in nine states. (Fig. 2) Many of these sites represent areas where privet is not

normally planted; therefore, one might expect an inordinately severe loss of trial plants.

Reports from regional trial cooperators, with respect to the performance of these privets over a five-year period give some indication of their value at different locations in the region. Survival record, plant loss record, condition and size of plants, and observations on characteristics of the plants under trial are presented.

### Survival

A summary (Table 1) of the five-year survival reports from 15 trial sites indicates that the Amur River North, *Ligustrum amurense*, occupies an intermediate position between the two common privets under trial with respect to the number of plantings with perfect stands and the number of plantings with no living plants. Furthermore, the survival record for P.I. 107630 was somewhat more favorable than either Amur River North or P.I. 26767.

\*Dodge, A. F. North Central Regional Plantings of Woody Ornamental and Shelter Plant Introductions. Proc. Plant Prop. Soc. 12: 179-199. 1962.



**Table 1. The number of plantings of three privet accessions when arranged by five-year survival percentage classes.**

| Five year survival Percent | Privet Accessions in Regional Trial |                                     |                               |
|----------------------------|-------------------------------------|-------------------------------------|-------------------------------|
|                            | Ligustrum vulgare P.I. 26767        | Ligustrum amurense Amur River North | Ligustrum vulgare P.I. 107630 |
|                            | Number of Plantings                 |                                     |                               |
| 91-100                     | 6                                   | 7                                   | 11                            |
| 81-90                      | -                                   | -                                   | -                             |
| 71-80                      | 1                                   | -                                   | 1                             |
| 61-70                      | 2                                   | 3                                   | 2                             |
| 51-60                      | 2                                   | -                                   | -                             |
| 41-50                      | 1                                   | 2                                   | -                             |
| 31-40                      | -                                   | -                                   | -                             |
| 21-30                      | -                                   | -                                   | -                             |
| 11-20                      | -                                   | 1                                   | -                             |
| 0-10                       | 3                                   | 2                                   | 1                             |

**Plant Losses**

Inventory changes taking place in the trial plantings, with respect to loss of individual plants were also obtained from cooperator reports. Four counts were made over the five-year trial period at each planting site, namely: (1) at the end of the first growing season; (2) at the end of the first winter; (3) at the end of the second winter; and (4) at the

end of the fifth winter. Reports from 15 trial sites yield the following comparative plant loss data.

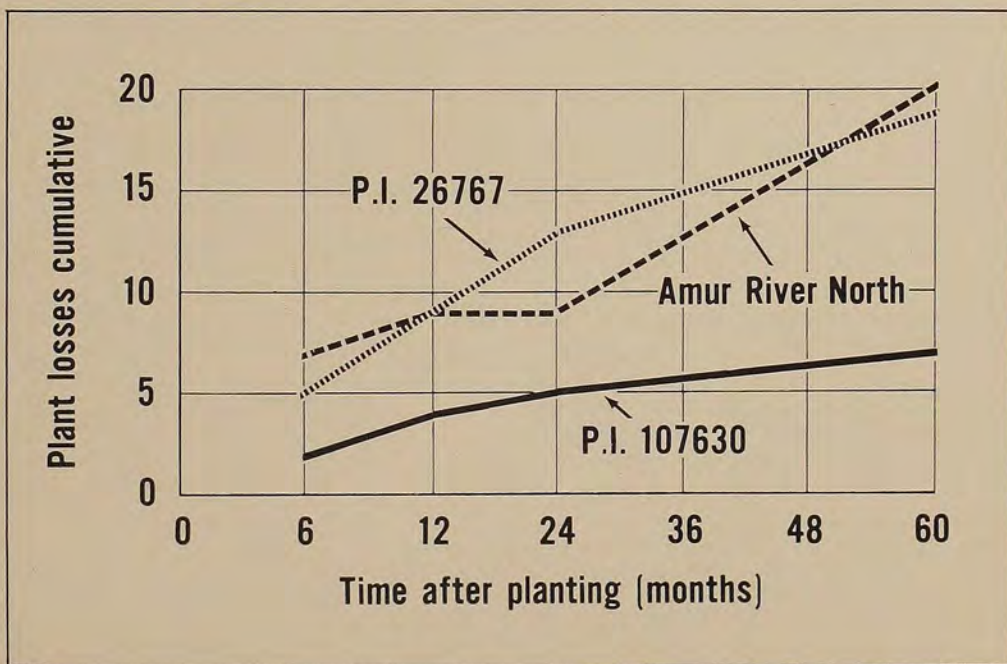
For the *Ligustrum vulgare*, P.I. 26767, it was found that the initial growing season loss was five plants. During the remaining 54 months additional losses of 14 plants were recorded. Thus 19 plants out of a total of 68 plants failed to live over the five-year period. These losses were noted at 9 of 15 trial plantings.

An initial season loss of two plants was reported for *Ligustrum vulgare*, P.I. 107630. Subsequent losses amounted to five plants over the balance of the five-year period. Only four sites reported losses. Sixty-seven plants were set out for which reports are available.

The *Ligustrum amurense*, Amur River North privet, plantings lost seven plants during the initial season. Losses for the next four and one-half years amounted to 13 plants. Twenty failures were noted among 69 plants at nine planting sites for this widely used hedging plant.

These plant loss data are arranged according to time after planting (in Figure 1) as cumulative losses by accession in five-year trial.

**Figure 3. Cumulative plant losses for the trial privets based on reports from 15 trial sites.**





### Plant Condition and Size

It is not enough to know that an introduction has survived at a given locality. It is probably more important to know how well the plants under consideration appear, and how well they may be expected to grow. Fortunately, these data are also being accumulated by the local trial cooperators.

The performance and average size (height x spread, in feet) of privet plants after five years in trial planting are shown in Table 2. The several reports are divided into two groups based on five year survival. Group I consists of the four plantings, with perfect survival for all three accessions. Trial plantings included in Group I are located at Rose Lake, Michigan; Madison, Wisconsin; Brookings, South Dakota; and North Platte, Nebraska. Group II plantings consisted of those in North Dakota, South Dakota, and Minnesota located north and west of Group I where poorer survival records were obtained.

*Group I:* Plants of each accession under trial at Madison, Wisconsin, were satisfactorily hardy and maintained at uniform size by shearing. The plantings at Rose Lake, Michigan, were made on an eroded, low-fertility, sandy site. Here the plant performance was generally poor; however, first fruiting of the Amur River North occurred during the fifth year.

At the Madison, Wisconsin, and Rose Lake, Michigan plantings, hardiness was not a problem. At Brookings, South Dakota, and at North Platte, Nebraska, trial plants were subject to varying degrees of drought and cold damage, as manifested by twig injury. This injury did not prevent trial plants at these locations from growing into sizeable shrubs.

*Group II:* All trial plants died during the first winter at the Dickinson Station in western North Dakota. Trial plantings in central South Dakota at Highmore were subjected to considerable plant loss as well as extensive twig injury by drought and cold. In comparison there is a marked improvement in plant stature of all three accessions at Brookings, South Dakota (one of the Group I plantings) which is 120 miles east of Highmore. The performance of test privet plants at Fargo, North Dakota, trials suggests that the three accessions

under observation should be continued in a "trial only" status.

The plantings in northwestern Minnesota at Crookston are quite far north in the state. To date, all established plants have done quite well at this Red River Valley site despite adverse climate and rather high soil alkali content. Certainly the trial privet accessions were better at Crookston than at either Grand Rapids, where the single trial of Amur River North failed to overwinter, or at Duluth where recurring cold damage resulted in unsatisfactory plants. The Grand Rapids and Duluth trial sites are not only considerably east of Crookston, but somewhat south as well.

The results of the west-central Minnesota planting at Morris indicate that these privets should be used here for trial purposes only. The plantings of the three trial lots of privet at the Waseca Station in south-central Minnesota have done well despite the fact that two accessions were moved during the third year of the trial.

The Excelsior, Minnesota, plantings, southwest of Minneapolis, were reduced to one accession when both P.I. 26767 and the Amur River North privet (commonly planted in the Twin Cities area) were killed during the second and third winters, respectively. The remaining common privet, P.I. 107630, has performed well, and is reported to be the hardiest *L. vulgare* selection yet observed at the test site.

### Plant Characteristics

Plants of the two common privet introductions, P.I. 26767 and P.I. 107630, are similar in many characteristics, but there are also differences which set them apart. For example, both accessions are vigorous shrubs with dark, semi-evergreen, opposite-leaved foliage and shiny jet-black, round fruit (Fig. 4). The branching habit of P.I. 26767, originally from the Crimea, is irregular, making a dense growth. This condition is in contrast to that of P.I. 107630, whose vigorous branches are generally erect or ascending and similar to Amur River North.

A marked contrast in foliage color was noted throughout the growing season between the Amur River North privet and the two common privet importations. The leaf color of the former may best be



**Table 2. Five-year performance and average plant size (height x spread, in feet) of three privet introductions.**

| Locality and Soil   | P.I. 26767                                  | Amur River North                             | P.I. 107630   |
|---|---|--|---|
| Group I. Trials in which all 3 privets survived without loss            |   |  |   |
| Rose Lake, Mich.<br>Sandy, low fertility soils                          | 4x1.5                                       | 4.5x2.5<br>fructed 5th year                  | 4.25  |
| Madison, Wis.<br>Fertile soil   | Hardy, sheared                              | Hardy, vigorous growth, sheared              | Hardy, sheared  |
| Brookings, S. Dak.<br>Fertile soil                                      | 6.5x4.5<br>Some tip kill                    | 6.5x4<br>Borderline hardness                 | 6.7x4.7<br>Some tip kill                              |
| North Platte, Nebr.<br>Good fertility                                   | 8x10<br>Best adapted                        | 7.5x8<br>Poorly adapted to dry land          | 10x11<br>Severe kill back winter 1961-62              |
| Group II. Trial plantings located north and west of Group I trial sites |   |  |   |
| Dickinson, N. Dak.<br>Dry land, fertile                                 | Failed 1st winter                           | Failed 1st winter                            | Failed 1st winter                                     |
| Highmore, S. Dak.<br>Dry land, fertile                                  | 2.5x2.5<br>Not hardy                        | 1x1<br>Not hardy                             | 2.3x1<br>Not hardy                                    |
| Fargo, N. Dak.<br>Fertile   | 4.5x4 Some freezeback                       | 3x2.5 Severe freezeback                      | 3.5x3.5 Considerable freezeback                       |
| Crookston, Minn.<br>Fertile, alkali                                     | 6x6 Considerable top kill                   | 5x4 Tip kill, no chlorosis                   | 4x4 tip kill  |
| Grand Rapids, Minn.<br>Sandy loam                                       | Not planted                                 | All plants dead                              | Not planted   |
| Duluth, Minn.<br>Fertile  | Plants died 4th winter                      | 4.1x4 Considerable dieback. Not recommended  | 4.1x4 Considerable dieback. Not recommended           |
| Morris, Minn.<br>Fertile  | 6x5.8 Some dieback. Not recommended         | 6x4 Some dieback. Not recommended            | 5.1x2.5 Some dieback. Not recommended.                |
| Excelsior, Minn.<br>Fertile   | Severe dieback. Death 2nd winter            | Dead after 3rd winter. Commonly used in area | 3.5x4 Hardest of <i>L. vulgare</i> selections tested. |
| Waseca, Minn.<br>Fertile  | 5x5 (1 plant failed after moving—3rd year.) | 6.9x5 Commonly used.                         | 5.9x3.7. Plants successfully moved 3rd year.          |

described as a moderate yellow green, 7.5 GY 5/7 (Nickerson Color Fan). The common privet leaves are somewhat darker, a grayish olive green, 5 GY 3/2.

Both common privets under trial tend to retain their dark foliage well into the autumn, while the yellowed foliage of the Amur River North is soon dropped.





Figure 4. When used in the border, the common privet, such as P.I. 107630 pictured here, presents a good fall display of shiny fruit.

### Summary

Three large shrub privet introductions, including the Amur River North and two common privets, P. I. 26767 and P.I. 107630, have been included in comparative North Central Regional adaptation trial plantings since 1956. The Amur River North privet, introduced to the middlewest more than 60 years ago, has proved a satisfactory hedge

plant. Valued for its apparent tolerance to anthracnose blight, this North China shrub has been observed to suffer drought and cold injury when planted in unfavorable situations in the plains and northern prairie states.

One of the common privet introductions, namely P.I. 107630, originally from Yugoslavia, has been grown for several years by two wholesale nursery firms which offer it to their dealers as a hardy privet for the midwest. The other common privet (P.I. 26767), grown successfully in west central Nebraska since 1915, is thought to possess considerable drought tolerance.

Five-year reports of privet plantings at 15 trial sites were examined with respect to survival, plant losses, plant development, and characteristics. These reports indicate that the common privet, P.I. 107630, was successfully grown without loss at 11 trial plantings for the initial five-year reporting period. This survival record was somewhat more favorable than the record of seven successful plantings for the Amur River North, or six perfect plantings of the common privet, P.I.26767.

Seven plants of the common privet, P.I. 107630, were reported dead at four trial sites, while losses of 19 and 20 plants each were sustained by P.I. 26767 and the Amur River North at nine trial sites.

Marked differences in branching habit were noted for the two common privet introductions. Plants of P.I. 26767 branch quite irregularly, but P.I. 107630 is an upright shrub with numerous ascending branches. The foliage of the two common privets tested was noted to be a grayish olive green color as compared to the moderate yellow green color of the Amur River North foliage. Both European accessions retain their leaves in the autumn for a longer period than the privet originally from North China. These attributes are thought to add to the attractiveness of the two common privet plant introductions tested.

Subsequent ten-year reports on the performance of these introductions are necessary for a better understanding of their adaptation to the climate and soils of the midwest.



# Canadian Hemlock Variants

BY JOEL W. SPINGARN  
*Baldwin, N. Y.*

The vast majority of gardeners consider the hemlock tree a very dependable, fairly rapid growing pyramidal conifer. It is extremely graceful when grown as a lawn specimen; excellent for hedging; or as a background for perennials or other plant material of lesser stature. The hemlock is somewhat tolerant of shade and relatively free of disease and insects. It grows with difficulty only on poorly drained dry, or overly alkaline soil.

One rarely thinks of hemlock as available in many different textures, colors and growing habits. However, like the yew, but to a lesser degree, quite a number of different forms are available, ranging from completely prostrate mats to fastigiate, arborescent trees. In addition to various shades of green, some are grown that are of a beautiful old gold color while others are variegated with white and seem to be covered with snow during mid-summer.

In the past ten years of collecting unusual conifers, I have gathered together about fifty different dwarf or otherwise unusual forms, quite a number of these being very distinct and in sharp contrast to the normal *Tsuga canadensis*.

The pendulous form of Canadian hemlock (*T. canadensis* 'Pendula'), also referred to as Sargents' hemlock is probably one of the most graceful and handsomest of weeping forms of all conifers. It forms a broad, low, flat top with branchlets drooping from the tips of each branch. Although fairly slow of growth, it can attain a circumference of a hundred feet in a century. The original plants were discovered near the summit of Fishkill Mountain near Beacon,

N. Y. by General Joseph Howland about 1870. At the time, four duplicate seedlings were found. General Howland distributed three of the seedlings to other horticulturists, one of whom was Professor C. S. Sargent, for whom the plant is now named. Two of the plants are presently alive and doing well. It has been recently reported by the U.S.D.A. Plant Introduction Station at Glenn Dale, Md. that this form comes true from seed. However, this fact was known more than fifty years ago as the result of a shipment of seed being sent by the propagator of the well known Parsons Nursery at Flushing, N. Y., one Mr. J. C. Van Heiningen, to his brother, a nurseryman in Holland. At the time the importation of *Tsuga* was prohibited in Holland so Mr. Van Heiningen decided to try it from seed in an effort to raise some stock. The resulting plants came true and are probably the original stock that supplied European gardens.

Another low form, extremely rare because of its slow growth and popularity with collectors is *T. canadensis* 'Cole's Prostrate'. This plant forms an inverted dish, a ten year old specimen being about three inches high and ten inches across. It is typically bare of foliage in the center, disclosing its odd branching habit. This plant was discovered by Mr. H. R. Cole near the bottom of Mt. Madison, N. H., in 1929. Good cultivation requires a steady supply of water, and shade during the hottest part of the day. It is a fine plant, lending much character to the rock garden—a quality that often gives way to the myriads of colorful but short lived blossoms. I have found it best not to allow this plant to overhang





PHOTOS BY THE AUTHOR

*Tsuga canadensis* 'Hussii'—One of the extremely dwarf forms of Canadian Hemlock. It fits well into the setting of the garden with a Japanese accent.

a rock unless well shaded, for the sun, heating the rock, may cause dehydration of the overhanging foliage. This is the only completely prostrate form except for a chance seedling I found near my home in Baldwin, Long Island, that seems intermediate between the 'Cole's Prostrate' and 'Pendula'.

Another choice cultivar, *T. canadensis* 'Armistice' forms a beautiful deep, shining green, horizontally tiered bush. My plant is flat topped and grows no more than one inch each year. It measures

24 inches across and 16 inches in height. I would estimate it to be at least twenty five years old. I cannot trace its origin. Other forms with similar outline but possibly slightly pendent branches would be *T. canadensis* 'Benet', 'Fantana', 'Green Spray', and 'Minima'. All are very choice dwarf plants but faster growing than 'Armistice'.

Those wishing a *Tsuga* form exuding an oriental flavor, for possible use in a Japanese garden, should not overlook *T. canadensis* 'Hussii'. This is another extremely dwarf plant with short twiggly branches and closely packed tiny leaves of a very dark green color, irregularly dense in habit with short stubby branches, that have a tendency not to form definite terminals. The annual growth is about one inch. This clone was first described in 1933, and was isolated about fifty years ago by Mr. Huss, a former Supt. of Parks, Hartford, Conn. Being very odd it appeals strongly to lovers of dwarf evergreens and is a gem for the rock garden.

Globose forms of hemlock include *T. canadensis* 'Globosa', foliage typical, globose in form, but growth rate considerably slower than its arborescent parent. Another globe form is *T. canadensis* 'Cinnamomea'. This plant, discovered by Mr. Frank L. Abbott of Athens, Vermont in 1929, has unusual foliage and cinnamon brown hairs on the twigs.

Pyramidal forms of slower growth than normal are numerous and include *T. canadensis* 'Dawsoniana', 'Pomfret', 'Microphylla', 'Fremdii', and 'Macrophylla'. There are many duplicate variants and much confusion exists as to nomenclature in this group but many are very handsome and deserve space in the garden.

A color form, *T. canadensis* 'Aurea' may be described as a connoisseur's plant. Pyramidal in habit and very slow of growth, a six foot tree may be more than sixty years old with very compact, young growth a golden yellow deepening to a glowing old gold in the Fall. It is much admired and desired by collectors and unbeatable to lighten a dark spot in the garden. Another color form is *T. canadensis* 'Albospicata'. This is a compact, low pyramidal form with white branch tips which are very intense in color during mid-summer and truly, a "conversation piece."



A form of gardening originating in England and gaining popularity on this side of the Atlantic is the trough or miniature garden. What could be a more appropriate plant for this type of garden than *T. canadensis* 'Minuta', if one is fortunate enough to obtain this gem. It forms a tiny bushlet, irregular in outline, very compact, with short congested branchlets, annual growth, one half inch. My plant, growing under optimum conditions, is about twelve years old, six inches high by six inches across. It is very rare because the small growth offers little in the way of propagating material. A very interesting history goes with this plant. Originally collected in the wild near Charlotte, Vermont, the mother plant was about two feet by two feet bearing cones. Being impossible to dig, the plant was left undisturbed but seed was collected and the resulting plants indicated that seedlings come true to type. In addition a number of seedlings were found growing near the parent plant. The discoverer was very discreet about his find and never divulged the location of the parent plant, however he described the area as impenetrable. Collecting the seedling plants had to be done in very early Spring, before the ferns sprang up and after the winter snow had matted down the leaves. These seedlings were sold to various customers but no record was kept. The last visit to the site was made in 1935 but no more seedlings could be found, and the parent plant had died. However, in recent years one of these seedlings was found growing in a nursery in New Jersey. Some confusion exists as to who discovered the cultivar 'Minuta'. Mr. Henry Teuscher gave credit to Mr. Frank L. Abbott in the Brooklyn Botanic Garden Record, Handbook on Dwarf Trees and Shrubs Vol. 5 No. 3, 1949. An earlier report on this form was contained in "Canada Hemlock and its Variations" by John C. Swartley in 1939. Mr. Swartley gave credit for the discovery to Mr. Daniel M. St. George of Charlotte, Vermont. Both reports indicate the discovery was made in 1927 in the same area. This plant, a mutant of proved stability was named *T. canadensis* f. *minuta* by Mr. Henry Teuscher (in The



PHOTOS BY THE AUTHOR

*Tsuga canadensis* 'Aurea' — A dense, pyramidal form, slow of growth with the tips of the young foliage golden. The color intensifies until Fall.

New Flora and Silva, 1035). Other extremely diminutive forms include *T. canadensis* 'Pygmaea', 'Ruggi', 'Palomino', 'Horsford', and 'Jervis'.

In conclusion, I would advise those interested in obtaining any of the aforementioned varieties of hemlock that most are available at one specialist nursery or another, however it is often necessary to be placed on a "waiting list" for the very slow forms. The demand for these plants invariably exceeds the supply.



# The Cornus Collection at Plainfield, New Jersey

BY BENJAMIN BLACKBURN  
*Drew University, Madison, New Jersey*

A visit to Cedar Brook Park in Plainfield is always rewarding, and especially so to people interested in woody plants because every year brings additions to the Cornus Collection, which now numbers over 60 kinds. Nine species in the collection are native of Asia, two of Europe, and twelve of North America. Four of the cornels are hybrids which have originated in this country (three at Rochester and one at Boston), and one is a baffling entity which is considered to be a natural species, possibly from northeastern Asia, but its origin is not known to botanists. The others making up the impressive total are horticultural selections or clones (*cultivars*, if one must join in taking up this contrived and annoying term) which have caught the eyes of plantmen for some individual trait or combination of characteristics and in the case of woody plants are usually propagated vegetatively.

These figures are of particular interest because they include all the woody species of *Cornus* of eastern America and of Europe. The fabled Pacific Dogwood (*C. nuttallii*) is represented by two specimens in good health, and the older one has produced flowers and fruits several years. Horticulturists know, often to their sorrow, that this species from the west coast is of extremely difficult culture away from its

native region, but plants grafted on *C. florida* seem to have improved chances to succeed in our area in the eastern states because the root systems, naturally, will be adapted to soil conditions here, and this will enforce some growth adjustment in the tops to the markedly different climate.

Of the nine species of *Cornus* from Asia growing in the collection, Kousa Dogwood and its Chinese variety are the most handsome. In fact, if this dramatic small tree had the advantage of being represented in equal numbers with Flowering Dogwood, it is very likely that the exotic would surpass the native species in popular favor. In this region, where Flowering Dogwoods are conspicuous and abundant both as native and as garden subjects, Kousa Dogwoods have great appeal for their novelty and especially for their later season of bloom.

The artistic treasure of the Cornus Collection lies in extensive plantings of Flowering Dogwoods on both sides of Park Drive. These comprise the original gift of 75 White Dogwoods by The Plainfield Garden Club, dating back to 1931, when Mr. W. R. Tracy, Superintendent for the Union County Park Commission, was carrying out the inspired plan to turn an old city dump into a feature of beauty in Plainfield. In 1940 the Garden Club gave the Park Commission 110 additional trees to





ROBERT McLAUGHLIN

### View of Park Drive through Cedar Brook Park.

balance and complete this drive, and this splendid gift is commemorated in a plaque.

Miss Harriette Rice Halloway has continued as chairman of the Cornus Collection Committee of the Garden Club, and also as amateur consultant to the Park Commission in expanding the collection and keeping records of all plantings made. Cedar Brook Park is also outstanding for other areas in which Miss Halloway has lavished hours of time and attention, notably the Iris Garden (started in 1932) and extensive collections of Daffodils and Peonies and displays of other herbaceous plants. Under the expert attention of Mr. Robert

Koller, Horticulturist for the Park Commission, plants for the Cornus Collection were given the attention required to encourage them to succeed. Small accessions were grown in a nursery until large enough to be put out in permanent locations and make their stand in the situation allotted—and under the hazards presented in a public park becoming increasingly popular as an area for use by great numbers of people.

The Plainfield Dogwoods now include plants from many countries and many floristic regions of the Northern Hemisphere. A collection of cornels of this scope, growing in a compact reserved area, represents a marked achievement,





ROBERT McLAUGHLIN

Close-up of Flowering Dogwoods in bloom at Cedar Brook Park.

and this one in New Jersey may well be unique. None other is known to the writer to be existing elsewhere in this country, and a match for it is not to be found growing at the Royal Botanic Gardens at Kew or at Edinburgh, at the other famous gardens in Britain, nor in western Europe. One does not expect to find good specimens of Flowering Dogwood in Europe, but even if this species is removed from the list, it does not appear that a comparable collection exists, made up as this is of labelled specimens growing together so that students and admirers can walk around them all in a matter of minutes.

It is very fitting that The Plainfield Garden Club and The Union County Park Commission take pride in this artistic and educational accomplishment. The *Cornus* Collection at Plainfield offers an admirable example of cooperation between groups interested in the cultural and horticultural riches of a municipality.

*Cornus* in the Collection are Grouped by Geographical Origins

China, Japan,  
Korea

*controversa*

*kousa* var.  
*chinensis*  
*macrophylla*  
*officinalis*  
*paucinervis*  
*poliophylla*  
*walteri*

Europe, Western  
and Northern  
Asia  
*alba*  
*alba* var. *sibirica*  
*australis*  
*australis* var.  
*koenigii*  
*mas*  
*pumila* (origin  
purportedly  
uncertain)  
*sanguinea*

North America

*alternifolia*  
*amomum*  
*baileyi*  
*drummondii*  
*florida*  
*florida* f. *rubra*  
*foemina*

*nuttallii*  
*obliqua*  
*pubescens*  
*racemosa*  
*rugosa*  
*stolonifera*  
*stolonifera* var.  
*coloradensis*



## A Book or Two

### *A Field Guide to Rocky Mountain Wildflowers*

John J. Craighead, Frank C. Craighead, Jr., and Ray J. Davis. Houghton Mifflin Company, Boston. 1963. 277 pages. Illustrated. \$4.95. (Library)

This is the latest, the fourteenth, in the series of Peterson Field Guides. Like all the others, it is a field book, easily carried in hand or hip pocket. It is aimed to serve the outdoorsman and amateur botanist in the Rocky Mountain area. The authors are competent. Two, the Craighead twins, are ecologists; the third is a well-known Idaho botanist. They have done a good job. Of the more than 5000 plants that inhabit the Rockies some 590 of the more conspicuous have been selected for inclusion in this volume. Following brief introductory paragraphs on such pertinent subjects as vegetation zones, plant succession, plant foods, classification, etc., one finds the main part of the volume. This is composed of a standard presentation of the plants, arranged to follow the Dalla Torre and Harms system. Descriptions are practical; some are accompanied by line drawings. I especially congratulate the authors on their inclusion of the "interesting facts" paragraph for each species which relates the particular plant to man and to its environment. Outstanding in detail and reproduction are the 24 composite color plates—reproductions of color transparencies of plants photographed in the field. By means of these, bound conveniently in one central section, a majority of plants can be quickly identified through simple comparison. For vacationers, interested in showy native plants and headed for the Rockies, this volume is a must.

W. H. H.

### *Common Trees of Puerto Rico and the Virgin Islands*

Elbert L. Little, Jr. and Frank H. Wadsworth. U.S.D.A. Handbook No. 249 of the Forest Service. Available from Supt. of Documents, Washington \$4.25. 550 pages quarto, 250 full page line drawings of leaves, flowers and fruits. (Available in Spanish from Univ. of Puerto Rico, Rio Piedras.)

This splendid volume describes in detail 250 of the commoner and more important native and exotic tree species most likely to be seen in the islands, and more than half of them grow also in Florida. To aid in identification, 130 additional related species are mentioned briefly and compared with those illustrated. Both scientific and colloquial names are given, and every effort made to produce a guide for students and sightseers, as well as landscape architects and foresters. Because so many of the trees are identified also with South Florida, the book is an excellent handbook for residents and tourists in that State. Some 72 of the exotic species described are common throughout tropical America, so the volume is much more than a Puerto Rican book.

Actually some 500 different trees are native to Puerto Rico and several hundred have been introduced into the islands, some experimentally, others as permanent residents. Obviously this calls for a companion volume to match this first monumental effort, and the authors announce their intention of producing the second book.

The authors are knowledgeable experts on trees. Their book is highly recommended.

EDWIN A. MENNINGER

*(Books available for loan to the Membership are designated: (Library). Those not so designated are in private collections and are not available for loan. Books available for sale to the Membership are designated with the special reduced price and are subject to the usual change of price without notice. Orders must be sent through the American Horticultural Society accompanied by the proper payment. Please allow two to three weeks for delivery. Those not designated for sale to the Membership at reduced prices can be purchased through the Society, however, at the retail prices given. In these instances the full profit is received by the Society to be used for increased services and benefits of the Membership.)*



### **The Gardner's Fern Book**

F. Gordon Foster, D. Van Nostrand Company, Inc., Princeton, N. J., 1964. 240 pages. 71 line drawings and 16 color photographs by the author plus 18 black-and-white photographs. \$7.95.

This reviewer sincerely wishes that this book had been published before he was secretary of the American Fern Society. During that time he was frequently asked for a book on fern cultivation and there was no such book, at least none published in this country. *The Gardener's Fern Book* is not only THE book but an excellent one, treating both outdoor and indoor cultivation. The author's extensive experience in the study and cultivation of ferns makes him eminently qualified. The illustrations are excellent.

Chapters on cultivation and propagation are very detailed and are handsomely illustrated with photographs and drawings. I do feel that the importance of humidity for ferns in homes is not stressed sufficiently, but this is a minor point.

Forty hardy ferns and twenty-seven tender ferns are described, discussed, and individually illustrated. Three short chapters on the botany of ferns and one on identification will be of interest and enlightenment to the majority of fern enthusiasts, but the book is primarily concerned with cultivation and contains ample information to enable the novice to achieve success.

DONALD G. HUTTLESTON

### **The Southern Fern Guide**

Edgar T. Wherry. Doubleday and Co., Inc., Garden City, N.Y. 350 pages, Illustrated. 1964. \$4.95. (Library).

Similarly to his useful THE FERN GUIDE, Dr. Wherry's present volume has complete and accurate information about all the ferns in southeastern and south-midland United States condensed into a convenient, compact, "pocket-size" volume.

The approximate 200 taxa included in the present work are described and "keyed out" by Dr. Wherry, and the more than 150 species are carefully and attractively delineated with line drawings by James C. W. Chen and C. Y. Chen, Formosan botanists. The work is founded not only upon Dr. Wherry's extensive field studies but also upon extant collections in various herbaria.

The introductory matter includes as a frontispiece a map of the area covered, some explanatory notes, a glossary of technical terms, a table of abbreviations used in the text, a typical fern life-cycle, a discussion of fern classification, a summary of southern fern distribution to supplement the map, and helpful suggestions regarding the raising of ferns from spores and advice about the culture of ferns. The inclusion of the basal chromosome numbers of southern lowland genera, not often found in most books of this nature, will be of interest to fern cytologists and geneticists.

The main text is divided into three parts. The first part includes in a compact, concise form all of the keys needed to identify families, genera and species that are treated in the second part.

The second part, in turn, treats those ferns that grow only in the southern lowlands, or only in localized areas at moderate elevations in the southern uplands but not farther north, or in both of the above regions as well as up over northeastern North America. The third part of the text includes those species that are chiefly northern and barely, if at all, descend into the southern lowlands. This geographic delimitation in the treatment of species conveniently reduces the number to be dealt with in each area covered. The several comprehensive indices include both the technical and colloquial names that make this guide a handy reference tool for both the amateur and the professional botanist, alike. Dr. Wherry has also adjusted the nomenclature to present-day usage.

The book is well-printed and is strongly bound in an attractive field-gray buckram. Anyone interested in ferns can take into the southern field a copy of this excellent work and study with confidence the ferns of this vast and interesting region of the United States.

Dr. Wherry, Professor Emeritus of Botany at the University of Pennsylvania, is an outstanding and internationally known pteridologist who has spent almost half a century working in the sciences of horticulture and botany. He has contributed immeasurably to research and teaching of the lower vascular plants. His two very useful books, THE FERN GUIDE, and THE SOUTHERN FERN GUIDE, reflect his intimate knowledge of the ferns and fern allies of the eastern half of the United States and Canada. He has been an active and interested member of the American Fern Society for 46 years and has only recently been elected to the Society as an Honorary Member. He has also served as the Society's President for four years.

DONOVAN S. CORRELL

### **Narcotics, Nature's Dangerous Gifts**

Norman Taylor. Dell Publishing Co., Inc., 750 Third Avenue, New York. 212 pages. \$1.65. (Library)

A revised paperback edition of the author's "Flight from Reality," published in 1949. A lively account of the better known narcotic plants.

### **Forty Favorite Flowers**

Beverly Nichols. St. Martin's Press, New York. 1965. 87 pages. Illustrated. \$4.95. Members price \$4.20. (Library)

This is primarily a book of photographs—forty outstanding portraits, well reproduced, of favorite garden flowers of Britain. It would make a nice gift volume for a gardener. The plates are in black and white, full paged and bled to the page edges. They are selections, apparently, of the best of Britain's horticultural portraitists. Each illustration is paralleled with a page of sparkling commentary—one might almost call it smart—on the particular subject portrayed by the photographer. Though British in scope, most of this book will be of interest to the American garden lover. Certainly hostas and pansies, snowdrops and peonies are favorite flowers with us also; *Meconopsis* and *Eucryphia* and some of the others would be likewise but unfortunately most of us cannot handle them under our garden conditions.



### ***Bird Songs, Adventures and Techniques in Recording the Songs of American Birds***

Norma Stillwell; Doubleday & Company, Inc., Garden City, New York, 1964. \$4.95. Members price \$4.20. (Library).

Perhaps this book may best be reviewed briefly by quoting from the Introduction, a sentence written by Dr. Peter Paul Kellogg, Professor of Ornithology and Biological Acoustics, Cornell University. He says, in part, "This book will appeal to many because it is the story of a hobby which ended in success . . ."

Working in cooperation with Cornell's Laboratory of Ornithology, the Author and her husband made over 1600 tape recordings of bird songs, traveling for twelve years, covering 41 states and 180,000 miles. This is the account of some of their adventures during that time, and the wealth of incidental knowledge which they acquired.

For the most complete enjoyment of the book it is recommended that the reader first secure the recordings of Bird Songs of Dooryard, Field and Forest, available in the record collections of many Public Libraries. It will then be much easier to appreciate the 'basic English' vocabulary which until quite recently has been the only way in which the song of a bird could be recorded in print.

If it did no more than inspire others of us to put as much time and effort into insuring the success of our hobbies, "Bird Songs" would be a book well worth reading, but for anyone who has heard a Cardinal call a "Pretty Girl" in the early Spring, it is a "Must."

M. F.

### ***Garden Plants in Japan***

Fumio Kitamura and Yurio Ishizu. Kokusai Bunka Shinkokai. Tokyo, 1963. 266 pages, illus. in color and b/w.

This book was published in the hope that it will fill the need for a guide to the plants found in Japanese gardens. It was made possible through contributions from members of The Garden Club of America and is intended to assist serious horticultural visitors to Japan in the identification of garden plants.

The format is the typical descriptive note on each plant discussed, of which 209 items are included. Points discussed are under the major headings of Habitat, Character, and Use. The Japanese vernacular, scientific, and English names are also given both in the descriptive portion and as indices. Each plant is pictured.

This book covers most of the garden plants of importance that one will encounter in Japan and is the kind of text that has only been available in Japanese with accompanying language barriers. Subject matter is divided into Trees and Shrubs, Bamboos, and Herbs but emphasis is on the woody plants. Written by Japanese horticulturists, there are many species described that might be missed if this book had been otherwise prepared. Several of the plants that are not in the United States are discussed and some of these are worthy of introduction. For example, *Machilus thunbergii* is described and

the point that makes this evergreen tree of unusual beauty is stressed—the brilliant reddish growth—flushing in the spring.

This is a horticultural book and is directed solely to the purposes of horticulture. I am certain it will serve the traveler to Japan but equally confident that horticulturists interested in Japanese plants will find much of value for use here at home.

The Garden Club of America should take pride in having made this guide available to American horticulture.

J. L. C.

### ***Bonsai: Trees and Shrubs***

Lynn R. Perry. The Ronald Press Company, New York, 1964. 234 pages, illus. \$7.50. (Library)

This book is a guide to the methods and practices of the art of bonsai. It is in two parts. Part I deals strictly with the techniques of propagation, pruning, transplanting, and the many other intricate details which must be followed in the development of these artistic manipulations of plants. Part II is a descriptive key to the various plants which can be so handled. In this portion of the book the plants are grouped into Coniferous Bonsai, Flowering Bonsai, Summer Bonsai, Fall-coloring Bonsai, and Fruiting Bonsai. I mention this only to point out the careful details that have been considered in the preparation of this book.

Certainly Miss Perry is qualified to write on this particular subject. It is a difficult task to express in detail the methods that the Japanese use in growing Bonsai without becoming boring but this is not the case here. Few Americans have had the opportunity to study Bonsai firsthand and with the masters of this art in Japan. Having spent some time in Japan during the period when Miss Perry was engaged in studying Bonsai, I am familiar with the nurseries where she applied herself and the Japanese with whom she worked.

The book is amply illustrated with examples of famous bonsai as well as details of wiring and pruning that are more easily understood pictorially.

I could not but help note the comment that bamboos are no longer used to produce bonsai in Japan because they grow too fast and after three years become too large. Most of the bonsai in Miss Perry's book are 50 to 100 years old. One might well wish to start with bamboo to have a finished product in these uncertain times.

J. L. C.

### ***On Gardening***

Gertrude Jekyll. Charles Scribner's Sons, New York, N.Y., 1964. 283 pages, illustrated by Margaret Philbrick, with a foreword by Elizabeth Lawrence. \$6.00. (Library)

For the gardener of today who may not have been fortunate to have in his library any of the books written by Miss Jekyll, this will be a valuable substitute if one can ever be satisfied with



a substitute. Her books, published so long ago, relatively, and frequently out of print, are hard to come by now.

Each gardening period, where there is a definite change of style or practice, usually has a singular person or two, who stand head and shoulders above their contemporaries, either as the most vocal or the most active in the changes.

In the case of Miss Jekyll, the prominence was particularly conspicuous in that she was a woman, and those days were the times when ladies did not do this or that, outside of the approved activities. An artist by instinct and profession, a painter, she carried into her horticultural activities the same acute senses that were employed in her paintings. These were singularly aided by the fact that her eyesight was very much hampered by her near-sightedness, a fact that she herself made known. This made for two things that mark her work; her amazing interest in minute detail, as related to beauty; and her capacity for seeing landscape effects on a large scale, a fact that brought into use some terms that she probably was the first to use. For example, drifts, as applied to large or long masses of a single species or plant.

It was her good fortune to have a fairly large acreage on which to work, at Munstead Wood, which one always considers as her home. She tells of its virtues and its limitations, the latter chiefly as related to soils which she considered poor and sandy. All this also contributed to the styles she developed on her own place, and to the determining of much that she came to believe as her skills grew. It was her good fortune also, to be living at a time when William Robinson was leading a movement to take the current garden styles away from "carpet bedding" as used in unsuitable places, and to bring to the attention of all, the hosts of splendid plants that were to be found chiefly near the homes of humble folk.

The present book is made up of selections from only ten of her books and there is a table that presents the titles, each marked by a decorative symbol that serves to identify the sources in the various chapters that make up the book. There are no specific references, with chapter and page, and this reviewer does not find any name for the person or persons who have made the selections.

The first chapter is entitled "A Gardening Credo" in which are set forth, the definite, and sometimes rather arbitrary points that she felt of major importance. This must be read before any of the following chapters are read, as it is unreasonable to look for something that the writer has no intention of treating.

The book will be of little value to the reader who can use only manuals of how-to-do-it, but for the perceptive reader who can study the presentations, determine the sound underlying principles for some areas and some regions, the book is a treasury of value.

Probably, the most important things to be gained by a study of the book would be: a determination to see whole and in scale: an embracing of the spirit of gardening in the sense of the creative artist sensitive to colors and forms; and to remember always, that a garden should bring to the owner, not just the sense of successful creation, but of unlimited joy in

Nature, each day of the year, whether the weather be fine or not. If one dare borrow a title of another book, in no way related to horticulture, this book might well have been called, A Testament of Devotion.

For those who know little of Miss Jekyll, the Introduction by Miss Elizabeth Lawrence will give not only the statistics that seem pertinent, but many sidelights on Miss Jekyll's life and person, that relate to the whole, as well as reflecting a sound understanding and appreciation of Miss Jekyll's work.

B. Y. M.

### *Seaside Plants of the World*

Edwin A. Menninger. Hearthsides Press Inc., New York. 1964. 303 pages. Illustrated. \$9.95. (Library)

"Seaside Plants of the World" is a somewhat misleading title. For in this volume, the author does not present species that are native to the seashores of the world but rather all plants which may be cultivated in gardens close by the sea. With some protection from salt laden winds and the ameliorating temperature effect of the sea itself almost any garden plant one can name can be grown and listed as a seaside plant at some spot in the world. That is what the author has done, for this is an uncritical compilation of all references to plants grown in sea margin gardens. One certainly would not consider *Pachysandra terminalis*, *Taxus baccata* (var.), *Rudbeckia hirta*, *Magnolia stellata*, *Heliconia caribaea*, *Passiflora caerulea*, or *Mitchella repens*—to name just a few herein included—as "seaside plants." There is need for a good summary volume on ornamental plants which are really resistant to the deleterious effects of salt spray, etc. for seaside planting. A number of these plants are described in this book but Mr. Menninger has done a disservice to gardeners by not limiting his sights to a full treatment of these alone.

W. H. H.

### *Wild Flowers to Know and Grow*

Jean Hershey. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 1964. 235 pages. Illustrated. \$6.95 (Library) Members price \$5.90

This book deals with the culture and identification of many of the more common wildflowers and their general habitats.

The plants included are primarily those of the Northeastern United States, that region with which the author is presumably best acquainted. There have been included however, some of the more spectacular wildflowers found in other areas of the country.

The author writes in a most interesting and entertaining manner, enabling the reader to gain much inspiration as well as increase his knowledge concerning wildflowers and their culture.

All plants mentioned in the book are grouped seaside, deep shade, streambanks, bog areas, according to habitat, and include such areas as fields, etc. For creating a wildflower garden of one's own, the cultural needs for each plant are discussed.



The last chapters are devoted to the topic of conservation stressing the importance of retaining natural areas both for their esthetic and soul-soothing qualities as well as for practical reasons. Many interesting and new, at least to me, examples of the results of lack of conservation practices are presented.

Finally, there is a discussion of what the interested individual and the garden club group can do and has done in regard to conservation.

The 200 full color plates are quite good and add much to the appeal and value of this book.

Interesting features include a state by state listing of wild flower preserves and trails, a list of wild flower dealers and a rather nice compilation of native plants that can be grown at the shore areas.

A disappointment was the lack of any index that would enable the reader to find a particular plant in the text of the book. However, all in all, this lively and informative book is quite a welcome addition to the popular literature concerning native plants.

PETER ATKINSON

### ***Flowers and Festivals of the Jewish Year***

By Lillian S. Freehof and Lottie C. Bandman, drawings and photographs by S. William Hinzman (except where otherwise noted) Hearthside Press, Inc. Publishers, 118 E. 28th St., New York. 192 pages including index and bibliography. \$5.95 (Library) Members Price \$5.05

Christian readers like myself will find this a pleasant book through which to become acquainted with the religious customs of our friends of the Jewish faith. Worship and altar committees of all faiths could find this a useful primer in decorating for their own festivals and religious holidays. The book is in large, legible print and profusely illustrated with black-and-white photographs and has 5 full color prints.

It is not in any way a book of flower arrangements, it is a joyous account of the family festivals and religious customs of the people of Jewish faith, giving us a feeling that some of our own non-Jewish customs may have originated through them, such as the hunt for the mazzot which leads to the finder getting a gift—perhaps the Scandinavian custom of hunting for an almond in the traditional Christmas rice pudding which also brings the finder a gift may have stemmed from the ancient Hebrew custom; and it is also surprising to learn that this book puts forward the suggestion that since our Puritan settlers selected some of the laws of the Torah by which to govern our colonies, "on the basis of the biblical Succoth, the Feast of the Harvest, they established in the new world the harvest festival of Thanksgiving."

The great emphasis which is placed on the agricultural festival of Succoth by the authors and illustrated with many displays of same in beautiful Temples all over the United States, makes us hope that the interest engendered through the knowledge of flower arrangement by women of Jewish faith may spark a resurgence in agricultural study by their children.

There is a 25-year calendar of Jewish holidays, a chapter mis-called the "science" of

flower arrangement, (since science is EXACT and art is creative, this should be called the ART of flower arrangement) giving brief, thumb-nail paragraphs to aid the beginner.

We need to learn more about each other in every religion and this book has enriched my former scant knowledge on the subject matter. It is needed more by us non-Jewish than those of Jewish faith who know, or should know, their rich heritage.

KAREN FOSSZIMMERER

### ***Modern Abstract Flower Arrangement***

Emma Hodkinson Cyphers, Nov. 1964, printed by Hearthside Press Incorporated, Publishers, 118 E. 28th St., New York. 128 Pages. Illustrated. Price \$4.95 (Library) Members Price \$4.20

This little book of only 128 pages is printed on excellent paper and large, easily read print. It is recommended for the advanced arranger and for anyone connected with the art field for whom the terminology will not be strange, but the beginner may find it hard sledding and requiring much studying. It will be also of value to the seasoned student of ikebana, who will translate the oriental mathematical degrees into terms of the spatial and plasticity offered by the author.

The trend-conscious arranger apprehensively concerned about the inclusion of more and more abstract classes in her local, State and National flower shows, will find Mrs. Cyphers covers her subject with most fluid writing and has chosen excellent illustrations in the many black-and-white photographs included. In defining "abstract art" Mrs. Cyphers states it "stresses the unconventional." It is distorted reality and to the uninitiated it has another, secondary definition "abtruse, difficult of comprehension." Matisse may be considered right in defining non-objective art as "devoid of any troubling subject matter" but this book should be of help to judges and would-be interpreters.

Traditional and classical arrangers will be always with us, but we know the only sure thing in life is change, and in the field of compositions it is definitely the abstract. Mrs. Cyphers quotes "to thine own self be true" as the credo for any artistic endeavor and should be created for oneself and not for the beholder (or with thought of how she will pass that judges' course). Debatable that abstract art is progress, it is very much with us and Mrs. Cypher's newest book offers help, presenting also something new, a judge's scale of points on non-objective with no qualifications; non-objective with qualification as to the material to be used and abstract-expressionism a non-naturalistic arrangement.

The author has done a great deal of research but the book contains no bibliography and the index, while mentioning some of her art sources, does not mention Riester or Arnheim, so perhaps in the second edition a bibliography can be added. The author's own arrangements might also be added.

It is also recommended to the collector of books broadening his horizon of a challenging subject.

KAREN FOSSZIMMERER



### ***The American Camellia Yearbook, 1965***

Edited by Joseph H. Pyron, American Camellia Society, Tifton, Georgia. 1965. 323 pages. Illustrated in color and black and white. (Library)

The 1965 Camellia Yearbook contains an impressive collection of articles which are separated into seven major sections: Camellia Personalities, Culture, New Varieties, Camellias in the United States, Camellias in England, Research, and Miscellaneous. Each of these sections has three or more articles containing pertinent information about their respective subject matter, but as might be expected, the greatest number of articles is devoted to culture practices and research.

Within the first section, an outstanding tribute is made to Frederic Heutte, Norfolk Botanical Garden for his monumental work over the years at Norfolk with ornamentals and camellias in particular.

The section on culture will be of particular interest to the serious camellia grower because here many ideas are presented, such as: How to grow better greenhouse camellias. How to protect outdoor plants and flowers, as well as a list of the better-performing varieties for the Southeast. The history and use of gibberellic acid and its effects on camellia blooms. Methods of growing camellias in full sun. Propagation of camellia cuttings by ordinary procedures and by intermittent mist propagation.

New varieties are always of interest to the camellia fancier and this year's camellia book takes no exception with the past in keeping its readers posted about promising new camellias from the West and Southeast.

Several interesting and unusual locations where camellias are grown in the United States and England are described, including marginal areas where cold hardiness is a problem. Reports such as these provide further evidence of the intense desire to extend camellias beyond the conservative camellia regions.

Without continued research in both culture and breeding, the camellia industry would soon stagnate and die. Research is not for the professional alone; but should be pursued by the amateur as well. As pointed out, the latter can play an important role and should not be discouraged by the bigness of some professional programs. In interspecific hybridization, the ability to detect true hybrids is an important phase of research. A number of acceptable methods are described, including: botanical identification, chromosomal and chromatographic studies and the use of sclereid patterns. No one method appears to be universal in its applicability to all situations. Frequently a combination of two or more techniques is necessary for accurate identification. The method of chromatography, a new one for camellias, is discussed in considerable detail in two of the articles.

Perhaps of greatest interest to the camellia breeder will be the camellia progress report by C. R. Parks, geneticist, Los Angeles State and County Arboretum. Here, the size of the operation and the complexity of the various facets of investigation are enough to stagger the imagina-

tion of the average camellia breeder. It must, however, give him a great deal of satisfaction to know that so much is being done to improve his lot and that of all camellia fanciers.

W. L. ACKERMAN

### ***Caribbean Gardening***

By Aimee Webster. 6 color plates, 50 monochrome photographs, diagrams. 138 p., cloth. Printed in England, distributed in U.S.A. by Edwin A. Menninger, Stuart, Fla. \$2.80 and in Jamaica by Sangsters.

This is a complete guide to growing the Tropic's best loved shrubs, trees, annuals and pot plants, with chapters on garden layout, cultural practices, propagating, and control of pests. Most of the book is given over to descriptions and discussions of the 2,000 plants commonly found in West Indian gardens.

The author, Aimee Webster, is garden editor of the Jamaican *Sunday Gleaner* where she is widely known under the pseudonym "Green Leaf" for her revealing articles on tropical horticulture.

In the West Indies are cascading colors of mammoth flowers and fabulously variegated foliage, found stretching from the drier coastal regions of the islands to the misty rain forests found in many of the mountains. For hundreds of years the immigrants from Europe, Africa, Asia, brought their favorite plants and found they could grow most of them successfully in Jamaica. This has made for a complexity of gardens with exceptional opportunities for bold effects. Miss Webster has done her subject justice.

### ***Other Books added to the Library***

#### ***A Revision of the Genus Petrorhagia (Vol. 3 No. 4)***

P.W. Ball and V.H. Heywood, The British Museum (Natural History), September 1964. Illustrated. 22 shillings. (Library)

#### ***The Cactaceae***

N.L. Britton and J.N. Rose, Dover Publications, 180 Varick Street, New York 14, N.Y. 1963. Illustrated. Vol. I & II 241 pages, Vol. III & IV 318 pages. \$20.00 set. (Library).

#### ***Garden Spice and Wild Pot-Herbs***

Walter C. Muenscher and Myron A. Rice, Cornell University Press, 124 Roberts Place, Ithaca, New York, February 1964. 221 pages. Illustrated. \$10.00 (Library).

#### ***Strauberry Diseases***

A. G. Plakidas, Louisiana State University Press, Baton Rouge 3, Louisiana, December 1964. 195 pages. Illustrated. \$5.00 (Library).

#### ***You Can Garden in Florida***

Mary Noble, Mary Noble, 3003 Riverside Avenue, Jacksonville 5, Florida, November 1963. 148 pages. Illustrated. \$1.98. (Library).

#### ***The Story of Gardening***

Richardson Wright, Dover Publications, Inc., 180 Varick Street, New York 14, N.Y., 1963. 474 pages. Illustrated. \$2.00 (Library).



# The Gardeners' Pocketbook

## Two Native Trees of Texas

*Pistacia texana*—The Texas pistacia is so rare in the United States that few people have seen it. The stand near the mouth of the Pecos River will probably be covered with water when the Amistad Dam across the Rio Grande near Del Rio is completed.

Fortunately *Pistacia texana* is also found in northern Mexico. It has attractive neat evergreen pinnate foliage. The berries are reddish-brown and are mature by September in Mexico. In the mountains south of Monterey *P. mexicana* was seen in the same area as *P. texana*. It has smaller leaflets and purplish black berries. *P. texana* should be hardy in zone 9 and possibly part of zone 8. It is the most attractive pistacia I have seen.

*P. lentiscus* (evergreen) and *P. atlantica* (deciduous) from north Africa grow only fairly well in Houston. *P. chinensis* (deciduous) grows very well and there are some large trees that have striking fall color.

*Pistacia texana* is one of several superior ornamental Texas trees destined to become extinct in the wild before long.

*Sabal louisiana*—Taller and larger crowned palms are sometimes seen standing above the thickets of low palmettos (*Sabal minor*) from central Texas to Florida. In a description of this plant written by Miriam L. Bomhard in 1935 reasons were given for naming it a separate species, *Sabal louisiana*.

The common palmetto is a deep rooted trunkless fan palm growing as far north as Oklahoma and Arkansas. Prob-



L. HINTON

Largest known *Sabal louisiana*, Brazoria county, Texas.



ably no other palm equals it in hardiness. Often thousands of plants cover many acres of lowland so thickly that a solid cover is made. After seeing countless numbers of these dwarf palms it is surprising to come upon a few specimens with trunks standing from a few feet to much higher.

The largest *Sabal louisiana* was found by Robert A. Vines in Brazoria County, Texas. It has a trunk of 18 feet high.

It will be interesting to see what seedlings of *S. louisiana* look like at maturity compared to those of *S. minor* from the same grove. Will the *S. louisiana* seed produce plants resembling both species? Plants from seed collected in Louisiana on Lake Pontchartrain 7 years ago seem to be forming trunks.

*S. texana* (Texas Sabal) and *S. palmetto* (Florida cabbage palm) are the most cultivated Sabals in the U. S. Both get

as high as 50 feet or more; the cabbage palm having a slenderer trunk, a smaller crown, and producing the tallest specimens.

Because the Sabal species are so similar when small, care should be taken by growers to be certain of their seed source to be sure of the species. Nomenclature has often been confused in the trade.

—LYNN LOWREY  
Houston, Texas

#### *Lilium* × *fialkovaja*—An Unusual Hybrid from the Soviet Union

A few years ago, through the courtesy of the Moscow Botanical Gardens, we received a bulb of *L.* × *fialkovaja*. It flowered here for the first time during the early summer of the year 1963 and proved to be a very handsome lily with sweet-scented, light violet-reddish flowers. It was obvious to us that this hybrid

*Lilium* × *fialkovaja* (*L. szovitsianum* × *L.* × *maculatum*)

HERMAN V. WALL







HERMAN V. WALL

Hybrids of *L. dauricum* and *L. concolor*, the select strains now grown as *L. × Rainbow Hybrids*.

was of complex parentage and this was confirmed by information subsequently received from Russia.

This hybrid lily was raised by the late Professor I. W. Michurin and it flowered for him for the first time in the year 1914. According to the records, *L. szovitsianum* was the seed parent and *L. × maculatum* the pollen parent. *L. szovitsianum* has been produced by us from seed. It has proved to be a rather difficult lily. It flowers very early and its sweet-scented, sulphur yellow, bell-shaped flowers are most attractive. With *L. kesselringianum* and *L. monadelphum* it forms a group of interesting lilies that is found in southern Georgia, Azerbaijan,

and in Russian Armenia. All three species intercross readily and produce inter-specific hybrids that are attractive and vary only slightly in color and form.

*L. × maculatum* is a hybrid raised from crosses between *L. concolor* and *L. dauricum*. These crosses seem to have been made centuries ago by Chinese and Japanese gardeners. From the resulting hybrids, a number of fine garden plants were raised. We can surmise, from post-factor evidence, that Professor Michurin used an apricot-colored plant. The cross has never been successfully repeated.

*L. × fialkovaja* grows to 40" tall, the leaves are darker than those of *L. szovitsianum*, 11½" long and hairy at



their base. Inflorescence, which is very robust, resembles *L. szovitsianum*. When fully grown, the plant will carry as many as twelve funnel-shaped, downward-facing and fragrant flowers. Flowers are 2½" in diameter. The color is light violet, with a touch of yellow at the base of the petals. The whole petal is masked with small dark spots which, at times, are elongated. The stigma is very dark. The hybrid flowers in Oregon in mid-June.

With its complicated ancestry and the

many interesting characters which it has inherited from each of its parents, it holds a great potential for future hybridization. At the Oregon Bulb Farms, experimental crosses have been made with the bulb which was obtained from the U.S.S.R. It has been used in crosses with several of our well-known hybrids and the results, which appear to have been successful, are awaited with interest and pleasure.

—JAN DEGRAAFF  
Gresham, Oregon

Inter-specific hybrids of *L. szovitsianum*; *L. monadelphum* and *L. kesselringianum*.

HERMAN V. WALL







*Lilium szovitsianum*

HERMAN V. WALL

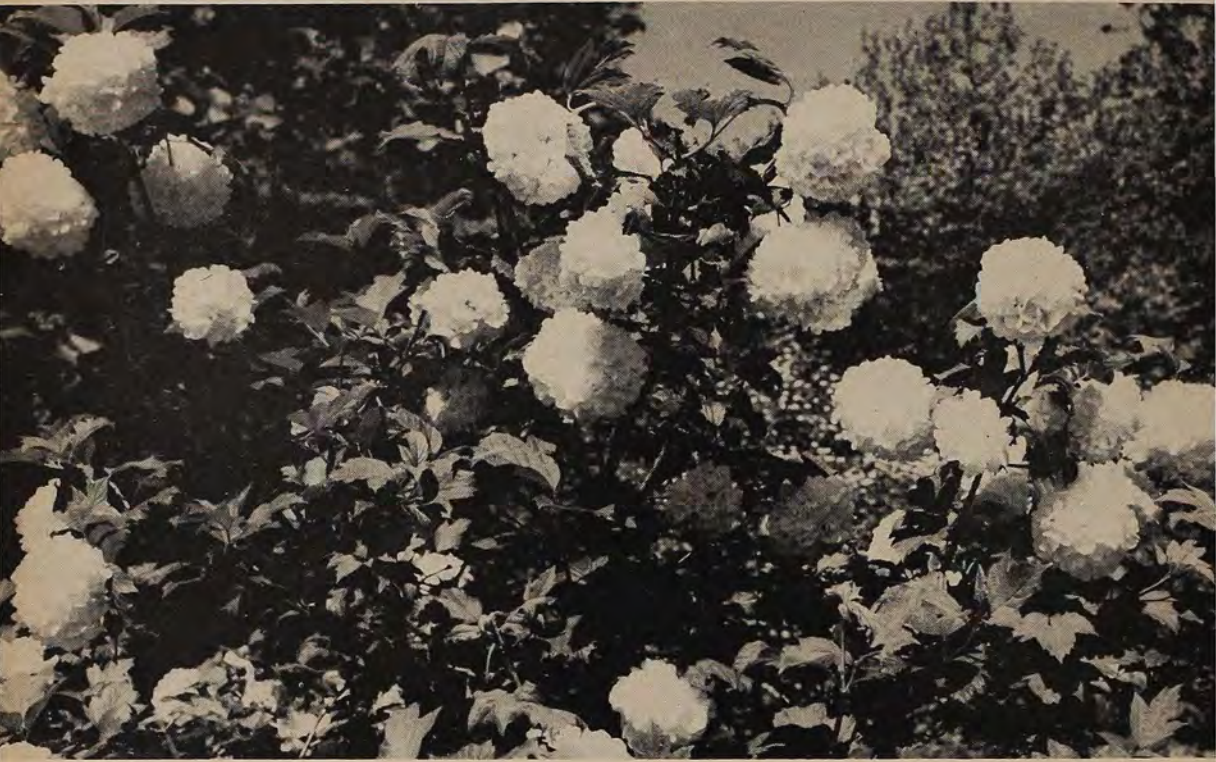
### *Viburnum opulus* 'Roseum'

The old-fashioned European Snowball has been a favorite in American gardens since Colonial days. Bean noted that it was supposed to have originated in the Netherlands and has been popular in English gardens since the sixteenth century, and possibly before. It was incorrectly termed *Viburnum opulus* var. *sterile*, but the correct name is now *V. opulus* 'Roseum'. The sterile flower heads are sometimes  $2\frac{1}{2}$ " or more in diameter and borne in the form of a rounded ball. These are produced profusely each year. Bean continued to say that it is "one of the most beautiful of hardy shrubs," but before inexperienced

gardeners plant them in large numbers, they should know two important facts.

In the first place, since all the flowers are sterile, no fruit is produced. In contrast, the species, with fertile flowers, produces bright red fruits in large clusters which may remain on the plant well into the winter. Even more important is the fact that the European Snowball is susceptible to serious infestations of plant lice which can seriously mar flowers and foliage alike. If this snowball is to be used in an area where this pest is a possibility, arrangements must be made to spray promptly to control the insect. Other viburnums seem to be immune or infested not nearly so much.





*Viburnum opulus* 'Roseum'

ARNOLD ARBORETUM

Because of this possible pest trouble, one should also consider the Japanese Snowball (*Viburnum plicatum*, formerly incorrectly listed as *V. tomentosum* var. *plicatum*), which is reliably hardy as far north as southern New England, or the larger-flowering Chinese Snowball (*V. macrocephalum*), which is hardy from Washington, D. C., southward. This last species has flower clusters six to eight inches in diameter and makes a wonderful display when in full bloom.

The European Snowball has been the widely used favorite over the years, probably it has been known longer and is hardy throughout all but the coldest parts of the United States. However, the Chinese Snowball is certainly the plant for the South and the Japanese Snowball should be given first consideration elsewhere. It is admitted that the hardier European Snowball makes a wonderful impression when it is observed *without plant lice*, but if you have ever seen a plant truly crawling with those obnoxious pests, you will be wary of using the European Snowball in a garden where spraying is held to a minimum.

—DONALD WYMAN  
Arnold Arboretum

#### On Transplanting Trees Ferns from the Wild (Panama)

One of the most interesting features of a tropical flora, is the existence of certain primitive types long since vanished from the face of the earth in more rigorous northern climes. Among the most interesting of these are the tree ferns, which flourished in the continental United States in late Paleozoic times, contributing to the building of the vast coal deposits. Although driven farther and farther toward the Equator by successive climatic changes, they still flourish in the rainy tropics of both the old and new worlds. They are probably some of the world's most stately plants, waving their enormous lacey fronds atop trunks sometimes reaching a height of thirty feet or more.

These plants have long been a feature in the displays of tropical botanic gardens throughout the world, being grown along streams, beside pools, and in luxuriant groves against more somber foliage. It had long been our wish to establish a few of these species, native to the





ARNOLD ARBORETUM

*Viburnum opulus* 'Roseum'

Republic of Panama, on the grounds of the former Missouri Botanical Garden's Tropical Station at Gamboa. We had been told that the native species were practically impossible to transplant from the wild. Our first attempts tended to prove this statement true, since two lots of a dozen plants each, brought in to the Station, died immediately. Since these were brought in during the dry season, we suspected that the difficulty might be the lack of humidity in the air. Water at the roots had been supplied in copious quantities to no avail. We decided upon a third attempt at the beginning of the heavy rains in May, bringing in four plants, with trunks varying in height from four to ten feet. All of the fronds were removed, and generous balls of earth were brought about the roots. To our delight all of the plants began sending out new fronds at once, and grew without any check.

The next attempt was to see if it was necessary to plant the ferns in deep shade. Since we were troubled with a weedy species of tree, especially bother-

some in dropping leaves into our pool, we decided to bring in a specimen plant which we had admired for some time in the mountainous region leading into El Valle, in Coclé province, to replace our eyesore as an attractive accent mark at the corner of the pool. With abundant profanity, and the help of four local Indians we managed very painfully to snake the giant twenty-foot trunk out of the little canyon in which it grew. It was necessary to send a man ahead with a machete, cutting all trees and shrubbery back far enough to allow the men to pass. The floor of the canyon was boulder strewn, so that the sizeable ball of earth had to be carefully lifted over and around many obstacles. When the half-mile distance to the truck had been covered, not a man of us had any of the skin left on our shoulders. We estimate that the trunk and ball weighed about six hundred pounds. With the ball of earth resting on the tail gate of the truck, the top incurled fronds reached fully seven feet over the entire length of the truck. With little further trouble the



specimen was planted at the corner of our lily pool, in full sunlight. It thrived and became one of the most prominent features to meet the visitor's eye on entering the Station grounds. All in all, fifteen tree ferns were established which added greatly to the Station's appearance.

PAUL H. ALLEN

About the author:

This brief note comes from unpublished material of the late Paul H. Allen (1911-1963), tropical botanist and horticulturist, who served the Missouri Botanical Garden as director of its tropical station in Panama in pre-World War II days. Although known especially for his published accounts of Central American orchids and trees, Allen was a keen plantsman. This note dates from his Panama Garden days.

Walter Hodge

### *Iris japonica*

I was rather surprised not long ago to read that it was not possible to grow the evergreen *Iris japonica* outside in the garden anywhere in the United States except on the Pacific Coast. And on the Pacific Coast only from about central California northward to Vancouver, British Columbia—and that is, west of the Cascades, not east of the mountains.

I have *Iris japonica* in my garden—lots of it. What surprises me is that the entire surface of the temperate world is not crowded with it! Except for a few slug holes in the young blades, nothing seems to bother it. It is most persistent and though evergreen, it will take a frosty winter in Portland with no harm done except a few brown-tipped leaves. It spreads rapidly by underground stolons where it is happy—in humusy, moist soil in dappled shade. It does not like full afternoon sun at any time, either summer of winter. It simply flourishes between the rocks of a shady rock-garden and to even think of putting it in among small choice plants is foolish indeed.

Confined to its proper place, *I. japonica* is a lovely thing. Late in Spring it sends up what looks like a 4- to 6-inch beardless wheat head. This head has lateral "husks" which open up, sending forth little branches, each with two or three blooms. These blooms are simply exquisitely beautiful though small, being not quite as big as those of *I. cristata*. They are pale lilacy white with violet stainings, have frilled edges and gold

splashing on the falls. They bloom for a long time and one plant may send up a stem which will have thirty to forty flowers during the blooming period. These last two or three days and bloom hit and miss up or down the flowering stem. As a cut flower the stem has "holes" in it, i.e., spaces where the flowers have come and gone.

My *I. japonica* does not set seeds—it seems to rely entirely on underground methods of spreading. It flourishes under the dappled shade of a lath-house as do several other plants which have never learned to fight back. So every now and then I go around and pull up a bushel or two of plants (saying all the while "excuse me, buddy, I love you but I need your room"). You know when plants are happily situated they never fail to repay their gardener friend. The satisfaction this gives me makes life infinitely more livable.

—PHILIP S. CHENEY  
Portland, Oregon

### The Wonderful Chugai Azaleas

About fifteen years ago I purchased rooted cuttings of 16 varieties of Chugai azaleas and was amazed at the exotic beauty of the flowers produced by these tiny plants. Although I had about 100 other varieties of azaleas I felt that the wonderful Chugai hybrids were in a class by themselves—far above most standard azaleas. Since that time I have not changed this opinion although agreeing that there has been tremendous improvement in azalea quality from such fine hybrids as the Glenn Dales, Gables, Exburys, and others.

My outstanding impression of the Chugai hybrids is the excellence of their flowers. Any attempt to describe these large, frilled, delicately colored blossoms is most inadequate. Colors from pure white to pale shades of pink and rose or even lavender and most amazing is the wide range of colors that often occur on a single plant.

Variations of pink on a white background are frequent and some flowers will be divided almost equally into half white and half pink. Some branches may have pink flowers while others have white flowers and still some blooms will be variegated—all on the same plant. The "Azalea Book" discusses this characteristic as follows: "The Chugai Hybrids rate





This 12 year old Chugai azalea is about 2½ feet wide and 1½ foot high. It has been replanted several times and may be somewhat smaller than if grown under ideal conditions.

high in excellence of flowers and habit although one might wish at times they were more restrained in their variability of flowers and thereby less confusing to the eye". "The Azalea Book" states: "one plant may bear as many as five different color forms or patterns." In their English catalog of 1936-37 the Chugai Nursery Co. made the following statement concerning the beauty of these azaleas: "The flowers are of most noble and refined beauty—we recommend with confidence their real value of highest attainable grade which is totally unknown to outside of Japan."

Another very desirable feature which characterizes the Chugai azaleas is their lateness of flowering. In the area near Washington, D.C. most azaleas have completed their blossom period by late May while the Chugais do not usually begin to flower until June. Generally the blooming period extends for about a month with a nice balance of flowers and deep green foliage which is pleasingly different from azaleas which are blanketed entirely with blossoms.

Plants of the Chugai hybrids are definitely low-growing and compact in habit with outstanding glossy, dark green foliage. Even when winter weather reaches to almost zero most of the leaves remain on the plant; thus these varieties can be considered as evergreen. I have found them to be very winter hardy, far superior in this respect to many clones generally considered suitable to the suburban D.C. area.

Standard propagation practices give good results with the Chugais but be-

cause of their compact growth the cuttings are quite short. A nice plant about 4-6 inches tall and about the same in width can be obtained in 2 or 3 years. By comparison with most azaleas these varieties are very slow-growing which probably accounts for their lack of popularity with some nurserymen. They have the usual basic azalea requirements of acid soil; lots of sawdust or peat as a mulch; of acid-type complete fertilizer plus cottonseed meal; and a constant—but not excessive supply of moisture.

Some of my favorite Chugai varieties are: 'Jindai', 'How-Raku', 'Gunrei', 'Mai-Hime', 'Row-Gettsu', and 'Shinnyo-no-Tsuki'. At one time more than 50 varieties were listed by the Chugai Nursery Co. of Kobe, Japan. This nursery had purchased the clones from private breeders of Satsuki hybrid azaleas and propagated them for resale as Chugai Hybrids. Parentage of these azaleas apparently is *Rhododendron indicum* crossed with either *R. simsii* or Belgian



At the peak of bloom this Chugai hybrid shows a nice balance of beautiful flowers and glossy, green foliage. This photo is from a color transparency and thus does not show good detail.

hybrids. Close relatives are the fine Macrantha azaleas which are very similar in growth habit and lateness of flowering. In 1938 and 1939 the Plant Introduction Section of the U.S. Department of Agriculture released 53 of the Chugai azaleas to U. S. nurseries but so far they have not received the popularity merited by their many excellent qualities.

—WALTER F. JEFFERS  
Salisbury, Maryland



### More Notes on Native Trees and Shrubs of the Southeast

Two people replied to my request for further information about native trees and shrubs in cultivation.

Miss Arlene Ziegler writes from Nashville, Tennessee, that she has not yet been able to establish *Stewartia* in her garden, but knows of a beautiful tree nearby. She says her yellow wood bloomed the second year after it was planted, and has bloomed every year since. It is twenty years old.

Miss Ziegler considers the black haw, *Viburnum prunifolium*, one of the most beautiful native trees: "It has most effective white blooms, very shiny green leaves which turn a lovely red in the fall, and also lovely red berries. I find it difficult to transplant." Just the other day a friend in Charlotte said, the same things in praise of the black haw, but the trees we found already growing in this garden and in our Raleigh garden never showed any autumn color, and the berries were few, or else the birds ate them before they colored. Its flowering is delightful, but brief. Dr. Totten considers the blue haw, *Viburnum rufidulum* a better tree.

Miss Ziegler is disturbed because some people consider *Aralia spinosa* a pest, and grub it up. I must admit that I am one of these. I love it, but after planting it in the garden I simply was not able to cope with the suckers. It is a good tree for those who, like Miss Ziegler, "have plenty of land, both hillside and valley." She is in the limestone country, and says she had trouble with *Hydrangea quercifolia* until she learned to grow it in the shade, and give it plenty of water and an acid fertilizer.

Mr. Emory Smith wrote from Baton Rouge, Louisiana, that *Gordonia lasianthus* grows reasonably well though not native. *Illicium floridanum*, called star tree, or stink tree, is a standby. He has found, as I have, that although it begins to wilt the first sign of drought it will come back when watered, even though it seems completely dried up. He also grows *Cyrilla racemiflora* (not *racemosa*, as I incorrectly wrote it), which becomes a small tree in his garden as it does in the Carolina pocosins.

He says *Stewartia malacodendron* grows and blooms for him, but only with difficulty and careful attention in dry weather; it is native in the sandy soil of the hill country not more than fifty miles to the north. His garden is on the Mississippi River bluff only fifteen feet above the bottom land. His soil is very heavy, although well-drained, in spots it is almost impervious to water. This is very different from Miss Ziegler's cold hillside, but she and Mr. Smith both grow the oak-leaved hydrangea and the red buckeye, and they probably have many other plants in common.

—ELIZABETH LAWRENCE  
Charlotte, North Carolina

### Correction

On page 57 of the January, 1965 issue, a plate of *Diplarrhena moraea* erroneously appears as *Magnolia stellata*. This is entirely an editorial error and not that of the author who did not have an opportunity to see page proof with the incorrect photograph.

J.L.C

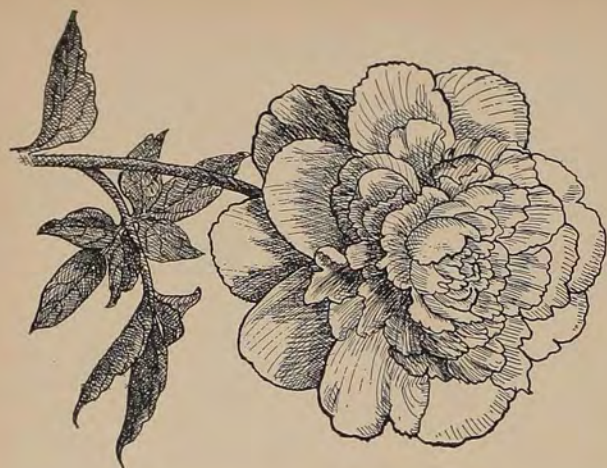


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The Editorial Committee of the American Horticultural Society, which reviews all material contributed for publication, makes the following suggestions with respect to manuscripts submitted for consideration in the Society's journal, the American Horticultural Magazine.

1. Place *full name* and *address* in the upper right-hand corner of your manuscript.
2. Manuscripts should be written at the level of the serious amateur gardener. For examples of the style desired refer to recent issues of the American Horticultural Magazine. An article about a particular plant or group of plants should emphasize cultural and descriptive phases of ornamental horticulture. When uncommon plants are discussed it is advisable to mention sources. Some botany and history in terms clear to a gardener are useful; also, the text should be taxonomically sound. Taxonomy can be checked by the Editorial Committee. Avoid if possible, footnotes and lengthy citations of literature.
3. Accompanying photographs are highly desirable. They should be sharp, black-and-white prints preferably four by five inches in size or larger. Captions for photographs should be on a separate sheet and enumerated with corresponding number on the back of the photograph, carefully so as not to emboss the reverse side, together with the name of the contributor for purposes of identification. It is advisable to *write out* numbers.
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CANNA SEED CAPSULES

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