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The
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Volume Twenty-Three

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1944

J. Horace McFarland

Simple,—Single camellia. Section I. Group A
Variety Enchantress.
Many single flowers are broadly trumpet shaped.

Camellia Classifications

H. Harold Hume

Camellias first became known to Europeans through the writings of James Petiver (1702), a London apothecary, and Englebert Kaempfer (1712), surgeon in the Dutch East India Company. Exactly when or by whom living plants of *Camellia japonica* came to England is not known but the date commonly given for their introduction is 1739. George Don (1831) stated that, "The plant was cultivated in England before 1742 by Robert James, Lord Petre." William Edwards (1747, plate bearing date 1745) illustrated a variety grown at Lord Petre's estate, Thorndon Hall, Essex, England. It is quite generally understood that the plants Lord Petre secured were the first to come to Europe. George Joseph Kamel, for whom Linnaeus (1735) named the genus Camellia, often has been credited with bringing the camellia to Europe in 1739 but he died in 1706 in Manila, P. I.

At Caserta, near Naples, Italy, a royal garden was started by Charles II in 1732. This passed to his son Ferdinand in 1759 and L'Abbe Berlèse (1837) mentioned a camellia planted in the garden in 1760 that supplied seed from which many camellias were grown in Italy and elsewhere. William Curtis, (1788), published a hand-colored illustration of a single-flowered camellia in his "Botanical Magazine."

However, the general culture of camellias as greenhouse and garden shrubs really began with the introduction into England of *Alba plena* and *Variegata* by Captain Connor of the East Indiaman "Carnatic" in 1792. These two were followed by *Incarnata* 1806, *Carnea* 1806, *Myrtifolia* 1808, *Paeoniflora rosea* 1810, *Fimbriata* 1816 and others. Samuel Curtis, (1819), cousin of William Curtis, published five camellia plates by Clara Maria Pope and dealt with eleven varieties in his "Monograph on the Genus Camellia." When 1830 arrived, William Beattie Booth was able to give a list of twenty-three varieties and six species introduced from the Orient. George Don (1831) listed twenty-six imported varieties in England, of which one had come by way of the continent. At least twenty-five of these had come from China. He also listed fourteen seedling sorts originated and named in England.

Interest in camellia culture grew apace. New varieties grown from seed by hand pollinations were introduced in large numbers. "Sports" were added to the lists. English camellia enthusiasts were very active and large numbers of varieties came from Italy where *C. japonica* thrives out-of-doors. When the Italian, Lorenzo Berlese, (L'Abbe Berlèse) published his "Monographie du Genre Camellia" (1837) the number of varieties had so increased that he listed the names of two hundred and eighty-two. As he pointed out, some of these were duplicates, but even after making allowance for synonyms, the number was large. Now it is even larger. It is probably no exaggeration to say that two thousand names have been applied to camellias and there are actually in American catalogues today more than thirteen hundred listed. For handling and understanding such a large number of different kinds, the need for some sort of orderly grouping or classification is apparent.

The Berlese Color Classification

Lorenzo Berlèse, abbot of the Sainte-Rose monastery in Italy, maintained an establishment in Paris for growing camellias. His active interest in them extended over a period of about thirty-two years (1817-1849), though he disposed of his Paris collections in 1846, and during this time varieties in large numbers came under his observation. He was credited with being the foremost private grower in Paris at a time when camellias were at the height of their popularity. Berlèse realized the need for some system of classification upon the basis of which varieties with one or more characters in common could be grouped together. Such an arrangement, he recognized, would make for order in handling and identifying large numbers of different kinds. Hence in his "Monographie du Genre Camellia" (1837) he proposed and used a classification based on color, in working out the details of which he had the assistance of M. Chevreul, Director of the Royal Establishment of Tapestries (Gobelins) and Professor of Chemistry in the Museum of Natural History (Paris). That no doubt might be left as to what was intended by any given color designation he used, a table or chart of colors was provided, forerunner of the several modern color charts now avaliable. In this chart he arranged the colors in ascending order from tints to deeper shades in two gamuts. In the text and tables, camellias were arranged under these and further divided into self or solid colored and bi- or two-colored groups. His classification was set forth in four different places in his monograph: (1) pages 11-13, (2) pages 47-49, (3) in the group headings of the varietal descriptions on pages 51, 58, 65, 91, 105, 106, 112, 115, 117, 120, 121, and finally (4) in the group tabular descriptions on pages 125 to 132 inclusive.

The Berlèse classification of 1837 reduced to tabular form with the pages allotted to each group in the monograph, is as follows:

\#First Gamut—pure white, to rose, to cherry, to amaranth, to purple.

(a) Self or solid colored.
   1. Pure white, 51-58.
   2. Clear rose, 58-65.
   3. Clear cherry red, 65-90.
   4. Deep cherry red, 91-105.

(b) Bicolored (Two-colored).
   1. White ground, striped or spotted rose, 112-115.
   2. Rose ground, striped or spotted with cherry red, 115-117.
   3. Ground clear or deep cherry, spotted with white, 117-120.

\#\#Second Gamut—yellowish flesh (dingy white), to flesh, to deep orange, to poppy colored.

(a) Self or solid colored.
   1. Flesh colored, 105-106.
   2. Orange-red, more or less deep, 106-112.

(b) Bicolored (Two-colored).
   1. Ground yellowish flesh, striped with white, 120-121.
   2. Ground orange-red, clear or deep, striped or spotted with white, 121-122.

In the second column of his tabular listings of varieties Berlèse made use of such terms as "regular simple," "regular full," "irregular double," "regular

semi-double," "irregular semi-double" and "irregular full," in describing the forms of camellias. Use of these descriptive terms indicated his awareness of the value of form but in 1837 he made no use of flower shapes as a basis for classification though he did so at a later date.

The Second Berlese Classification

Following the color classification of 1837, Berlèse outlined another in the second edition (1840) of his "Monographie du Genre Camellia." This was based on the form or shape of the flowers and the amount of doubling. To translate his words, it was a "New Method Based on the Shape of the Corollas." This classification was accompanied by four drawings and in the third edition (1845) by seven drawings illustrating the different divisions of his second classification. Also, the classification is repeated in the first volume of his large illustrated "Iconographie du Genre Camellia" (1841). Berlèse's fifth discussion of camellia classification is to be found in "Annales de la Societe Royale d'Horticulture de Paris" (1844). All outlines of the form classification, however, follow the plan presented in his "Monographie" (1840) which follows:

The corolla is *simple, semi-double, double* or *full.*	The corolla is *regular, semi-regular or irregular.*
Simple Corolla	Regular Corolla
Semi-double Corolla	Semi-regular Corolla
Double Corolla	Irregular Corolla
Full Corolla	

In connection with his classification outline, names were given to different forms based on their resemblances to other flowers. He said, "The corolla is *anemoniform,* or *peoniform,* or *rosiform,* or *ranunculiform* or *waratiform.*" Berlèse then furnished descriptive notes on each of the five groups and gave examples. His explanations, as he termed them, were these:

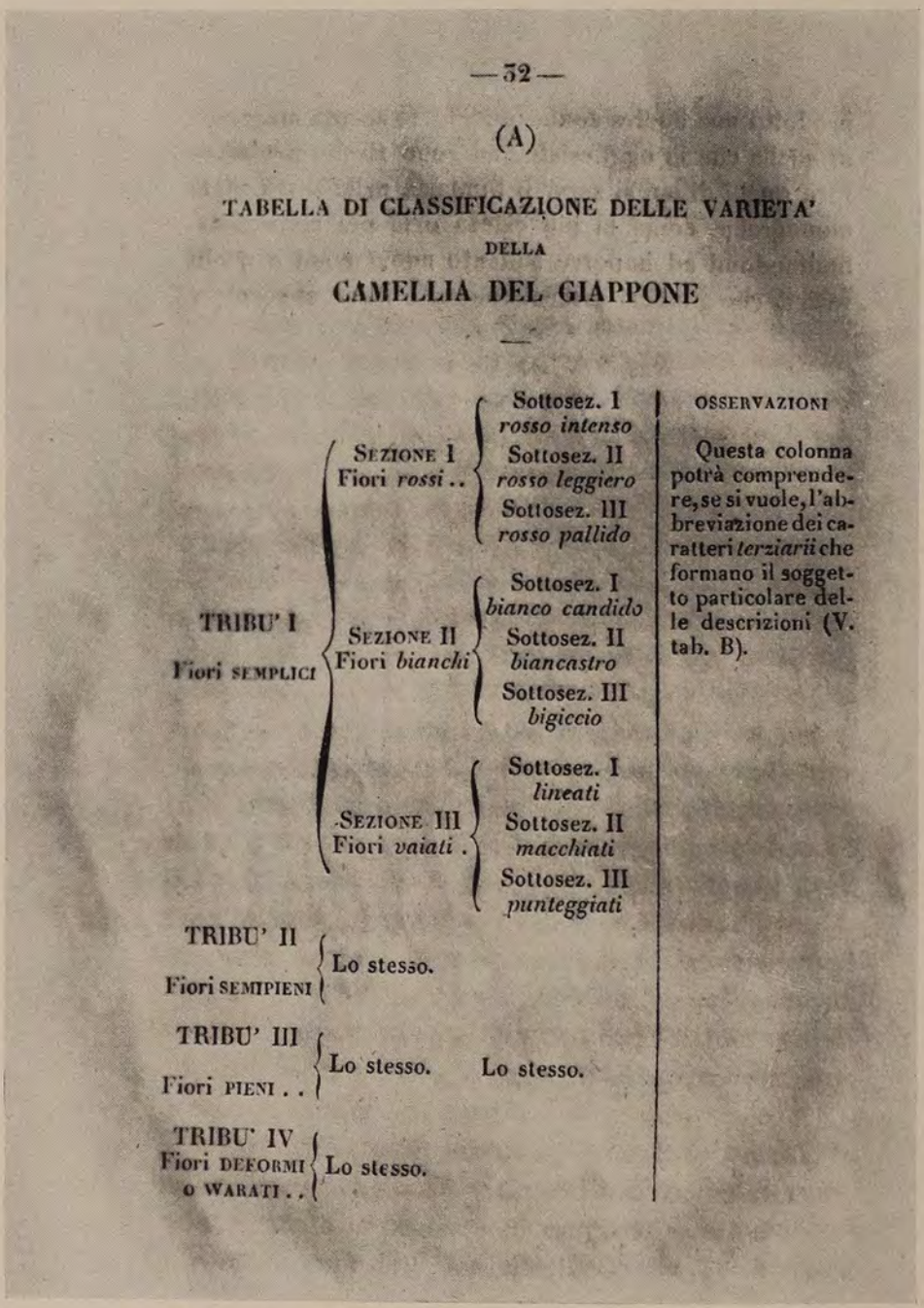
"The *anemoniform* corolla is that which has only two or three rows of exterior petals, and the sexual parts of which, being in a more or less petaloid state, form an anemone-like center. Ex: C. *Elegans Chandlerii.*

"The *peoniform* corolla is that which has a circumference composed of only 2, 3 or 4 rows of broad petals, and has its sexual parts transformed into petals which are complete, but unequal and misshaped, and the ensemble of which forms a center which is broad, bushy, shingled and convex, as that of the officinalis peony. Ex: *C. Colvillii.*

"The *rosiform* corolla is found under two different forms: First, a *semi-regular* rose with broad exterior petals arranged in 3, 4 or 5 rows overlapping at a distance: a center which is indeterminate, concave and more or less stuffed; stamens more or less visible. Ex: *C. Derbiana, C. Rosa sinensis.* Secondly, an *irregular rose* with diverse, shriveled, twisted, unequal exterior petals; a uniform convex center. Ex: *C. Variegata, C. Rex Bataviae.*

"The *ranunculiform* corolla is one which overlaps regularly throughout its circumference, with a center which is almost always concave and with petals which are close together much like those of a buttercup. Ex: *C. Alba plena.*

"The *Waratiform* or *pomponiform* corolla has the petals of its circumference arranged in one or, at the most, two rows, with sexual parts all transformed into



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(A)

TABELLA DI CLASSIFICAZIONE DELLE VARIETA'

DELLA

CAMELLIA DEL GIAPPONE

TRIBU' I Fiori SEMPLICI	SEZIONE I Fiori *rossi* ..	Sottosez. I	*rosso intenso*	OSSERVAZIONI
		Sottosez. II	*rosso leggiero*	Questa colonna potrà comprendere, se si vuole, l'abbreviazione dei caratteri *terziarii* che formano il soggetto particolare delle descrizioni (V. tab. B).
		Sottosez. III	*rosso pallido*	
	SEZIONE II Fiori *bianchi*	Sottosez. I	*bianco candido*	
		Sottosez. II	*biancastro*	
		Sottosez. III	*bigiccio*	
	SEZIONE III Fiori *vaiati* .	Sottosez. I	*lineati*	
		Sottosez. II	*macchiati*	
		Sottosez. III	*punteggiati*	
TRIBU' II Fiori SEMIPIENI	Lo stesso.			
TRIBU' III Fiori PIENI . .	Lo stesso.		Lo stesso.	
TRIBU' IV Fiori DEFORMI o WARATI . .	Lo stesso.			

Luigi Colla's classification of Camellia japonica published in his "Camelliographia," Turin, Italy, 1845.

petals which are perfect, elongated, thong-shaped, uniform, equal, the ensemble a sphere or pompon, like the old *Warata, Vespucius, Hebra, Rubina,* etc."

Berlèse's second classification is of interest because it still is used either as he outlined it or in somewhat modified form by societies or clubs in staging camellia shows.

Colla's Classification

Quite generally camellia enthusiasts have overlooked the classification outlined by Dr. Luigi Colla (1843) of the University of Turin in his "Camelliografia." It is reproduced from the original in the accompanying illustration, page 4. This when translated is as follows:

Table of Classifications of the Varieties of the Camellia of Japan

Tribe I Flowers simple	Section I Flowers red	Subsection I Deep red
		Subsection II Light red
		Subsection III Pale red
	Section II Flowers white	Subsection I Pure white
		Subsection II Whitish
		Subsection III Grayish white
	Section III Flowers variegated	Subsection I Lined or striped
		Subsection II Spotted (large spots)
		Subsection III Dotted
Tribe II Flowers partly double	the same	
Tribe III Flowers double	the same	The same
Tribe IV. Flowers deformed or waratah	the same	

J. Horace McFarland

Upper

Simple,—Semi-double camellia. Section I. Group B
Variety Imura

Lower

Incomplete Double camellia. Section II. Group A
Variety Gloire de Nantes

It will be noted that Colla divided camellias into four main groups or tribes, three of which he based on the amount of doubling while the fourth included what he termed deformed flowers. His sections were based on color, red, white or variegated and each of these was divided into three subsections covering intensity of color for the reds, purity of color for the whites and the kind of variegations for the third subgroup. He omitted names for any and all groupings.

Structure of Single and Double *C. japonica* Flowers

As an approach to another classification of camellias it is well to examine the structure of both single and double flowers of varieties derived from the species, *C. japonica.*

Single flowers of *C. japonica* have all the parts, calyx, corolla, stamens and pistils that go to make up a complete flower.

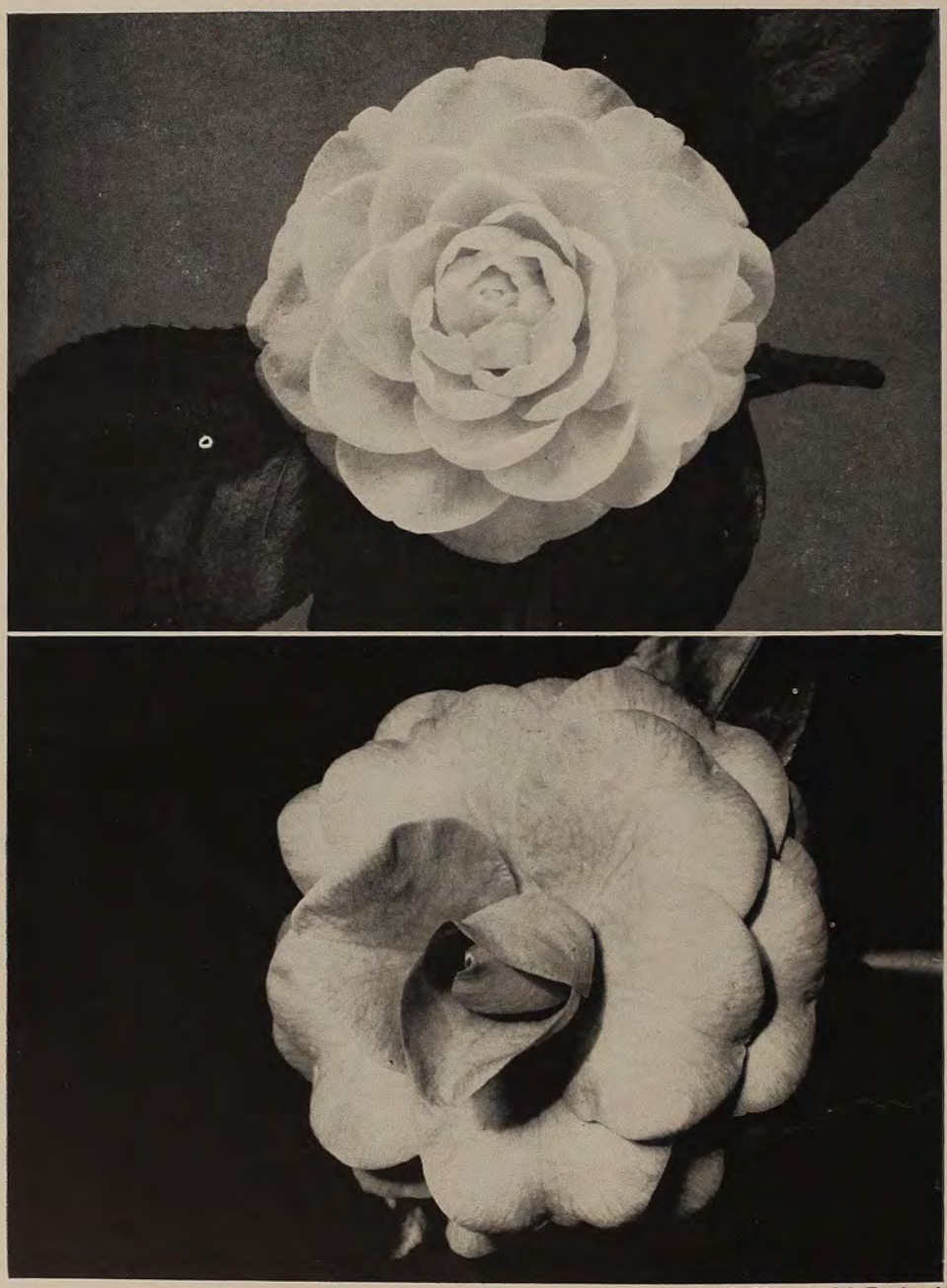
The calyx is flattened or cup-shaped, greenish, not persistent in fruit. Sepals are usually five to seven in number, imbricated, coriaceous, concave, increasing in size from the outer to the inner ones, usually dry and brown on the margins, semi-orbicular to triangular-orbicular in outline, approximately 1.8 cm. wide and 2 cm. from base to apex. The outer sepals are more coriaceous than the inner ones and the latter in double flowers are likely to be partially petaloid. It is not always easy to separate sepals from the bracts lower down, as they merge into one another.

The corolla in single flowers consists of 5 to 7 imbricated petals, united toward or at the base with the cylinder formed by fusion of the basal portion of the filaments of the stamens. They are somewhat circular in outline, constricted toward the base into a short, broad haft. Quite often the petals are auricled, i.e., provided with basal appendages, one on each side of the haft. When the flowers of single or double camellias drop from the plants, they fall as a whole because the stamens and petals are fused together at their bases.

Stamens in single flowers are numerous (81 to 136 or more), irregular in length (2.2 to 3.5 cm.), arranged in several rows, the outer ones longer. Filaments of the outer stamens are fused in their lower one-half or two-thirds to form a cylinder, but are free in their upper portions. Other stamens are attached to the inner surface of the cylinder at various levels, and usually there are ten, or approximately that number, free to the point of attachment at the base inside the cylinder. The filaments taper upward and are usually white or yellowish white in color, or sometimes pink. Anthers are yellow.

Normally, there are three to five pistils, usually three. The styles are fused or joined together for one-half to two-thirds their length from the base, free and linear above. The ovary has five cells, or by abortion three or four. Seeds are brown, globular, or rounded on the outer side and flattened on the inner surfaces, borne in a woody greenish capsule that splits at maturity into three to five parts.

Double flowers in *C. japonica* are an outcome of the conversion of stamens into petals. The structure of the stamen group and the attachment of the stamens form a basis for great variation in doubling. From the description of a single flower it will be noted that the lower one-half to two-thirds of the greater number of the filaments are united to form a cylinder and that in addition stamens are attached at different levels to its inner surface and that a number, usually ten, are free to their bases. In double camellia flowers the normal corolla of five petals or so is always present. The number of petals may be increased by additions from the sepals (converted), but the great number of petals in double flowers is



J. Horace McFarland

Upper

Complete Double, Regular Imbricated camellia. Section III. Group A Variety Frau Minna Seidel (Pink Perfection).

Lower

Complete Double—Incomplete Imbricated camellia. Section III. Group B Variety Mathotiana rosea.

produced by conversion of the stamens. There may be a petal for every stamen as in *Professor C. S. Sargent* and *Alba plena,* or the stamens may be only partially changed over, resulting in incomplete double flowers, of intermixed stamens and petals.

Single petals may be formed from one stamen or from two or more stamens united into a fascicle. Large petals are found toward the center of many flowers. These are due to the metamorphosis of fascicles or slabs of stamens into petals. If these be examined at the base, slight ridges may be detected, the remainder of bases of filaments; and if a cross section of the base of such a petal be examined under a microscope, vascular bundles, one for each ridge, may be seen. These bundles are similar to those found in unmodified filaments. In the transformation that takes place even the pollen sack may be turned into a petaloid organ, resulting in a small portion of colored tissue supported by a filament. Again, small portions of anthers containing pollen may be found on the margins of petals, otherwise completely transformed from stamens.

A New Classification*

As indicated above, additional petals are added to camellia flowers by metamorphosis of stamens. This new classification is based on two things, (1) the extent to which the stamens have been metamorphized and (2) the form of the petals by which the stamens have been replaced. There are variations in camellia flowers of different kinds that run through a series of changes all the way from normal single flowers with full complements of stamens to those in which all stamens have disappeared, completely replaced by petal structures. This makes a simple approach to classification. Color designations are left for inclusion in varietal descriptions where they belong.

Many varieties, in the early days of camellia culture, were given names based on the resemblance of their flowers to those of other plants and some of these were carried over in the Berlèse system as group names—"anemoniforme," "peoniforme," "rosiforme," "renonculiforme," and "varathiforme" or "pomponiforme." At that time such designations may have had quite specific application, but forms of most of those flowers for which camellia groups and varieties were named have since been so modified and changed as to make worthless such descriptive value as the names once had. Their continued use simply tends toward confusion, rather than away from it.

Section I. *Simple*—Stamens all central, united in a cylinder or in fasciles.

Group A. *Single*—Normal corolla of five to seven petals, occasionally nine. Mrs. Fred Sander.

Group B. *Semi-double*—Petals more than seven, usually fourteen to twenty. Tricolor (Siebold).

Section II. *Incomplete Double*—Petals numerous with single stamens or fascicles of stamens or both intermixed forming an irregular mass.

Group A. *Petals large,* representing fasciles of stamens. Gloire de Nantes.

Group B. *Petals small*—Formed from single stamens or very small fascicles. Elegans (Chandler).

Group C. *Petals sizes intermixed*—The features of A and B are combined. Nobilissima.

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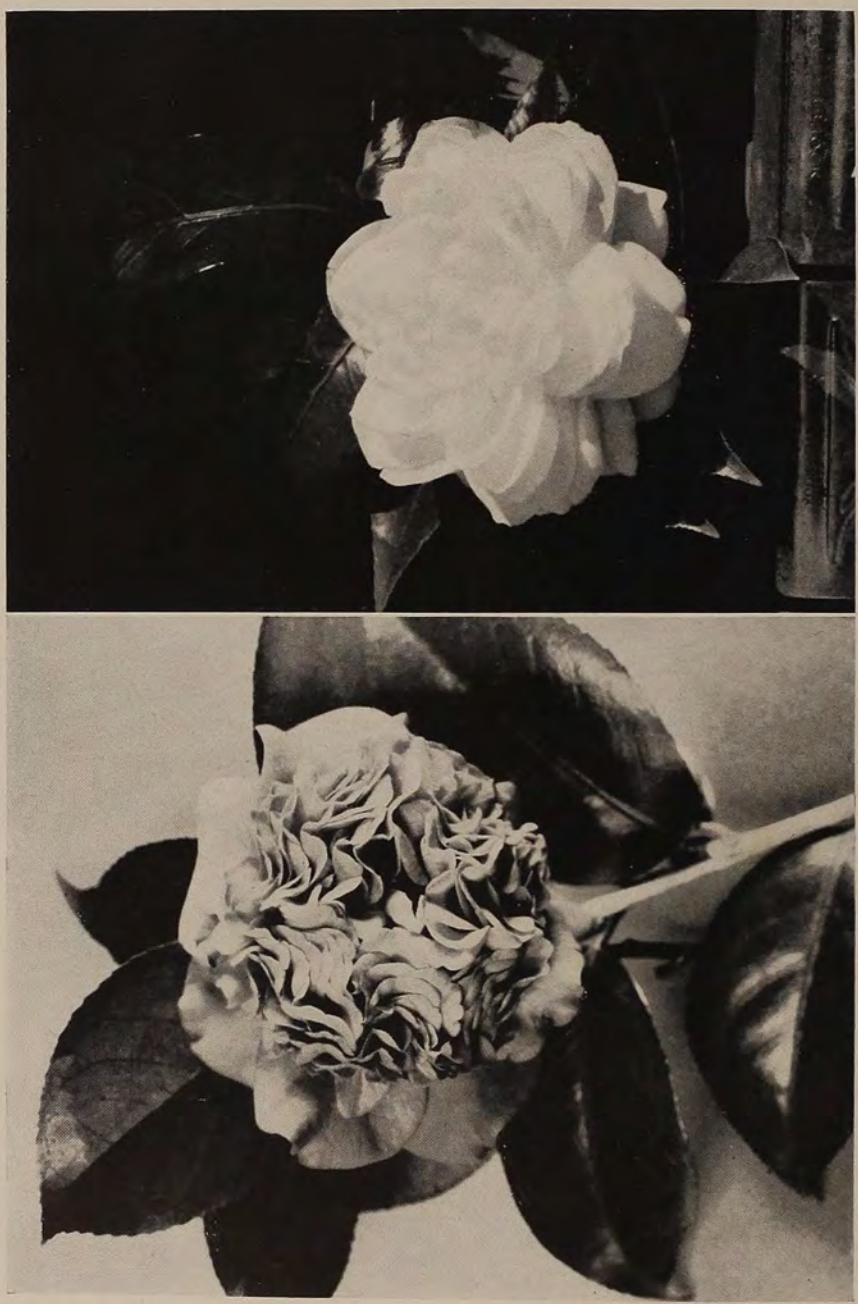
*A preliminary outline of this classification was published in the Bulletin of the Garden Club of America, pp. 28-32, June, 1942.



J. Horace McFarland

Upper

Complete Double—Tiered camellia. Section III. Group C
Variety Candidissima.

Lower

Complete Double—Irregular camellia. Section III. Group D
Variety Prof. C. S. Sargent.

SECTION III. *Complete Double*—All stamens have disappeared. Either they have been replaced by petals or if present they are few in number and hidden by petals.

Group A. *Regular imbricated*—Petals regularly imbricated (i.e. overlapping like shingles on a roof) from circumference to center, either completely or with only a small unexpanded remnant in the center. Alba plena.

Group B. *Incomplete imbricated*—Petals imbricated except for a relatively large unopened center. Mathotiana rosea.

Group C. *Tiered*—Petals arranged in tiers or rows from flower circumference to center giving a star-like effect. Candidissima.

Group D. *Irregular*—Petals irregularly arranged in a convex mass, usually small, stapulate, strap-shaped and folded. Prof. C. S. Sargent.

Any system of grouping has value in two directions. It is of use in placing varieties in groups of similar forms, thus resolving, in this instance, a great confused mass of forms into workable sections. It is also valuable in staging specimens for exhibition purposes. It must be remembered, however, that many varieties are not stable in form. Their flowers do not conform to a uniform pattern. Hence, any classification used in staging a camellia show has application to the exact specimen or specimens in hand; whether the specimen is representative of the variety is another matter.

LITERATURE REFERENCES

1702. Petiver, Jacobus. Thea Chinensis Pimentae Jamaicensis, etc., in his Gazophylachii Naturae & Artis. Tab. 33: Fig. 4. London.

1704. ————————. Thea Chinensis Pimentae Jamaicensis, etc., in Royal Society (London) Philosophical Transactions. 33: 1429. These two items relating to dried specimens prepared by James Cunninghame, collected in China, must be taken together. Indeed the first, accompanied by an illustration, is nothing more than a reference to the second. The latter appears generally to have been overlooked by subsequent writers. When considered together no doubt remains that Petiver's *Thea Chinensis Pimentae Jamaicensis folio, flore Rosaceo simplici* was what we now know as *C. japonica.*

1712. Kaempferus, Englebertus. Thea Japonensis pp. 605-631, pl. p. 606 and Tsubaki pp. 850-853, pl. p. 851 in his Amoenitatum Exoticarum. Lemgoviae.

The first of these articles deals with the tea plant, the second with two camellias, *C. japonica* and *C. Sasanqua.* Illustrations of the tea plant (*C. sinensis*) and of Tsubaki (*C. japonica*) are excellent.

1735. Linnaeus, C. Camellia in his Systema Naturae *under* 2. Monadelpha.—St. filiam coal. in 1 corp.

Here in the Systema, one of the earliest publications by Linnaeus, the generic name Camellia for the oriental shrub is used for the first time. He was acquainted with the writings of George Joseph Kamel (latin Camellus) but did not state that he had named the genus in his honor.

1747. Edwards, George. Chinese rose in his Natural History of Birds pl. 67. London.

With his colored illustration of what he named "The Peacock Pheasant from China," Edwards furnished a picture of a partly double variety of *C. Japonica,* the first illustration in color to appear in western literature.

The plate is dated 1745. He described the plant as follows: "The flower here figured by way of decoration is called the Chinese rose: I drew it from nature; it is what we see most frequently painted in Chinese pictures; it blows broader than a rose and is of a red rose colour, with the stems in the middle of a yellow or gold colour. The green leaves are stiff, firm and smooth, like those of evergreens.

This beautiful flowering tree was raised by the late curious and noble Lord Petre, in his stoves at Thorndon Hall in Essex."

1788. Curtis, William. Camellia Japonica. Rose Camellia in his Botanical Magazine, tab. 42. Mar. London.

This is an illustration of a single flowered camellia, the second colored picture of a camellia to appear in Europe. Complete double forms did not come to Europe until four years later.

1819. Curtis, Samuel. Monograph on the genus Camellia, p. 8, pls. 5, London. While there are only eight pages in this work, they are of large size and the fine plates by Clara Maria Pope are beautifully done. Eleven varieties are illustrated. Samuel Curtis grew camellias in the open in his garden on the island of Jersey.

1830. Booth, William Beattie. History and Description of the Species of Camellia and Thea; and of the varieties of Camellia japonica that have been imported from China, in Transactions of the Horticultural Society of London. *7*: pp. 519-562. pl. 14. London.

The title of this paper gives a very fair idea of its contents. Six species of camellias, twenty-three varieties of *C. japonica* and three varieties of Thea are discussed. Plate No. 14 shows four flowers of Variablis differing in color and slightly in form.

1831. Don, George. Camellia in his General History of Dichlamydeous Plants. 1: pp. 574-578. London.

In his discussion of the genus Camellia, Don described eight species and twenty-six garden varieties grown at that time in England. He also listed fourteen varieties produced in England, mostly by Alfred Chandler of Vauxhall.

1837. Berlèse, Lorenzo. Monographic du genre Camellia, ou essai sur sa culture, sa description et sa classification—1-132. 1 Col. tab. Paris.

1840. ————. Monographie du genre Camellia, et traite complet de sa culture, sa description, et sa classification. ed. 2, 1-237, pl. 1-4. Paris.

1845. ————. ed. 3, 1-337. pl. 1-7. Paris.

1841 and 1843. ————. Iconographie du genre Camellia, ou description et figures des Camellia les plus beaux et les plus rares. Peints d'après nature par J. J. Jung. 3 V. (*1:* pls. 1-100. 1841; *2:* pls. 101-200. 1843; *3:* pls. 201-300. 1843). Paris.

In these four works and also in a paper published in "Annals de la Societe Royale d'Horticulture de Paris (1844) Berlèse presented his two classifications, one based on color, the other on form. These are discussed in the foregoing papers and further comment is unnecessary.

1843. Colla, Luigi. Camelliografia. pp. 150, pl. 2. Turin. This is the earliest contribution on camellias from Italy where they grow well in the open. It contains Colla's classification, the third one presented.

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The United States Vegetable Seed Industry

WILBUR H. YOUNGMAN

The production of vegetable seeds is a comparatively new industry in the United States. While there has been some production, dating back to the Civil War period, the major expansion in this field took place during World War I. Moreover, before the present conflict began four-fifths of the world supply of vegetable seeds was produced in the area now under Axis domination. The production of Holland, Belgium, France, Germany, Italy, Roumania, and Morocco constituted the supplies for the farmers and gardeners of most of the world. Outside of this list of European and North African countries, England, the United States, Canada, Argentina, Chile, and New Zealand are the only countries producing quantities of vegetable seeds. Of this group only England, Canada, and the United States are of major importance.

A great many United States farmers look upon the production of field crop seeds as one of their farm enterprises. The production of clover, timothy, red top, alsike, and a long list of other farm seed crops is regularly a part of American farm operations. On the other hand, the production of vegetable seeds, the source of much of our food production is in the hands of a very few, probably less than 300 commercial seed firms. It is true that they contract with many farmers to do the actual growing, but they furnish the stock seeds, the technical supervision, and handle the harvesting and cleaning of the crop. Thus, it is a fact, the production of vegetable seeds for the thousands of acres of truck crops grown in this country each year, the millions of gardens, Victory and otherwise, and for the fields and gardens of our allies and the neutrals, depends upon the skill and unceasing efforts of a small but highly skilled group of American seedsmen.

During World War I, supplies of vegetable seeds from Germany and Roumania were cut off from the rest of the world, while difficulties in shipping from England, Holland, Belgium, and France limited supplies available to the Western Hemisphere. Our seedsmen to meet this shortage expanded production of a number of kinds. The small industry met the then large requirements which in the light of present problems of production were almost insignificant. In 1918 we produced about 120 million pounds of seed and imported 3 million. Exports were less than 2 million. Compare these with a 1942 production of 330 million pounds, imports of ½ million and exports of 15 million pounds, and with the 1943 figures which are much higher. In 1917 there were less than 50 commercial seed producers compared with the nearly 300 now growing vegetable seeds.

After the War, production was maintained although our growers had to compete with European producers. The favorable growing conditions to be found in various parts of this country, the large scale methods of production and the demand for certain kinds, types, and varieties not produced by European seed growers enabled our seed producing industry to maintain itself on a larger scale than had obtained prior to the War.

The development of new techniques may help in some instances to give United States growers further advantage over European competitors. It has

long been thought that Holland and Denmark had a monopoly in the production of cauliflower seed. However, methods recently developed in this country should enable our growers to more than meet European competition.

With the coming of World War II, practically every European source of vegetable seed was cut off. Even England, whose seed producing area is on the "invasion coast" had to curtail production sharply. Morocco was under Vichy France and, consequently, of no especial help to the United States or her Allies.

Before the United States entered the present conflict English seedsmen and the English Government made contracts with many growers in the United States and Canada for the production of seeds, especially the English types which we do not ordinarily grow. This served to give our production a stimulus. With all European sources cut off there was no other source of supply for the British. We began producing every kind, European and American types, and the demands seemed unending. Canada, like the United States, had received encouragement and aid from the garden-conscious England and while her resources and skill were more limited, began producing on a far larger scale than many believed possible.

Our South American neighbors finding themselves cut off from European sources also sought our seeds. Argentina, who had been producing some kinds in a limited way, is one of our largest customers. Chile, likewise, had attempted seed growing but outside of peas and beans had not been able to establish a successful commercial seed-producing industry. So the United States and Canada were the principal sources of seed for the Latin Americas also.

Australia and New Zealand had produced some seeds, mainly peas and beans. New Zealand with a cooler and more moist climate was able to produce some of the cool weather crops such as mangel beet, chard, etc., not on a large scale but in sufficient quantity to supply much of her own needs and a part of Australia's.

Thus the bulk of the world's seed supply had to come from the United States and Canada. While the foreign demands appeared to swamp the United States' capacity to produce they are actually small in comparison to our own requirements. The commercial growers who produce for canning factories and fresh markets are not always the major consumers of seeds. The Victory garden program with its millions of gardens needed millions of pounds of seeds. In total the Victory garden needs alone mounted by the millions of pounds and for a number of kinds consumed a major proportion of our production.

Production of many kinds of seeds was doubled. Some items were tripled and still we were unable to build up large reserves for postwar needs. Many of our basic garden crops are biennials which require two years to mature seed. Carrots and onions are examples. Because of this long period of growth they were the first to be exhausted (in 1943). In 1944 they are in ample supply. By 1945 it is expected that all biennials will be in abundance.

Seed production, to a large extent, depends upon climate and soil, hence suitable areas from coast to coast and from border to border were sought out and developed to lessen the risks of unfavorable growing conditions in any one season having a major effect on the crop. However, the major proportion of the seed growing is carried on in the western states where dry air aids in the control of diseases. The Puget

Upper

Field of Copenhagen Market cabbage—with an unusually fine seed crop. Production of cabbage seed requires a cool moist climate and because it takes two years to develop seed, involves risk of winter injury to the plants. This hazard is common to the production of biennial vegetable seed crops—beets, carrots, onions, etc.

Lower

Lettuce in seed and in flower. Lettuce seed is a comparatively easy seed crop to produce, although it takes considerable skill to remove the heads of the heading varieties so that the seed stalks may develop.

Sound Area with its cool, moist climate necessary for the production of the so-called "cool weather" crops, such as cabbage and broccoli, has a counterpart in Northern Maine. The high, dry sections of north central Idaho are ideal for the growing of peas and beans that are free from the destructive anthracnose disease. Onion and carrot production was rapidly expanded in California, Arizona, and other areas in spite of the shortage of field labor.

But seed production depends upon more than climate and soil. Skilled personnel is needed to select suitable fields; to see that the various crops are spaced far enough apart to prevent cross pollination; to "rogue" the growing fields, that is remove all plants not true to variety; to supervise cultivation and the work of disease and insect control. When the crops are mature it is necessary to look after the harvesting and curing, the cleaning, and storing of the seeds. Technical men are badly needed for every skilled seedsman can direct the activities of scores of farmers, and thus, figuratively speaking, be responsible for the production of many thousands of pounds of seeds.

Of course, the farmers also need workers to carry out the seedsmen's directions. They need fertilizer and insecticides and fungicides to aid the growth and to protect the valuable seed crops. Some machinery is needed but not a great deal except in the newer producing areas. In short, there are many difficulties to be faced and solved.

All of these requirements are urgent. Some of them were difficult to meet. However, the cooperation of all connected with the industry resulted in this tremendous expansion of production, in spite of the competition with food crops that were given the benefits of price supports and incentive payments. No such support was given the seed grower and his was a job that involved greater risk. No wonder that some farmers chose food crops in place of seed crops.

The seed industry did not have an organized program backed by reams of statistics to convince the world and Congress that more seeds were needed. In fact the only program suggested to the commercial producers the first year was produce more seeds and more seeds, and still more seeds. Perhaps we had a hazy idea of how much the commercial acreages required, but certainly the needs of the Victory gardeners could not be more than guessed. The needs of our Allies were even more indefinite, if that were possible.

We did have statistics on United States production and stocks, but nothing on our planting needs. During World War I, Congress gave the Department of Agriculture authority to collect any data on seeds deemed necessary to the prosecution of the war, but that was because we were not self-sufficient and it was necessary to determine our needs and to arrange for such imports as were necessary under wartime conditions. Data were needed to guide the new production programs. After the War those statistics were largely dropped. Consequently, when information was needed to guide and regulate production for World War II there was very little to go on.

The commercial seed producers met with Department of Agriculture officials, discussed the problem, and offered complete cooperation. Much basic information was furnished voluntarily. An industry committee was formed to develop plans and to aid in every possible way. Thus, with not much more than the will to do and on the basis of effective cooperation between the industry and the Government, production programs were formulated. It should be noted that they

were not supported by any known facts of how much was to be needed or when. Today after four years of War, we are meeting the majority of the requirements for the many kinds and varieties of vegetable seeds—somewhere around 500.

The United States and Canada are producing seeds to be planted in every part of the world, not only by our Allies and the neutrals but by the Army and the Navy who are shipping thousands, yes, hundreds of thousands of pounds of seeds overseas. These are to be planted, cultivated, and harvested that our troops may have fresh vegetables and, so far as possible, of the kinds they are used to. Wherever there are base troops, men who stay in one place for a considerable time, there you will find fields of vegetables being grown. Sometimes the soldiers till their own fields, but more often the natives produce the crops, selling them to the Supply Officers.

This supplying of seeds to the four corners of the globe has not always been easy. Shipping space has long been at a premium and guns and ammunition come first. Some seeds do not take much space and a corner in the Captain's cabin can be made to do duty. Seeds do rate high in shipping priorities, however, for a pound of seed can be made to produce many tons of fresh vegetables. A pound of carrot seed is enough for 10 tons of roots, while a pound of cabbage seed should produce 100 tons of cabbage. In addition to the shortage of shipping space, there were the problems of protecting the seeds from moisture and excessive temperatures (high or low) so that they would retain their viability. Air-

Threshing carrot seed with a small "combine." In this field the plants were pulled before "combining," although with uniform ripening the seed may be harvested from the standing stalks. The combine is widely used in the harvesting of vegetable seeds in the United States.

tight steel drums were effective but steel is scarce. Refrigerated ships in normal times were the answer, but not in wartime. Such ships are needed for meat, butter, and other highly perishable foodstuffs. The seeds had to go in common stowage. The use of moisture-proof fabricated containers, developed to protect them, have proved fairly satisfactory.

Recognizing the importance of and ease of shipping seeds as compared with foodstuffs, seeds have been incorporated in the plans for rehabilitation of liberated areas so that their populations may produce so far as possible their own foods. This, however, is not as easy as it seems. Many of the European types and kinds of vegetables, such as broad beans, lentils, and chickpeas, are not grown in the United States. We produce the solid-headed varieties of cabbage that are seldom to be found in many European countries. Our tomatoes are more acid. We do not grow many of the tap-rooted beets. Rutabagas, Swedes or winter turnips, as they are often called, are not at all common in this country but across the seas where the climate is cooler they are a staple food item.

We have developed a taste for varieties that are in many instances very different from those which are in general cultivation in other lands, although we do grow and enjoy many of the English varieties of peas. The varieties of carrots we use are practically the same in all corners of the globe. We like sweet corn, a crop that is not well known outside of North America. Lettuce has become a major item in our diets, but is of comparatively minor importance in many lands. We use quantities of cucumbers, watermelons, cantaloupes, pumpkins, squash, and other crops that are hardly known in some places.

In addition to supplying our own gardeners and those of our Allies, we have under way a program of storing seeds against the day of liberation of the occupied countries. This plan has been carefully worked out and has been agreed to among the United Nations. The exact quantities of seeds of each kind to be needed are, of course, a matter of speculation. No doubt Europe is producing seeds today, perhaps, not the usual kinds, but certainly they are growing those most essential for food. How much they will need to supplement their own production or to replace those destroyed as the enemy retreats is, of course, problematical. However, all will agree that a reserve or "stockpile" should be accumulated. But a relatively large reserve is not easy to accumulate when our seeds producers are expanding every facility at their command to meet current needs. Nevertheless, such a reserve in moderate amount should be provided as quickly as possible as an aid in restoring liberated peoples to self-sufficiency. Russia has already made great strides in converting desolated battlefields into productive fields with American seeds. The Soviet Government has publicly acknowledged the effectiveness and expressed their appreciation of the seeds supplied to them through Lend-Lease and the Russian War Relief.

Russia has recaptured a vast area, the cropland in the Ukraine alone being approximately one-fifth of the total United States acreage in crops. Seeds will be needed in vast quantity, but how much? No doubt Russia is producing some seeds in new areas—the Ukraine was formerly a seed-producing area. We have no way of knowing how successful the new programs are, but we do know that it takes seeds to produce food crops.

(*Continued on page* 57)

Grove of Silver Trees near Constantia Nek

Silver Trees on the Cape Peninsula

Sarah V. Coombs

Much has been written of South Africa's Silver Trees but very few people have any idea of their beauty. To a great extent this is unavoidable, for the trees show at their best only when in motion and a quiet, still young plant in a greenhouse gives no suggestion of the trees on a hillside, swaying in the strong southeast wind from the Antarctic. When that wind blows, the thousands of silky white hairs on the leaves rise to prevent too much evaporation and the whole tree shines with a silvery glitter, a very beautiful sight.

Native of the Cape Peninsula in South Africa, that strip of land with the Table Mountain range running its length to the Cape of Good Hope, Silver Trees are grown in a few other places, a specially favorable spot being the southern part of California, where a good many of them are doing well. I believe some are grown as far north as San Francisco. The climate of southern California is very like that of South Africa.

The photograph shows a grove of the trees near Constantia Nek, a few miles from Cape Town. The road winds around in a semi-circle, with the sharp-edged mountains rising on the right, the ground on the left dropping abruptly to the valley below, just beyond the house shown in the picture. It is a view

Staminate and Pistillate flower-heads of the Silver tree (Leucadendron argenteum)

one does not forget. Kipling wrote of it: "Under hot Constantia broad the vineyards lie," etc. With sunlight and shadow falling across the valley, the mountains opposite shining with an opalescent haze, the Silver Trees are in an appropriate setting.

The trees, *Leucadendron argenteum,* belong to the great family of the Proteaceae, which have odd flower heads of many flowers, the bracts which surround them being often bright-colored. The Proteas, first cousins of the Silver Trees, are the National Flowers of South Africa. The leucadendron is practically dioecious and the male and female heads are shown in the second photograph. If grown under glass, the plants should be watered with great care to prevent rotting and should have a cool temperature, a great deal of fresh air and sunlight. The soil should be a fairly light one, with good drainage. The plants should be set out of doors in summer in a sunny, windy place, if possible, to ripen their wood. They may be grown from seed. Both seeds and plants are obtainable in this country.

Many varieties of Proteads used to be grown with success in England in the old kiln-heated greenhouses. Like many of the South African plants, they did not like the hot, moist air and excessive watering of most modern ones and their cultivation almost ceased. As the cool, airy greenhouse becomes more and more popular, we find quite a number of Leucadendrons growing. I am inclined to think that they would like the conditions of a sunroom. It might be worth while to try.

New Quinine From This Hemisphere

B. Y. Morrison

In April, 1941, there were reported in this Magazine the experiments of Messrs. Stoutemyer, Hope, and Close in the use of sphagnum moss as a seeding medium, as applied to a considerable range of plant types, and under varying conditions. The authors reported their reasons for believing in the superiority of the material for routine seed beds.

Since that time a very considerable number of institutions have adopted the practice and have found it desirable.

There are under way at present certain field experiments which later will present evidence to show what happens when seedling transplants, grown on in sphagnum or in a sphagnum mixture, are transplanted to the field.

At a time when all practices are examined to show their possible application to the war, whether directly or indirectly, the work reported above finds itself close to the war effort in the campaign to reestablish quinine in this hemisphere.

Although the newspapers and various commentators have had much to say of late about the quinine seeds that MacArthur sent to this country, when those seeds actually arrived there was no fanfare, no hurrahing—merely a quick but preemptory telephone call from the War Department to the Division of Plant Exploration and Introduction of the then Bureau of Plant Industry—"Seeds are on the way—get going."

The seeds came along in two lots in June of 1942, and they came with all the careful work that showed the care that Colonel Fischer, an old correspondent of the Division, had utilized in

spite of his breath-taking trip back into occupied country to get them. As for ourselves—"we were in the war now" and recognized as such, at least by some. As swiftly as possible seed were sown in quantity sufficient to fill all available greenhouse space. Then came the task of "evacuating" the greenhouses of all the plant introductions which, under normal circumstances, would have occupied all this space. Before the seedlings, which germinated finely and grew on without a check, were ready to move from the propagation house where they had been sown, to the large houses for growing on, the two large greenhouses were empty and cinchona moved in.

Of course, cinchona growing was no new thing for the Division. Twelve years before it had concerned itself with growing supplies of seedlings, part of which were sent to government plantings in Puerto Rico and part to Guatemala to cooperating private interests. From these latter come reports this year that out of some 15,000 trees tested individually, 35 were chosen as outstanding and of these 24 came from our seeds. All this long before Pearl Harbor when there was no hue and cry about quinine and no one much cared whether we worked with cinchona or not.

Then the results were by no means one hundred per cent—now with a new sowing medium, the one real danger, damping-off, was beaten. But a new problem arose in the thought of preparing the plants for airplane shipment —how to avoid the weight of soil. Try sphagnum and use some liquid feeding? Briefly, it works.

Bit by bit each step in the procedures has been examined until the greenhouse range has the aspects of a factory. Personal prejudices have been broken down, individual whimsies overruled. But the work goes on and before this year is over well over 200,000 small trees will be in their new homes in Latin America.

Can it all be reduced to a formula? Only as far as any natural process can be so reduced.

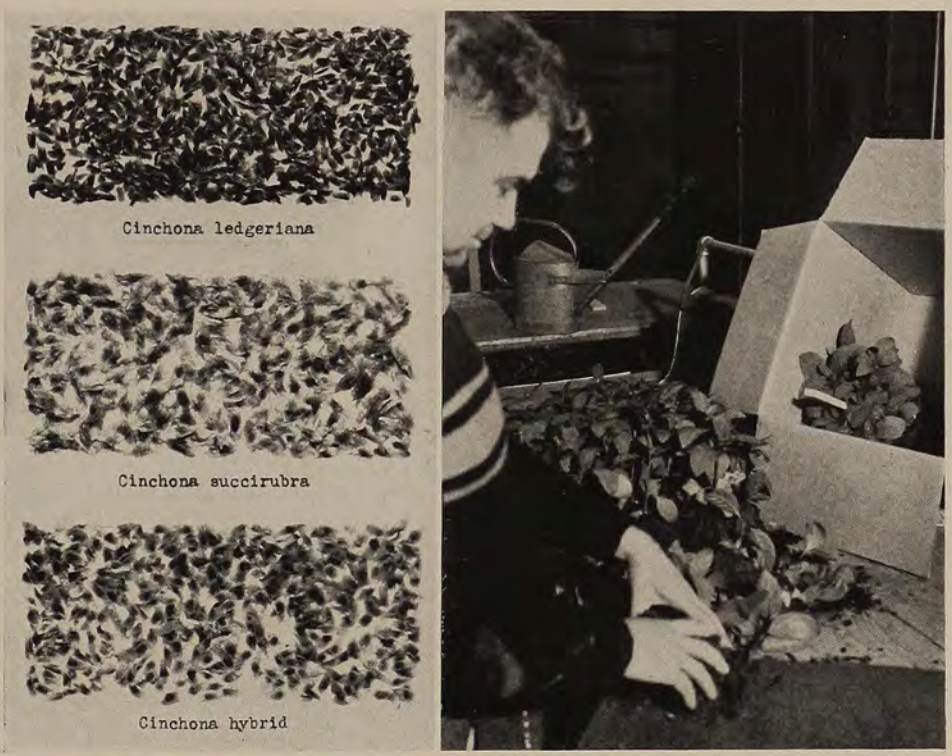
What do we have? Seed of a tree native to high altitudes in the Andes (between 3,000 and 9,000 feet), growing in places where there is deep, well-drained soil, rich in humus content and with acid reactions, with a rainfall of at least 120 inches distributed throughout the year. Although occurring in mixed forests, there is some evidence that it may have once been found in more nearly pure stands than any now known.

A little consideration of the natural range suggests that the tree probably seeded on the dark forest floor, that such seed fell on the vegetable humus that was acid, moisture holding and well drained, that the temperatures were never extremely high or extremely low. Here are all the clues the gardener needs. All of them have been checked by special tests and experiments that need not be recounted here.

The photographs show the procedure and the legends amplify the text.

To the inevitable question as to why seed should be sown here and plants flown away, the answer is that tropical nurseries continue to suffer tremendous losses in seed beds, losses which are lamentable when one realizes that good seed is limited and that none can be spared now, and that there are not now enough trained people to do the job in the respective countries. Those that are there, moreover, could well devote their time to getting nursery sites in order, since it is no small task to fell trees, clear brush, and get planting beds and shelters in order.

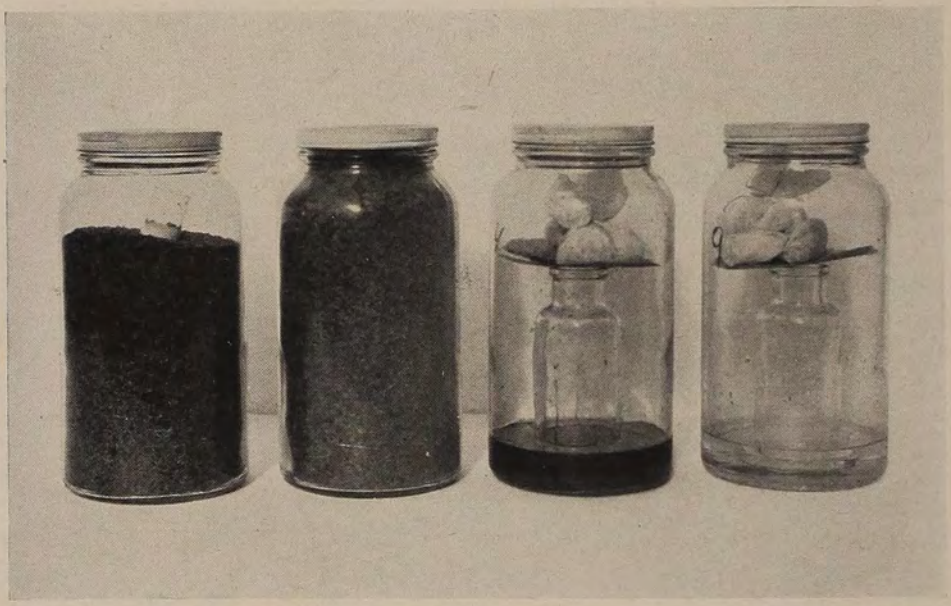
To the question, why plant any more cinchona when there are synthetics, the answer is that there is no final proof,



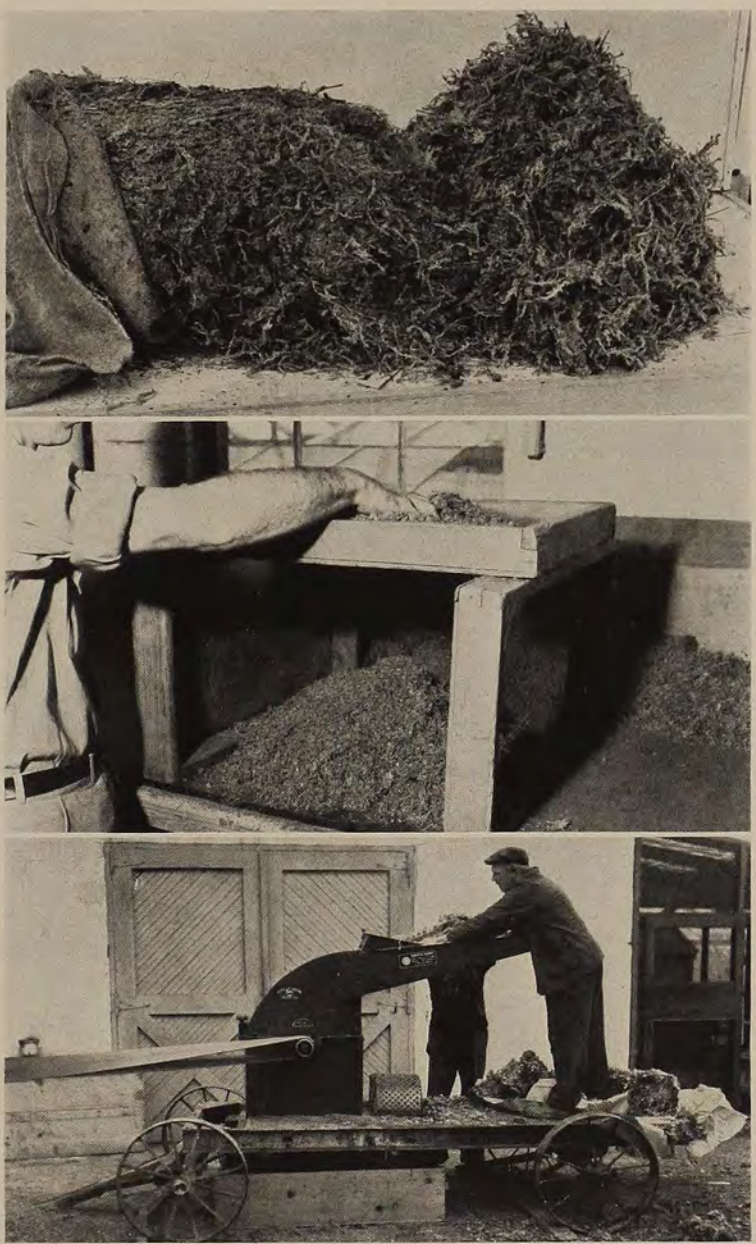
The beginning and the end: seeds and six month seedlings being packed for air shipment.

despite all assertions, that synthetics can and will cover the case. There is considerable medical evidence to show that they will not; there is no evidence as yet to show that quinine will lose its virtue nor that it will not be used for many other things, even if it were to be superseded today in the treatment of malaria.

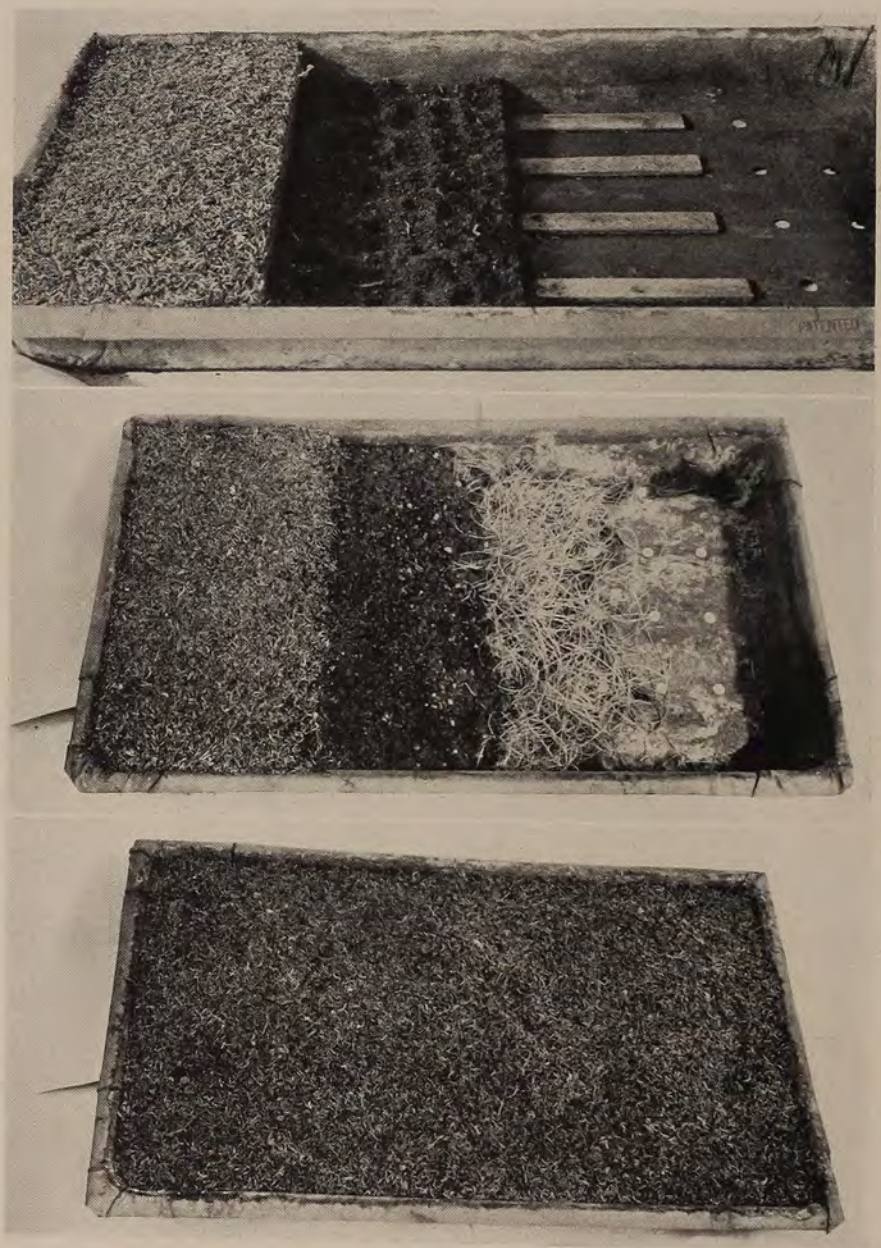
There are other problems related to cinchona, both botanical and technical, in nursery and in harvest place, but these do not concern us here. They are all of vital interest and God grant that soon we can be forever relieved of those who gabble away about the now discredited Countess Chinchon and sigh over the skill of the skillful Dutch planters, leaving for our own continents the task of having brought together and set on the way of recent and orderly development cinchona plantations that will take their place in many a national life.



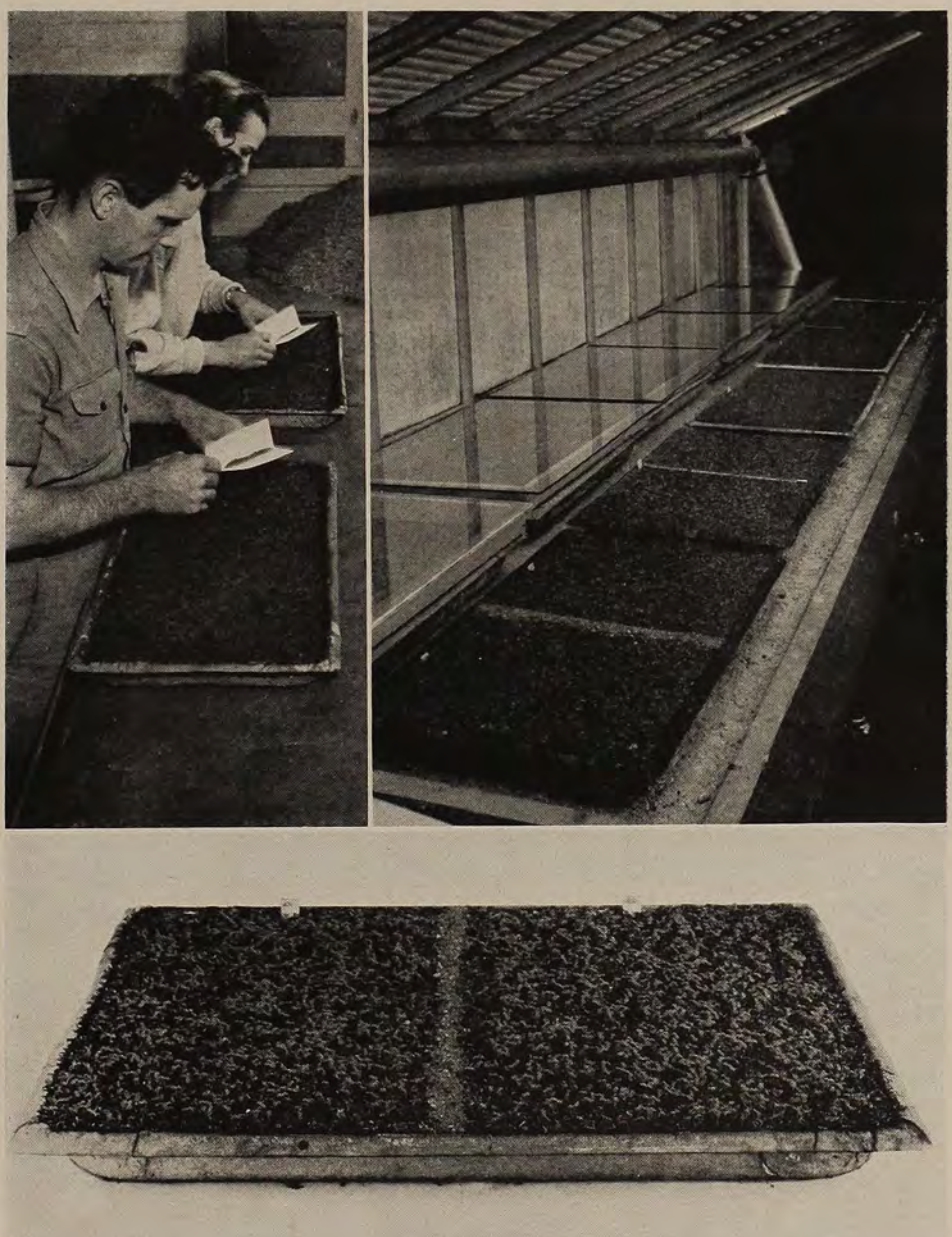
Seed storage is a vital part of the work. Large quantities, carefully dried, are kept in tight containers with a vial containing calcium chloride to pick up excess moisture. Small amounts are kept in cloth sacks on a wire platform over sulphuric acid which also absorbs moisture. Losses of germinating power have been about five per cent in almost two years. Normal temperatures for storage are all that are necessary.



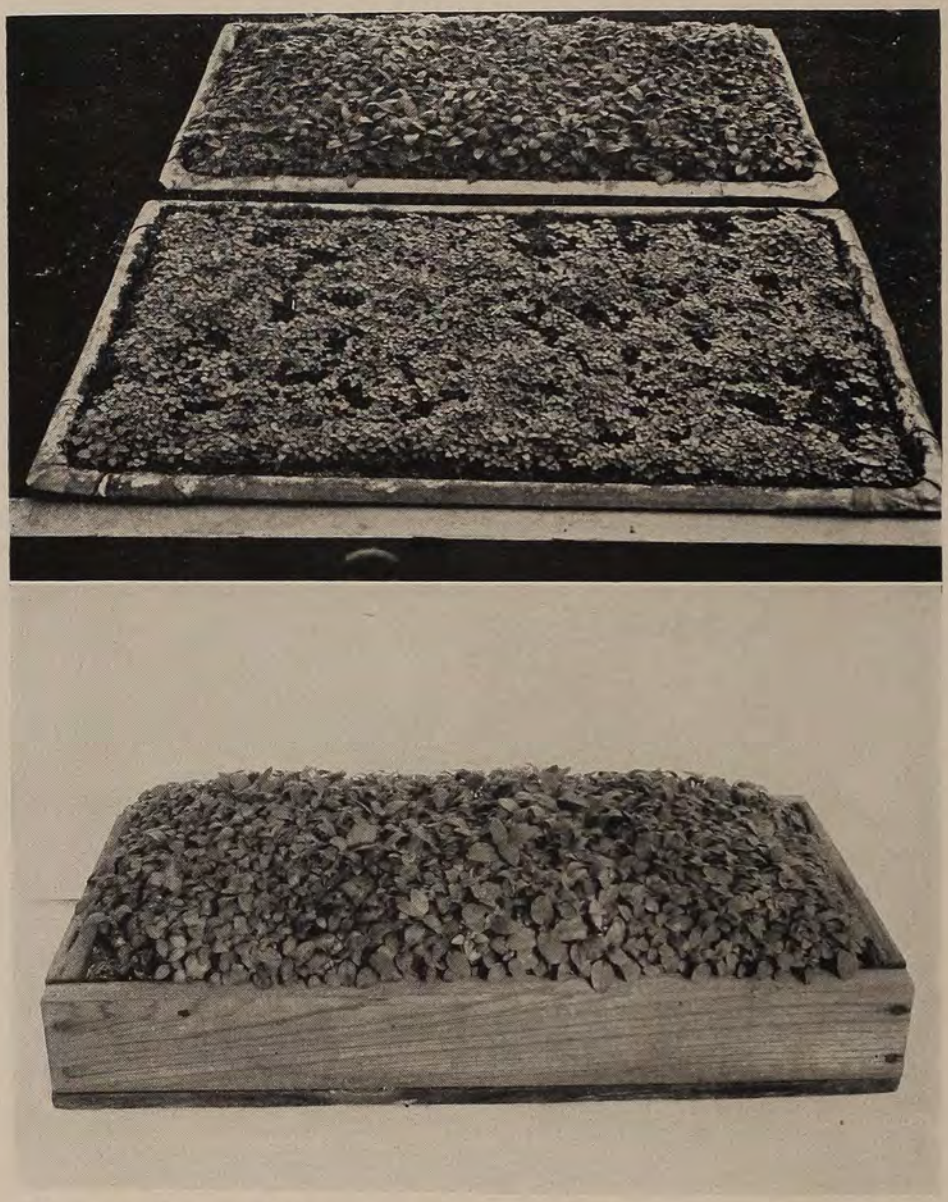
Sphagnum moss as it comes from the bale may be rubbed through a three-eighth inch mesh wire, or put through a hammer mill to prepare the even medium used for sowing. These details have been described elsewhere by Stoutemyer, Hope and Close.



Two metal flats "set up" to show preparation. Wooden lath or excelsior may be used to cover drainage holes. Then a layer of peat with the deep cover of prepared sphagnum. Notice that the finished flat is full to the rim. Flats are soaked and drained before seed is sown.



Seed is sown by tapping a channeled paper in which it lies. With a little practice an even layer can be had. Until germination is nearly complete, about twelve days, the flats are covered with glass supported by a wooden frame. The greenhouse is shaded. Typical germination is shown below.



The upper photograph shows more transplanted seedlings on sphagnum (rear) on wood soil mixture (front). Same age. The lower picture shows a flat of untransplanted seedlings which have been kept almost a year in health by careful reduction of watering.

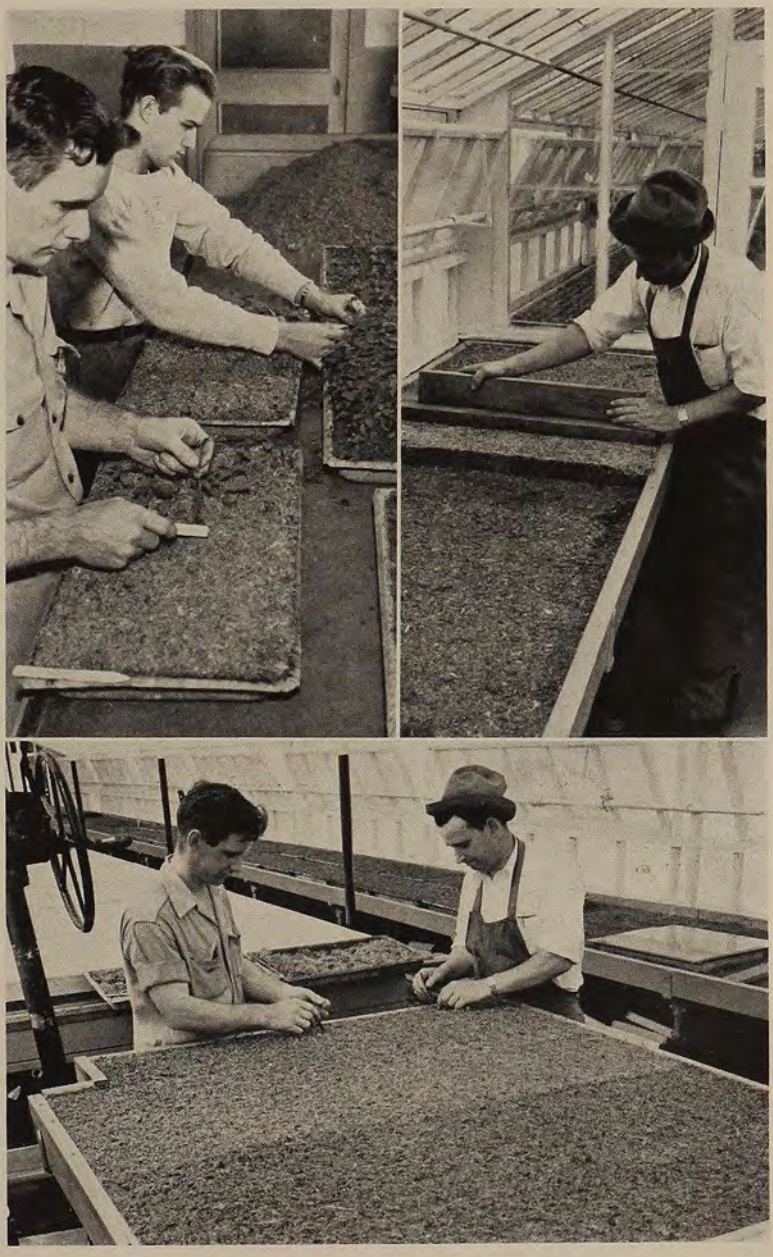
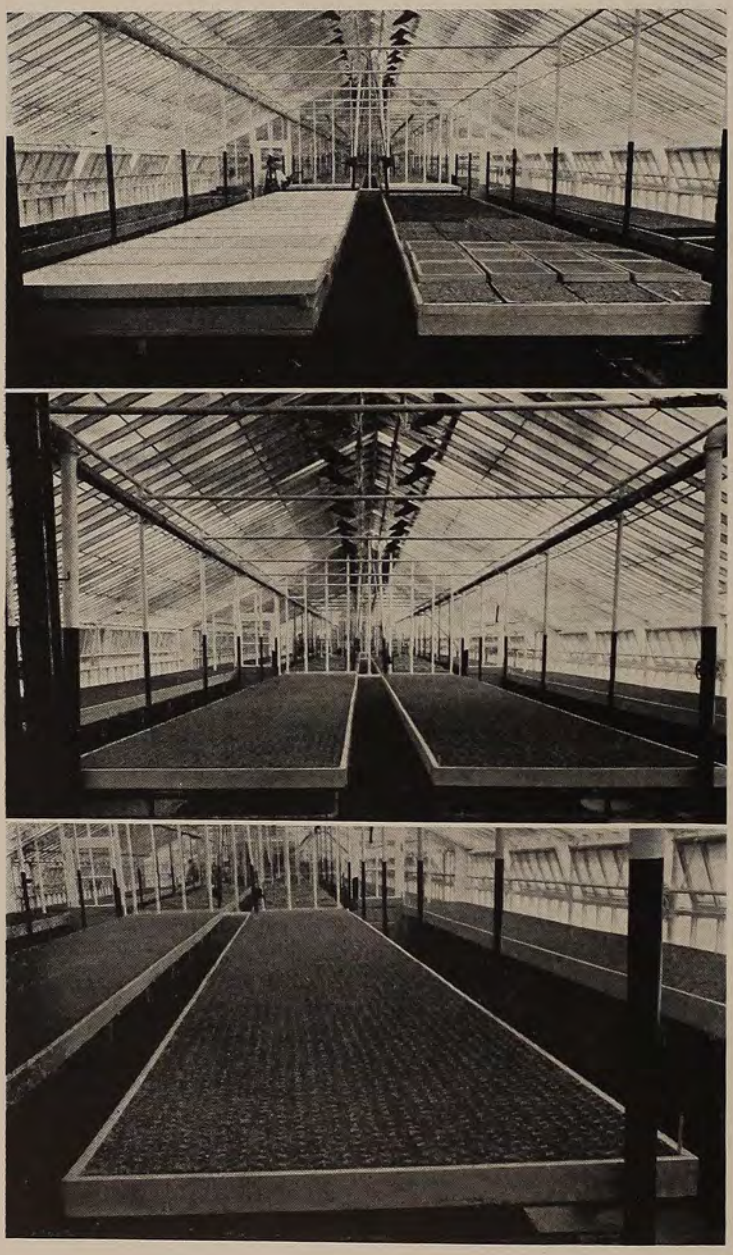
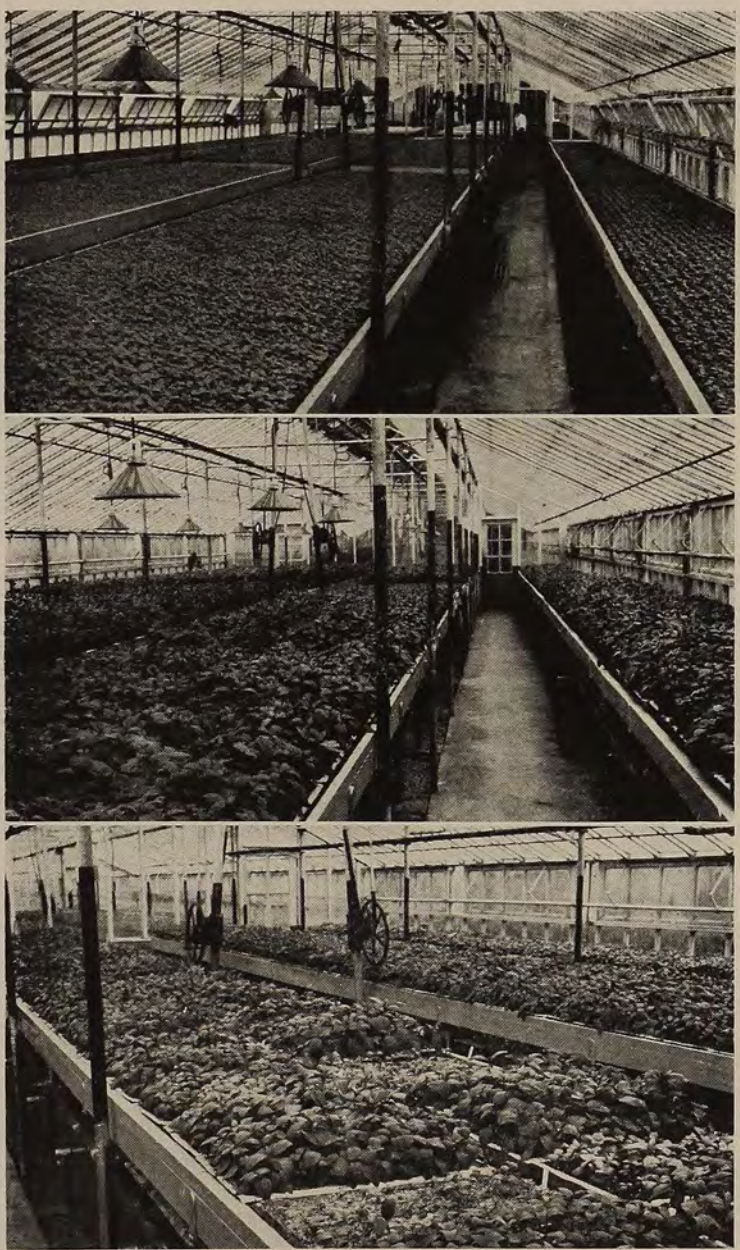


Diagram to show method of transplanting to flats. The seedlings are larger than is desired. Preparation of a greenhouse bench calls for firm but not packed sphagnum. Transplanting seedlings that are almost too small to be photographed.



Wholesale production. Upper picture shows various ways of giving temporary shade after transplanting.



Upper photograph showing about one month's growth after transplanting. Center photograph showing early transplants in flats. Lower photograph, special tests with fertilizers. All poor stands had received lime.

Sphagnum Moss as a Medium for Growing Plants

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Soil is so commonly used as a growing medium for plants under glass that it is taken for granted. It is a commonplace observation, however, that soils vary and their suitabilities for specific uses diverge correspondingly; the multiplicity of mixtures recommended in garden literature affords ample evidence that no one soil is perfect for all purposes. The requirement of sterilization or change of soil, or of both, may become burdensome in growing plants under glass, and recent years have witnessed introduction of other media—water, gravel, cinders or sand, with nutrients controlled rather exactly. These offer certain advantages, in varying degrees, for various plants; but generally require rather elaborate installations or considerable watchfulness.

Rather venerable among the special media, but long neglected, is sphagnum. Merely casual observation in the field reveals many plants making their initial growths on sphagnum, and Rigg and Harrar (6) record large trees growing in sphagnum bogs near Seattle, Washington. Berwick (1) and Correvon (3) grew many alpine plants successfully in sphagnum. Azaleas are reported to have been grown in sphagnum for long periods on the stone terraces of Italian villas. The use of sphagnum in growing plants in pots was advocated by Galloway (4), particularly for plants which were destined to be shipped. Emphasizing the great reduction in shipping weight, he stated that a four inch pot of soil weighs about twenty ounces, but a pot of sphagnum of the same size weighs only four ounces. A further advantage of the sphagnum lies in the fact that balls of sphagnum remain intact much better than those of soil.

In the greenhouses of the Division of Plant Exploration and Introduction of the U. S. Department of Agriculture at Glenn Dale, Maryland, germination of seed on sphagnum has been routine practice for several years (2) (5) (8) and plants of one kind or another have occasionally been grown on in sphagnum. Results with these have been so generally satisfactory that further exploration of the method and of its applicability seemed justified. The present paper presents the results of one phase of this study, in which attention was devoted to the suitability of the sphagnum medium to plants of rather diverse natures and the behavior of plants started in sphagnum when transplanted to mineral soils.

Methods of Culture

Some experiments were conducted during the season of 1943 in order to test the survival and behavior of plants grown in sphagnum when lined-out in rows of an unirrigated nursery on several different soil types. The sphagnum used in these experiments was the ordinary baled horticultural product, usual-

ly coming from New Jersey or Wisconsin. The sphagnum was prepared for use by passing through a hammer mill, though small quantities may be rubbed through a sieve of one-quarter inch mesh.

Normal growth rates fully comparable with those of plants in soil are obtained regularly with sphagnum if mineral nutrient solutions are applied at intervals. About three applications during a growing season seem adequate for many plants. Various nutrient solutions may be used. The one commonly applied at the U. S. Plant Introduction Garden, Glenn Dale, Maryland, consists of a teaspoonful of a complete 12-12-6 mineral fertilizer mixture per gallon of water, applying enough to wet the moss thoroughly. The moss ordinarily decomposes slowly and various kinds of plants have been grown for two years without repotting. The moss may be used in flats, benches or in ground beds as well as in pots.

Tests With Hollies

Two species of holly were used to test the survival of woody plants started in sphagnum. Cuttings, uniform in size and type, of *Ilex crenata microphylla* and *Ilex cornuta Burfordii* were rooted during the late winter and were potted in the middle of April in two and one-half inch pots, half in a composted soil and half in sphagnum alone. Both groups were kept in a cool greenhouse until they were set in the nursery on May 11. Fifty plants of each group were planted in a randomized block arrangement using ten plants per lot, in order to equalize variations due to soil differences. At the time of planting, the buds were just starting into growth, but no appreciable terminal growth had been made. The planting on this date was on a heavy clay loam soil. A delayed planting of one species was made on June 12 on a loam soil of a more desirable type, using the same layout. The ball of soil or sphagnum was set without breaking so that the top of the ball was about one-half inch below the surface of the soil. Plants in the experiments with other species were planted similarly.

The results from both plantings are shown in Table I, from records made on August 24. In this table and also in Table II the term "significant" is used to indicate a probability between five and one per cent that the indicated result is not due to chance variations, and "highly significant" indicates a similar probability within one per cent as determined by the ordinary "t" test, used for testing significance of differences between means (*7*).

The data presented in Table I show that the plants of both species planted on May 11 did not differ appreciably in survival or in terminal growth as measured by the height of the plants. In view of the exceptionally severe drought of the season of 1943 in Maryland, the conclusion seems justified that for a reasonably early planting date, sphagnum is satisfactory as a potting medium for lining-out stock. However, a word of caution must be given after an examination of the results of the planting on June 12 which was near the beginning of the period of drought. The survival of the plants started in sphagnum was lower and the growth was reduced. These results indicate that drought may be injurious to plants started in sphagnum if the roots have not had time to become established in the soil. The results with the earlier plantings show that the presence of the ball of sphagnum does not necessarily reduce drought resistance after the roots have emerged from it.

TABLE I
SURVIVAL AND GROWTH OF HOLLIES IN THE NURSERY FROM CUTTINGS POTTED IN SOIL AND IN SPHAGNUM

		Soil		Sphagnum		Mean
Species	*Date of Planting*	*Per Cent Survival*	*Mean Height (Cm.)*	*Per Cent Survival*	*Mean Height (Cm.)*	*Difference in Height with Standard Error*
Ilex crenata microphylla	May 11	94	10.3	100	9.9	0.4±0.65
Ilex cornuta Burfordii	May 11	100	10.8	100	9.8	1.0±0.57
Ilex cornuta Burfordii	June 12	98	8.3	82	6.2	2.1±0.76**

**Indicates highly significant difference between means. (Probability in excess of 1%.)

TESTS WITH VEGETABLE PLANTS

A number of amateur gardeners have reported excellent results in starting vegetable plants in sphagnum moss with entire freedom from damping-off. Because of the great amount of interest in this group of plants, several experiments were conducted with a number of species which are often transplanted to the field in commerical practice. In some cases, height measurements were taken and these are presented in Table II.

Eggplant

Seedlings of Black Beauty eggplant started in sphagnum in the greenhouse were potted on May 5 in two and one-half inch pots, half of the number in soil and half in sphagnum. The plants were held in a simple sash greenhouse and were moved to the field on June 11. At this time the plants in sphagnum were slightly larger and somewhat more succulent in growth than those in soil. Fifty plants were set in lots of five in randomized blocks. Measurements to the terminal bud were made on July 15. At this time the plants started in sphagnum were significantly taller. Even casual inspection would reveal a definite superiority of the plants from sphagnum, and this was maintained throughout the season in spite of the severe drought.

Pepper

A similar experiment with Chinese Giant Pepper was started at the same time as that with the eggplant, but unfortunately over a third of the plants in both groups wilted and died shortly after setting in the field. The plants started in sphagnum, however, were taller and retained a definite superiority throughout the season.

Tomato

Seeds of Marglobe tomato were sown on March 23 in sphagnum and were potted in two-and-one-half inch pots on April 20, half of the number in sphagnum and half in the standard composted potting soil mixture. The two groups were kept in close proximity on the greenhouse bench. On April 22, those in sphagnum were watered with the usual nutrient solution. The plants were set in the field on May 10 in two locations and were arranged in randomized blocks with ten plants per lot. Sixty plants started in sphagnum and an equal number started in soil were planted on each location. On one site the soil was a rich friable loam, high in fertility and organic matter, but on the other the soil was a heavy impervious clay. The plants were set four feet apart in rows which were spaced three feet.

Planting of eggplant showing appearance on July 19. Row on right (with label), plants started in sphagnum. Left: plants started in soil.

The height to the terminal buds was measured on June 18 and the number of plants with fully opened blossoms were counted. On the loam soil, forty of the plants started in sphagnum had fully opened flowers and forty-two of those started in soil. The latter group averaged 5.2 cm. greater in height and this difference was significant statistically although apparently not important. Fruits ripened in both lots at the same time and subsequent differences in growth and behavior were so slight as to be indistinguishable to the eye.

The somewhat softer growth of the plants in sphagnum had a more unfavorable early effect on the plants that were set in the clay soil than on those planted in loam. Here also the plants started in soil were taller on June 18. Probably a more liberal feeding of nutrients to the plants in sphagnum together with more hardening of the plants before setting in the field would have avoided the more severe initial checking of growth. However, the differences between the two groups of plants were so slight later in the season as to be negligible and even on this highly unfavorable site without irrigation in a season of severe drought the plants started in sphagnum were not noticeably inferior in vigor of growth or earliness of ripening of fruits. Production records were not kept, but unquestionably the differences in yield would have been small.

Watermelon

Seeds of watermelon, variety "Wintermelon" were sown in three inch pots on May 6 both in soil and in sphagnum and were planted in randomized blocks on May 27. No differences were apparent during June, but when examined on July 11, the vines started in sphagnum appeared to be slightly larger in all instances although a period of severe drought had begun. Records of production were not taken, but observation indicated that sphagnum would be at least equal to soil for starting watermelons in plant bands as is customary in some regions.

Muskmelon

An experiment with muskmelons, using the variety "Hearts of Gold" was started under the same conditions as with watermelon. However, due to some unexplained condition, the plants started in soil were in poor condition and most of them died shortly after planting. Comparative observations could not be made, but the behavior of the plants started in sphagnum appeared to be satisfactory.

TABLE II

SURVIVAL AND GROWTH OF VEGETABLE PLANTS IN THE FIELD AFTER STARTING IN SPHAGNUM OR SOIL

			Soil		*Sphagnum*		
Species	*Date of Planting*	*Date of Observation*	*Per Cent Survival*	*Mean Height (Cm.)*	*Per Cent Survival*	*Mean Height (Cm.)*	*Mean Difference in Height with Standard Error*
Eggplant	June 11	July 14	100	14	100	17	3±0.86**
Pepper	June 11	July 14	60	10	56	15	5±0.96**
Tomato (Loam Soil)	May 11	June 18	100	41	100	36	5±2.43*
Tomato (Clay Soil)	May 11	June 18	100	27	100	22	5±1.02**

*Indicates significant difference between means. (Probability in excess of 5%.)
**Indicates highly significant difference between means. (Probability in excess of 1%.)

Plant of Neanthe bella *grown for two years in sphagnum without repotting but with occasional applications of a mineral nutrient solution.*

Behavior of Plants in Sphagnum

No plant has been found which will not grow well in sphagnum with a minimum of attention. A few plants which are difficult to grow in soil under the conditions prevailing in the vicinity of Washington, D. C., such as *Rubus macrocarpus* from the Andes Mountains will thrive in sphagnum. Various species of *Cinchona* are much more easily grown in the greenhouse in sphagnum than in soil. Grapes, figs, palms and many other woody plants do well in the moss.

Contrary to the expectation of some, cacti and succulents grow excellently in sphagnum moss. Some plants of *Cactus caesius* and *Edrus Haselbergii* made rapid gains in size following applications of mineral nutrient solutions to the sphagnum.

Plants growing in pots of sphagnum may dry out more rapidly than those in soil under certain conditions, but this disadvantage is more than compensated by the virtual elimination of the danger of overwatering. Plants offered for sale in stores where the clerks are inexperienced may be watered freely in cases of doubt. Top watering is satisfactory, but watering by plunging the base of the pot in a container of water may also be used provided the pots are not left in it for an unduly long time. The wick-like action of the sphagnum is too strong to make continuous subirrigation of the sphagnum desirable unless the rates of evaporation and water supply are evenly balanced.

Summary

Although these results are preliminary in nature, they indicate that plants grown in sphagnum perform normally when lined out in the nursery row, except possibly under exceptionally adverse conditions. The behavior of plants in an exceptionally wet season has not been observed. Possibly on heavy soils and on poorly drained sites the ball of sphagnum might form a well in which excessive quantities of water would collect.

So far as known, virtually all kinds of plants can be grown for indefinite periods on sphagnum with the occasional application of mineral nutrients in solution. Frequent renewal of the moss is not needed. Some species of plants which are difficult to handle in soil can be grown with ease in sphagnum. Plants grown in sphagnum are ideal for shipping. This method of plant culture must be considered to be promising and worthy of trial by both amateur and professional plant growers.

LITERATURE CITED

1. Berwick, C. C. Growing alpines in sphagnum with nutrient solutions. Journ. N. Y. Bot. Gard. 41:208-213. 1940.
2. Close, A. W. Use of live sphagnum in seed germination. Proc. Amer. Soc. Hort. Sci. (1937) 35: 858-859. 1938.
3. Correvon, Henry. Rock Garden and alpine plants. Chapter 5. pp. 54-62. Macmillan Co., N. Y. 1930.
4. Galloway, B. T. How to collect, label and pack living plant material for long-distance shipment. U. S. Dept. Agr. Circular 323. 1924.
5. Hope, Claude; Stoutemyer, V. T. and Close, A. W. The control of damping-off by the use of sphagnum for seed germination. Proc. Amer. Soc. Hort. Sci. 39:397-406. 1941.
6. Rigg, George B. and Harrar, E. S. The root systems of trees growing in sphagnum. Amer. Jour. Bot. 18(6) 391-397. 1931.
7. Snedecor, George W. Statistical Methods p. 69. Ames, Iowa. 1937.
8. Stoutemyer, Vernon; Hope, Claude and Close, Albert. Sphagnum for seed germination inhibits damping-off losses on unsterilized soil. Nat. Hort. Mag. 20(2): 111-120. 1941.

Aristolochia grandiflora, var. Sturtevantii

The Gardener's Pocketbook

The Pelican Vine

From the accompanying photograph it would seem that my "pelican vine," *Aristolochia grandiflora*, variety *Sturtevantii*, seems satisfied with its surroundings. The blooms are about four feet long and the vine has been producing them ever since January. Recently one would have had little difficulty in counting a hundred in different stages of development. The outside of the flower is greenish-white, the inside white, heavily splotched and marbled with purple, shading to a deep wine red in the throat.

Located in a half-shade lath house, the roots presumably are under the stage and get the drip from the watering of my other plants, which is about all they do get, as I live within the city limits and cannot have the luxury of a septic tank to feed it from. Some years ago when I lived elsewhere outside the city the blooms on the vine I had then measured up to five and one-half feet long and fifteen inches across. But then I had no city sewers.

Harry Johnson of Johnson's Cactus Garden at Hynes, California, wrote me some time ago that the vine was originally found by his then partner, Sturtevant, in the swamps of Guatemala. The flowers open early in the morning and, during the first day, generate an effluvium best likened to that of a bushel of very dead crabs. They work so hard at this that by sundown they have exhausted themselves and on the second day are thoroughly respectable members of society, closing up that night and soon falling off, a pulpy, squashy mass.

They rarely set fruit and must be propagated by layering, apparently in the winter. Barring a few aphis at times, the vine has no enemies but will not stand any frost. This vine began blooming when little over a year old. In the past I have had it flower in an eight-inch flower pot.

HUBERT BUCKLEY

St. Petersburg, Fla.

Malus Eleyi

One of the more interesting members of the crabapple group that is available and satisfactory. This is listed as being a hybrid between the common apple's red form and the Carmine crab which is reputedly a hybrid between two oriental crabs. In general habits this behaves as one of the oriental or flowering crab group. The leaves emerge a purplish red and fade into a bronzy green in the late spring. This color remains until the foliage drops, with the red showing somewhat more prominently during the fall. The growth is round-headed and the beautiful deep pink flowers which appear in early spring add much to the charm of this plant.

This is one of those plants that adds a definite color to the landscape. While most pronounced in early spring, the bronzy summer effect is quite pleasing and desirable in large plantings where shape, texture, and color accents are needed.

This is one of the flowering crabs that deserves more attention because the flower colors are definite and clear, and because of the excellent contrast afforded by the foliage.

Crabapples are hardy and not overly particular in any of the cultural requirements.

Magnolia nigra

Unfortunately for the midwest generally, magnolias have come to be considered as symbolical of tropical and sub-tropical climates. While it is regrettably true that the largest and showiest members of this genus are not hardy here, there are several species that do have great possibilities for many gardens.

One of the most satisfactory species for here is *Magnolia nigra.* This is considered to be a form of M. *liliflora* which is a native of China.

In cultivation this plant does not form a small tree as in the more familiar *M. soulangeana* but grows into a spreading bush which is about equal in height and breadth and may reach ten feet. The flowers are borne before the leaves and are a rich purple on the outside and a light purple on the inside. They are about eight inches long.

This variety is not at all uncommon in catalogues but is not commonly planted. Propagation can be easily accomplished by layers which root readily and make considerable growth in a year's time.

The precautions common to all magnolias should be observed: that is to move plants in the spring before active growth is too advanced, and to retain a ball of earth. A fertile soil with good drainage and fair sun is best for all of the hardy magnolias.

This variety is good for extending the magnolia season as it blooms about two weeks after the forms of *M. soulangeana.*

Ribes alpinum nanum

In this region where low hedge plants are at a premium the old standbys of the eastern and western regions are lacking. One of the nicest plants for low hedges is the dwarf form of the alpine currant. This plant will grow about two feet high but can easily be trained to a hedge not more than eight inches tall if attention is paid to trimming.

The foliage of the alpine currant is somewht glossy, about an inch in length and three-quarters as broad. With a little trimming the branches form numerous short stems that form a good shape for hedge work.

The alpine currant does not seem to be too particular as to soil and will flourish in either full sun or half shade. It is not bothered by the common run of insects and diseases. Its hardiness is unquestioned, as it worked well in Dr. Macoun's trials at Ottawa. Apparently he was dealing with the dwarf form, as it only grew to a height of twenty-one inches in thirteen years. Dr. Macoun's criticism that the foliage is a little too coarse for beauty is correct if the plants are allowed to form strong growths. Prompt trimming in the spring and early summer will cause an abundance of small stems and leaves that are not objectionable.

This plant is recommended as a trimmed hedge less than a foot in height. ELDRED E. GREEN

Some Comparatively Recent Crab Apple Introductions

In a recent publication ("Crab Apples for America," by Donald Wyman, published by the American Association of Botanical Gardens and Arboretums, July, 1943) over 260 crab applie varieties were listed as being grown in North America today. Undoubtedly this is not all, for the crab apples hybridize freely and new hybrids are constantly springing up wherever a number of species are being grown together in close proximity. However, many of these hybrids do not vary in marked degree from varieties available already; consequently, they are allowed to go unnoticed. Once in a while some seedling does have marked characteristics which make it stand out from the

general run of crab apples, and a few of these which have come to the attention of plant growers in recent years are well worth listing.

Flame: This variety originated at the state fruit farm of the University of Minnesota, Excelsior, Minn., about 1920. It grew in a block of seedlings of undetermined origin, and was outstanding from many of the other seedlings because of the fact that it carried an immense load of small, brilliantly colored red fruits, from the latter part of August until severe freezing weather in October turned the red fruits to brown. These brown fruits remained on the tree well into the winter and afforded considerable food for birds.

It was propagated and sent out for trial over a period of ten years. When it was determined that this tree was very hardy and could apparently be grown anywhere in Minnesota, it was introduced into the trade in 1934 under the name of "Flame." Even now, there are only three nurseries which list it in their catalogues, but it is available. The fruits are excellent for jelly making, slightly less than an inch in diameter and a brilliant red color for many weeks in the fall. The flowers are white, delicately shaded pink, about 1½" in diameter.

From the description of flower and fruit it sounds as though this might be closely related to *Malus robusta.* Regardless of that, its high degree of hardiness and brilliant fruit should make it one of the most popular varieties especially in the colder regions of the United States where some of the crab apples may tend to winter kill.

Jay Darling: For many years now there has been a decided mix-up in the nursery trade between *M. purpurea* and *M. pumila Niedzwetzkyana.* As I have pointed out before, *M. pumila Niedzwetzkyana* is merely a geographical variety of *M. pumila* with purplish flowers, foliage and fruit, found in Siberia in 1891 by Dr. George Dieck of Zoeschen, Germany. *Malus purpurea* is a cross between this variety and *M. atrosanguinea,* which latter is itself a hybrid. This makes *M. purpurea* of rather complex parentage, and when seeds of it are sown in an attempt to grow the same thing from seed, it does result in a rather complicated mix-up. The fact remains, the foliage of *M. purpurea* is much like that of *M. atrosanguinea* only the color is different. On the other hand, the foliage of *M. pumila Niedzwetzkyana* is much more pubescent and similar to the foliage of the common apple, *M. pumila.* Also, the fruit of *M. purpurea* is normally about an inch in diameter, while the fruit of *M. pumila Niedzwetzkyana* is from two to two and a half inches in diameter, really about that of a small apple. So much for the differences between the two.

In 1904, Croux & Fils, the famous nursery in Chatenay, France, listed one of the crab apples as the variety "atropurpurea." This variety was similar to *M. pumila Niedzwetzkyana* in every way except that the fruit is only an inch in diameter. Mr. A. F. den Boer, of Des Moines, Iowa, who has one of the largest collections of crab apples in the United States, has been trying to locate this variety for a long time. It has been mixed up with both the other purple fruiting crab apples above-mentioned, and has been offered by various nurseries incorrectly under various names. Also the name *atropurpurea* has been used for several different things. Because of this, and because the plant is very difinitely a hybrid and a clon, Mr. den Boer has suggested that it be given a clonal name; i.e., "Jay Darling," in honor of the famous cartoonist who is a resident of Des Moines.

Theoretically speaking, this is not a

"new" variety, but it can be termed a resurrected one. Mr. den Boer is very enthusiastic about it, for he has compared it with *M. purpurea* varieties *Lemoinei, Eleyi, Aldenhamensis, pumila Niedzwetzkyana, gloriosa,* "Red Tip," etc., and finds it different and decidedly deserving of a clonal name, for it is only in this way that its true identity can be kept. Alfred Rehder suggests that this variety may be a hybrid between *M. baccata* and *M. pumila Niedzwetzkyana,* but cannot be certain without seeing the flowers, which have not been sent to the Arnold Arboretum yet.

Katherine: This plant was first noticed by Mr. B. H. Slavin, Superintendent of the Rochester Park System of Rochester, New York, in about 1928. It was a chance seedling in a large planting of crab apples, but it had double pink and white flowers. There are not many crab apples with double flowers, and when one is brought up for attention, usually it is very much worth while. This particular plant is not offered by any nursery yet, and as far as I know is only growing in Rochester and in the Arnold Arboretum.

The tree is probably a cross between *M. Halliana* and *M. baccata.* The flowers are over two inches in diameter and have approximately 20 petals. It blooms ten days to two weeks before *M. ioensis plena* and for this reason is most valuable ornamentally. The few fruits that form are an inch and a half in diameter and red.

The original tree is still growing in Durand-Eastman Park in Rochester. At the request of Mr. Slavin, this clon was named "Katherine" for his daughter-in-law, Katherine Clark Slavin. With its unusually large double flowers that appear relatively early in the flowering sequence of crab apples, this variety should prove to be a worthy ornamental.

Prince Georges: In about 1919, seeds were collected in the Arnold Arboretum by the Division of Plant Exploration and Introduction of the U. S. Department of Agriculture. Apparently these seeds produced many hybrid seedlings, for scions from this plant were among a number sent to the Arnold Arboretum in 1930 by the Division of Plant Exploration and Introduction. Somewhere along the line this plant was incorrectly labeled *M. angustifolia plena.* Actually it is a hybrid between *M. ioensis plena* and *angustifolia,* blooming at the same time as both its parents. Its flowers are two inches in diameter and pink in color, the same as those of *M. ioensis plena.* The interesting thing about this clon is the fact that the flowers have approximately fifty petals or modified petals, more than the flowers of any other variety of *Malus.* There have been no fruits borne on the tree in the Arnold Arboretum.

Though the Division of Plant Exploration and Introduction may have been sending scions of this tree out through the years, I have no record of them, and as far as I know, this tree is growing only at Glenn Dale, Maryland, the Arnold Arboretum, and the Des Moines Water Works, and Heard Nursery, both of Des Moines, Iowa.

This tree is given the name "Prince Georges" after the name of the county in which it originally grew in Maryland. Several other names were proposed for this clon, but on the examination of various lists of names given to apple varieties in the past, the suggestions had to be discarded for they were already occupied. However, "Prince Georges" is an excellent variety and because of its very double flowers, it should remain conspicuous for some period after blooming starts in the spring. The leaves are narrower than those of *M. ioensis.* One impor-

tant fact may come out of another few years' trial. This variety may prove somewhat resistant to the cedar apple rust. Our one tree at the Arnold Arboretum has not shown any signs of the disease. If it is resistant or immune to this disease which frequently disfigures *M. ioensis plena,* then "Prince Georges" might well be expected to replace the very popular Bechtal's Crab in our gardens.

Van Eseltine: Mr. G. P. Van Eseltine of the New York State Experiment Station of Geneva, New York, crossed *M. arnoldiana* with *M. spectabilis* in 1930. After observing one of the seedlings for eight years, it was finally introduced in 1938 under the name "Geneva." Unfortunately, this name had already been given to a crab apple seedling by Miss Isabella Preston, of the Central Experimental Farm, Ottawa, Canada, several years prior to 1938. When this fact was pointed out, the name was changed in 1943 to "Van Eseltine," by the staff of the New York State Experiment Station in honor of Mr. Van Eseltine, who died shortly before this time.

This hybrid has semi-double flowers, carmine buds and flowers fading to dull pink. They are slightly over an inch in diameter, while the bright red fruits are slightly less than an inch in diameter. It is definitely an ornamental and is available from the New York Fruit Testing Association at Geneva, New York. I have never seen it in flower or fruit so cannot intelligently compare it with the varieties listed above.

Donald Wyman,
Arnold Arboretum,
Harvard University.

A Note on the Contribution of Dr. L. Hosford Abel in the Field of Lilies

Among amateurs who have made a definite contribution to lily breeding, the late Dr. L. Hosford Abel, whose garden at White Plains, New York, was well known to lily enthusiasts, ranked high. His best known contribution was the production of fine white trumpet lilies in a garden setting in an urban location where the problem of mosaic had to be faced. Most of his lilies were grown in the open, although there was a small gauze-covered cage where more susceptible species were carried on successfully.

Although he started with a few *Lilium regale* bulbs in 1917, Dr.Abel worked in the genus *Gladiolus* with outstanding results before he turned in the 1930s to hybridizing with *L. princeps,* Shelburne hybrids, and *L. centifolium.* From these by selection he evolved a fine population with good distribution of the flowers along the stem (a characteristic he emphasized greatly in any evaluation of a lily stalk), an extended interval of flowering, and a range of form and shading of the individual flower.

In the last few years Dr. Abel's interest extended to other lilies, and he had good results with hybrids of *L. Scottiae, L. tigrinum* and other colored lilies.

Aside from these contributions, there was always the demonstration of what could be done with good methods for growing lilies. Excellent representatives of the western lilies, *L. Humboldtii magnificum, L. Parryi, L. washingtonianum,* of *L. auratum,* of the stiff-stemmed form of *L. Henryi* × *Davmottiae,* × *Scottiae,* and the Preston hybrids were to be seen in his garden. Definite ideas and standards and an appreciation of the consistent effort and hard work necessary for progress in the field of lily development combined with his years of experience to make him an important factor in any conference of lily growers.

Norma E. Pfeiffer.

A Book or Two

Garden Flowers in Color. Daniel J. Foley. The Macmillan Co., New York, N. A., 1943. 320 pages, illustrated in color. $1.98.

It is no easy task to write a book about illustrations and it is no easy task to fashion a text, arranged from A to Z, even with the aid of gracious introductory pages and a useful, if general horticultural appendix.

Some of the illustrations are quite lovely, as for example the ismene on page 149; a few are pretty dreadful, as that of the morning glory, Heavenly Blue on page 187; but between these, lie many that touch every stage of in-betweeness.

Mr. Foley's text is smooth and pleasant, if not inflammatory, but who could envy him his task? Certainly the same millions who have read its predecessors will not fail to find this book to their liking.

Edible Wild Plants of Eastern North America. M. L. Fernald and A. C. Kinsey. Idlewild Press, Cornwall-on-Hudson, N. Y. 1943. 452 pages, illustrated. $3.00.

Under the aegis of the Gray Herbarium of Harvard University there appears this volume, somewhat different from their usual output, but not utterly divorced from the sound botanical practice of the institution.

The geographic range is clearly stated and if you live within it, you may set out to sample and to prove those plants that are herein recommended. There are pertinent and succinct suggestions as to how and when to find your herbs, how to prepare them when you find them and no end of small details that will invest each plant with a new interest.

Here's to vegetarians in new guises!

Garden Islands of the Great East. David Fairchild, Charles Scribner's Sons, New York, 1943. 239 pages, illustrated. $3.75.

To those who have read Dr. Fairchild's book "The World Was My Garden," the present volume will be even more delightful since it suffers the advantage, if one will admit such a paradox, of a greater unity of theme and of time. One savors here, even more than ever, the pleasure of the man himself in what he does, in what he sees, in what he dreams. Time and the world have touched him and the agony of the world's beauty, the exquisite beauty of mankind in its simplest manifestation is present like a great undercurrent in the writing, with the world war moving it all, touching as it does, even the most farflung.

In itself the book is the account of the expedition, long dreamed of and made possible by Mrs. Archbold, to the "Spice Islands" to gather plants or rather seeds of plants to be sent or brought home to Florida, a haven for so many plants from so many places in the world.

For those of us who may never know, may never see these parts, there are in addition to the vivid text, innumerable pictures to enforce the word pictures.

Palms, aroids, orchids, pandanus, spices, fruits that are words to us become vivid and actual, but there are always people, people, people, new and old links in the fellowship that exists without barriers of state or protocol, and one wonders if life always makes this reorientation in time with the human heart the inevitable touchstone to all learning, to all treating between mankind.

The Illusive Ivy-VIII

Proposed Changes in Classification

ALFRED BATES

(Part II)

I. LEAF SHAPE

While this varies to a maddening extent, and even on the same plant, there will be found certain characteristics which are constant to a delightful degree. Of course one must not expect to find so uniform a pattern as in the different forms of the Japanese maples but should rather look for tendencies of uniformity. Remembering that the shape of the leaf is built up around the framework of the vein structure, this vein structure therefore plays a most important part in the separating off of the forms. It not only governs the number of the lobes but also the proportion of the leaf. Therefore the first points to be noted under leaf shape are (a) the number of lobes plainly in evidence and whether or not a lower pair is indicated; (b) the direction toward which the lobes and their supporting veins point; (c) the proportion of the leaf; (d) size. These may be considered as relating to the general plan of the leaf; the next two, (e) the plane of the leaf surface and (f) the prominence of the veining, relate to its general appearance; while the last four are (g) relation between the main and the side lobes; (h) depth and width of space between lobes; (i) shape of tips of lobes; (j) shape of base of leaf.

The objection may be made by some that we are analyzing a leaf as much in detail as one would a flower and that the scheme is very complicated. To the latter contention I quite agree; but if we desire to "name" the various forms of ivy it will be necessary to go through a complicated outline of classification and when once learned it will be no more complicated than any other scheme. To the former objection I have only to say that in the case of the ivy we have only the leaf upon which to build our classification. Let us then take up these sub-headings in detail.

(a) *The number of lobes.* A typical leaf may be either unlobed or lobed. If unlobed the outline may be entire, that is without any notches or indentations, or it may have one or two notches along each edge. These notches occur at the ends of main veins just as the lobes do. These main veins are always 5 or 7 in number—a central one and 2 or 3 pairs. The lower pair may be only faintly indicated and very close to the lower edge of the leaf; but they should be counted as main veins for a careful examination will show that they spring from the petiole itself and not from other veins. In other words where the petiole joins the leaf the petiole rays out in 5 or 7 veins. There exists a seeming exception but it will be dealt with when we reach that form.

If the typical leaf is lobed it may be 3, 5 or 7 lobed. If 3 lobed, it may have a pair of notches at the base or it may merely have the lower pair of veins close to the edge; I have yet to see a form with three main veins only. Or a 5 lobed leaf may have an extra pair of main veins at the base and may even have them strongly enough indicated to have developed notches. But a 7 lobed leaf will very rarely have an extra pair of veins, either with or without notches; however, I have seen and have also had a plant which showed the sugges-

tion of nine lobes throughout the whole of one stem of growth for one season but it was not constant and is mentioned here only as a future possibility. I am perhaps being over-meticulous in making such detailed repetition but all these points should be explained as clearly as possible.

(b) *The direction toward which the lobes point.* The lobes, of course, follow the direction of the main veins which are always in a fan-like formation. If the framework of the main veins is a partly closed fan then all the lobes point forward. If the veins radiate out as in a wide open fan, the lobes will point outward. There will be degrees between these two extremes. And there will also be cases when the fan work of the veins is so widespread that the lower pair of lobes will point backward and away from the forward pointing central lobe.

(c) *Proportion of the leaf.* It will be easily seen that according to the spread of the vein structure will be the proportion of the leaf. A partly closed fan will give a leaf which is longer than wide; and a wide open fan, a leaf that is wider than long. But there will be cases where typical leaves with wide formations will have very long central lobes and other cases where backward pointing lobes or deeply cut bases counteract the effect of wide formations. So for a uniform standard in judging proportion the measurement for the width should be taken across the leaf at its widest span but the measurement for the length taken from the junction of petiole with leaf to the apex of the central lobe, and notation made of the extension beyond the petiole junction.

(d) *Size of leaf* can only be expressed in such relative terms as: small, medium and large; taking as the standard for comparison the typical leaf size of the *species* of which that particular specimen is a form. Among the green leaved ivies size of leaf does not play the important part that it does among the forms with marginal variegation; in that group it is almost the only characteristic that may be used to separate them and among this group size is much more constant than among the green leaved forms.

(e) *The plane of the leaf surface.* Most ivies have leaves with a comparatively flat surface but several forms, in their typical leaves, do not follow the tradition. Among such will be found forms in which the leaf area between veins is puckered and blistered-like so that the veins appear to be sunken when viewed from above and raised when viewed from beneath. There will also be a form in which the typical leaf is almost cup-like in section, the edges of the leaf being at a higher level than the central portion. There will also be forms in which the margins are so waved that when leaves are pressed the leaf surface near the edges is folded over in pleats. Then too these last two features may be combined, presenting a crested appearance.

(f) *Prominence of veining.* This is a very important feature to note, for often it is the only mark to distinguish one form from another; and is a characteristic to be used to place forms under their correct species. The veins may show indistinctly by being merely a slightly different shade of green from that of the leaf. They may be more distinct by being of a yellowish green in contrast to the green of the leaf. They may be very distinct by being a light grey in color, in which case they will be found to stand out above the leaf surface "as a thread laid on," as Hibberd so aptly describes them. And these grey veined forms may be divided into those with main and secondary veins so colored and those in which even the smaller veins are grey so that

the leaf is covered with a white tracery of network. Just how far we may separate forms according to the amount of grey venation I am not at present disposed to say. I have seen two plants of *H. Helix* growing on the same wall and within twelve feet of each other, one of which showed the typical grey veining of the species but the other carried that greyness even to its tiniest veins; in no other respect did the plants differ.

(g) *Relation between the central and side lobes.* This relation must consider both length and width of lobes. Under this heading there will be two groups. In one group are those forms in which all the lobes are fairly uniform in size—either long and slender or short and wide. In the other, all those forms in which the central lobe is much larger than the side lobes; and there is much diversity in this group. The central lobe may be very long and slender in comparison with the slender side lobes and the side lobes may spread out in a wide open fan formation or the lower pair may point backward; in some forms there will be a tendency for the central lobe to be notched. The central lobe may be long and wide with short wide side lobes, either pointing forward or outward and sometimes tending to point backward slightly in the lower pair. The main lobe may merely be larger than the side lobes as is shown in the typical shape of *H. Helix*. It goes without saying that in this group the first pair of lobes is always larger than the basal pair. This arrangement of the lobes is governed by the next point to be considered.

(h) *Depth and width of space between lobes.* Naturally the wider spread the lobes, the greater the space between them and when the lobes are narrow that space becomes greater. This space between lobes is technically called sinus. Perhaps it would be more scientific to measure the angle of the veins and the width of the lobes at their base; but an easier method is to classify the sinuses as narrow, medium, wide and very wide and set a standard for with such as this: narrow, an angle of about 30 degrees; medium, an angle of approximately 45 degrees; wide, an angle of around 60 degrees; very wide, an angle of 90 degrees and over. Besides noting the width of the sinus the point where the margins of the two lobes forming it meet should also be observed. According to width of sinus this may be an acute, a right or an obtuse angle; or it may be a curve.

(i) *Shape of tips of lobes.* The apex of the lobes may be either rounded or pointed; but in either case the angle formed by the sides of the lobes should be noted as sharp or acute, as approximating a right angle, or as blunt or obtuse.

(j) *Shape of base.* This is a point of major importance as the form taken by the base is in some cases the determining factor in separating "variety" from "variety." In a partly closed fan vein framework it may flare forward or merely curve forward. In wider open fan types it may curve slightly outward or be straight across. As the vein framework becomes more widespread the base may assume an outline much like the double curve of a Cupid's bow; or become heart-shaped; or flare backward more or less sharply in cases of backward pointing lobes; or it may be overlapping.

II. Leaf Color and Texture

In the green leaved forms the shade of green should be checked with some color standard such as Ridgway or the R.H.S. Horticultural Colour Chart for the new growth—and whether flushed with some shade of red-purple or not;

for summer or mature leaf color; for winter coloring.

The variegated forms should be grouped according to pattern of variegation and as to whether that variegation is "silver" or "gold." According to pattern will have four divisions.

(a) An all-over variegation in which the color, white or shades of yellow, appears as a flecking of small dots more or less uniformly distributed over the entire leaf and more or less persistent throughout the life of the leaf.

(b) An all-over variegation in which the color, white or shades of yellow, appears as a mottling of streaks and blotches more or less uniformly distributed over the entire leaf and usually persistent throughout its life.

(c) A variegation along the margins in which the color, white or shades of yellow, appears as an irregular band often extending deeply into the leaf and accompanied by areas of different shades of green; and almost always persistent throughout the life of the leaf.

(d) A variegation along the veins in which the color, white or shades of yellow, appears as irregular splashes extending out toward the margin but mainly confined to the area along the veins and often not persistent throughout the life of the leaf.

While the most usual variegations are of white or shades of yellow as listed above they may also be of some shade of yellowish green which contrasts but slightly from the main color of the leaf and usually fades into the leaf green as the foliage matures. However, such forms are constant in these features and must be included in a classification. Then too, in cases where the variegation exists in splashes, blotches, or as marginal, there will be areas of bluer greens. The exact shades of color should in all cases be noted as they are constant in the respective forms. The winter coloring should also be carefully recorded and also its duration for some forms begin to color earlier than others, some retain it longer and some are more strongly colored than others.

(e) Texture of leaf is most important, for many of the forms depart from what may be looked upon as the ordinary thickness of a leaf. Some may be thin and papery in comparison, while others will have a thick and waxy appearance.

III. Color and Texture of Petiole and Young Stem

The ordinary color of both petiole and stem of the young growth is a greyish shade of green which is caused by the presence of the air on their surface. But all forms do not adhere to this. In some both petiole and young stem consistently are more or less heavily tinged with some shade of red purple; this coloring may be toned down to some extent by the amount of the grey hair present or be very bright due to absence of hair, in which case both petiole and young stem will have a waxy texture. In some forms which show little or no color on stems and petioles of the young growth later on as the leaves develop will gradually show a dull red purple on the petioles. Then there will be cases in which both petiole and young stem are so heavily clothed with hair or felt as to present a very grey appearance. And also in some few cases both petiole and young stem will be more or less devoid not only of hair but also of green so that they are pale green; and in one form even quite white.

IV. Distinct Type of Growth

Earlier in the paper the statement was made that type of growth could not be used as a feature on which to base classification except in a general

sense and in certain definite forms. Let us see now just how far it may be used. While ivies in their vining or juvenile stage have a strong tendency to climb and will reach out to gain a support on which to ascend there are several very definite exceptions which do not develop scandent stems. We may therefore divide the forms into one very large group with more or less wiry "vining" stems and another smaller group without. The larger group may be further divided into a large section which displays a most decided tendency to climb and a smaller section which prefers to trail along the ground. This latter group have more flexible stems and make excellent pot plants where their less wiry stems hang gracefully over the edges of the pots. From not conclusive observations I am inclined to say that they *seem* to avoid going up trees and walls and prefer to drape themselves over low rocks and to form ground covers, whereas the larger group take every opportunity to climb and are ground covers only by force of circumstance. The trailing habit should therefore be noted in classification. And the new type of growth which has lately developed here in United States —the branching type—should also be noted *and* clearly marked as to which forms show vining or trailing or bushy inclinations.

This brings us to that small division in which the forms show no tendency to make wiry or trailing stems but form more or less compact and shrubby growths. They are the ivy's enigmas. Are they juvenile or mature stages of growth? The first record of "conglomerata" which I have been able to find appeared in the Gardeners' Chronicle of June 10th, 1871, reporting it as an exhibit before a R.H.S. meeting, but nothing was told of its history. For one who has a wall as his disposal, which I have not, it would be an interesting experiment to plant these forms against it and watch developments. It would take years before they fruited (if they ever did) and several more before the resulting seedlings showed their true type of growth (whatever it would be); but it would solve the problem once and for all. Until such a time we will be compelled to regard them as juveniles.

Then there is also a small group which for lack of a better term we will call for the present "semi-arborescent" as to their type of growth. Their stems are too thick to be spoken of as wiry and not woody enough to be called shrubby. They produce more true roots than aerial roots though they do sometimes make an effort to climb. They form fruiting branches from stems growing along the ground and what is more amazing is that the same stem which has put out a fruiting branch will continue along the ground as a "vining" stem. Up to the present I have never seen any of the fruiting branches branch out with other arborescent stems although they have several nodes from which such branches could develop; but "vining" stems have been known to grow from these nodes.

5. Age at Which Plant Reaches Maturity

It is common knowledge that an ivy attains to its mature stage of growth and begins to flower and fruit when it reaches the top of its support or gets near to the top. But some forms grow faster than others (regardless of soil conditions) and also some forms show a greater willingness to develop fruiting stems than others—and some produce fruiting branches even upon the ground, not as an exceptional occurrence but as a constant habit (see paragraph above). For a really scientific study this time limit should be recorded for every form because it has a definite

bearing upon whether or not some forms can or cannot be separated from others.

Conclusions

As a simple gardener the above points of difference do not seem to me to be sufficient to warrant the term "variety" in the great majority of cases and it would be far better to use the term "form" instead. But another fact enters in; a very large number of the forms are so much alike that they are distinguished only by hair splitting differences. As previously stated Tobler grouped many of them under certain *types*. There is an objection to the use of this term in connection with "forms," for B. D. Jackson in his Glossary of Botanic Terms defines it as: "Type (*typus*, a type), the ideal representative of a group, genus, species," which is not exactly what is meant here. In Article IV where the recently developed froms of branching ivies were discussed, the term "complex" was used to cover the entire development. This word was adopted after consultation with several botanists and was used in the sense of indicating a group of related *forms* each of which differ from the *species-type* enough to be distinct from it but not enough for the individuals to be referred to as *varieties;* yet all of them having certain main characteristics in common but differing from each other in various minor points. Plants with these minor points would then be designatted as *forms* under the *complex* in the same manner as *forms* may occur under a *variety*. It is now suggested that this term be used to cover such related groups instead of listing the various forms as pseudo varieties; and retaining the term *variety* for use in its correct meaning.

To illustrate the proposed use of the term: The present "varieties" "crenata," "cuspidata," "digitata" and "palmata" are all forms with leaves that are wider than long, palmate in shape, with the grey venation of *Helix* but of larger and greener leaf, of more rapid growth and of sturdier stem. None of them differ enough to be called a variety, for one merges into the other—often to the extent that the same plant will have leaves of the shape of the others; but each is consistently, or is claimed to be consistently, of a different shade of green. Using the earliest given name for the complex, a label would be written for any of them thus: *H. Helix* comp. *digitata* (complex being abbreviated to comp.). Then if the meticulous gardener or the collector desired to make minute distinctions he would label his subdivisions as forms of the complex: *H. Helix* comp. *digitata* f. *palmata*.

The objection to such a classification is that it would make an unwieldy name when given in full. Against this objection is the fact that it is more scientific and more exactly places each plant in its right group; would be used in full, that is to include "form," only by the enthusiastic collector—the ordinary gardener being satisfied with just the "complex" in whatever form his plant might happen to be; and it would eliminate many names from the nurseryman's catalog where only too often form-names are so mixed that the same plant is sent out under any of the group names. The nurseryman is not always to be blamed for sending wrong ivies. He gets a stock of plants under the name "palmata" and propagates from them; gets another stock under the name "crenata," and another as "digitata." The original plants when placed side by side show their slight differences, but the young propagations do not. An uninitiated workman is told to straighten up the ivy benches; he sees several batches of small plants which look exactly alike to him so he puts them all together. Then some

other helper comes along and notices that where there had been several rows of plants under one label there are now only a few pots; but under another label there are several times as many as there had been. An argument follows. Some one tries to pick out plants from the large batch to fill in the small lots. The result is that when a customer orders a plant of each "variety" he gets plants which are exactly alike. NOTE: the only way to buy ivies from any nursery is to pick them out yourself and then try to place them under name. If the nursery catalog listed these minutely different forms under the complex name as such then both purchaser and nurseryman would be on safe ground. The nurseryman could send out any plant which showed the characteristics of the complex and rest assured that no legitimate complaint could be made. The customer would get some form of the complex which should satisfy him unless he was forming a collection, in which case he would be compelled to trace his plant down to its form-name and keep his eyes open for other related forms.

So much for the questionable use of the term "variety" in connection with plants in the juvenile or vining stage. Let us now inquire into its use to designate the mature or shrubby stage.

ARBORESCENS IS NOT A VARIETY

Sooner or later every ivy attains to its mature stage of growth in which it flowers and fruits. The plant completely alters its appearance; the leaves change in shape and texture, the growth becomes woody and stocky, the stem no longer sends out aerial or true roots, and as said before, it develops flowers and fruits. While cuttings made from this stage take much longer to root than those made from the vining growth, when finally rooted they continue as compact shrubby and fruiting plants. Mention may here be made of complaints that some such plants revert to the vining stage. I do not think this would be the case if cuttings were taken of only those stems which had flowered. There is also a theory that shrubby plants revert when grown near a support (a wall or tree). There may be some truth in this, for it is an authenticated fact that ivies which have been growing on walls and in the mature stage for years will, if additional wall height is added, again send out vining stems to cover the added height.

Furthermore, when a plant has once started to develop into this mature stage it gradually becomes wholly mature. The arborescent change extends down the plant until few or no vining stems are formed. This statement may easily be verified by observing over a period of years any ivy on wall or tree which has started to become arborescent.

As this shrubby stage of growth is when the plant flowers and fruits, it forms the material upon which botanists have based their diagnoses when establishing a species. Therefore it does not seem logical to call plants taken from the mature stage "varieties," for they are really the true plant. Although the comparison is not exact because of the very definite difference in manner of growth of the two stages of the ivy's life, it would be just as reasonable to call a magnolia that is not old enough to bloom the species and when it begins to flower rename it var. *florescens* or some such term. The only difference is that in the ivy there is a change of form—and the vining state is better known than the mature state. It is now suggested to discontinue this false use of the term "variety" for the mature growth and to simply write ARBORESCENS or ARB. after the plant's name. Different combinations would therefore be as follows:

H. Helix Arb.
H. Helix var. *hibernica* Arb.
H. Helix comp. *digitata* Arb.
H. Helix comp. *digitata* f. *palmata* Arb.

This change would more truly express the condition of growth; but one would need to know the juvenile plant which had matured in order to correctly place the name. It would also wipe out a long list of names which in the past have been given to arborescent developments without any reference to the name of the juvenile stage which produced them. This would mean a wait of many years until each form had become arborescent; but we would then know where we stood.

Adoption of These Two Suggestions

Throughout this series the writer will use these two changes: (1) the discontinuance of use of the term "variety" for arborescent growth and (2) the grouping of related *forms* under a *complex* with subdivision into *forms*. The oldest name of a "variety" in each group will be used for the *complex* name unless it is long and cumbersome as in the case of some of the variegated ivies; fortunately many of these names have already dropped out of use. Strict observance of priority of name will be followed. This means that the names used by Hibberd in his early papers on the subject (Floral World, 1858, and Floral World and Garden Guide, 1864) and which were also the names used by William Paul (Gardeners' Chronicle, 1867, and Florist and Pomologist, 1870) will replace his (Hibberd's) innovations of 1870 and 1872. Added authority is given for the use of these earlier names by the fact that the German botanist Dr. Karl Koch republished Paul's list of 1867 in the Hamburger Garden- und Blumenzeitung of 1868 and Paul's list of 1870 in the Gartnerei und Pflanzenkunde of 1870, the names being the same throughout. Many of these older names were restored in 1886 by George Nicholson in the second volume of his Dictionary of Gardening.

The writer has recently been chided by a botanist writing on this subject for having given this date of publication as 1886. Had he verified the statement he would have found that the second volume, in which Hedera occurs, was published in 1886 as the title page clearly states; the Dictionary of Gardening having been published in four volumes over a period of years from 1885 to 1889. It is this lack of careful verification together with citation of partial quotations which omit the qualifying clauses in them that has helped to produce the confusion in this genus. Probably no other genus demands as long a period of close observation and thorough research before authoritative statements should be published than Hedera. Again let me emphasize that this series aims to give observations and lays no claim to finality which demands more time and garden space than I have at present. Would that a botanist with the thorough persistence and careful research of a Pugsley, who spent more than thirty years working with Narcissus before issuing a monograph on just the subgenus Ajax, would take up this genus. Or that a Salisbury, who would work hand in hand with a horticulturist and so combine the scholastic knowledge of the botanist with the practical observations of the gardener, would give his time to the study of the ivies.

Excellent as it is in many ways, Tobler's monograph is more concerned with botanical structure and scientific issues than with classification of garden forms and a clear description of them. As it is written in German it is inaccessible to the average gardener; and furthermore written in so highly polished

a style that some passages are difficult to understand. Tobler evidently had the same trouble with his English translations, for in several cases he misunderstands Hibberd's descriptions and in one case cites a form name as standing for a variegated ivy, evidently because the drawing showed highlights on the leaves, in spite of the fact that Hibberd places it in his green leaved group and definitely describes it as such.

The list of ivy names published in the October, 1941, issue, though not final, for changes may need to be made as new information comes to light, carried these names through the year 1873. Names given since then have occurred in various garden and botanical publications or in catalogs and will be added to it. In all cases the earliest name will be uesd if it complies with botanical rules of nomenclature and the date of publication will be given together with name of introducer or originator (when possible) and the publication in which the name first appeared. Where introducer is unknown the abbreviation Hort. (horticultural) will follow the accepted plant-name with date of its earliest use. The search for these names is not an easy task, for every available publication must be gone through and notes taken; should any names be missed through oversight or inaccessibility of book or magazine I will gratefully receive any corrections.

TENTATIVE OUTLINE FOR CLASSIFICATION

I. Leaf Shape

a. number of lobes
   1. unlobed
   2. unlobed with notches
   3. 3 lobed
   4. 3 lobed with 2 abortive
   5. 5 lobed
   6. 5 lobe with 2 abortive
   7. 7 lobed
   8. 7 lobed with 2 abortive

b. direction of lobes
   1. pointing forward
   2. pointing forward and outward
   3. pointing outward
   4. lower pair curving backward and outward
   5. lower pair pointing backward

c. proportion of leaf
   1. longer than wide
   2. wider than long
   3. either but with extra length at base
      (length to be measured from petiole junction to tip of central lobe)

d. size of leaf (in comparison with species)
   1. small
   2. approx. type size
   3. large

e. plane of leaf surface
   1. flat
   2. blistered or puckered
   3. cupped
   4. wavy at margin
   5. crested—cupped and wavy

f. veining
   1. indistinct
   2. lighter green than leaf or yellowish green
   3. light grey and above surface "as a thread laid on"
   4. as above but extending to smaller veins

g. relation of lobes
   1. equal—long and slender
   2. equal—short and wide
   3. unequal—main lobe slender and longer than slender forward pointing side lobes
      x. main lobe entire
      y. main lobe notched
   4. unequal—side lobes slender and spreading
      x. main lobe entire
      y. main lobe notched
   5. unequal—basal lobes backward pointing

x. main lobe entire
y. main lobe notched
6. unequal—main lobe longer and wider than forward pointing side lobes
7. unequal—main lobe longer and wider than outward pointing side lobes
8. unequal—main lobe longer and wider than others, basal lobes backward pointing

h. space between lobes
1. narrow—approx. 30 degrees
w. sinus base rounded
x. sinus base acute
y. sinus base right angle
z. sinus base obtuse
2. medium—approx. 45 degrees
w.-x.-y.-z. as above
3. wide—approx. 60 degrees
w.-x.-y.-z. as above
4. very wide—approx. 90 degrees
w.-x.-y.-z. as above

i. apex of lobes
1. rounded
2. pointed
x. sharp—acute
y. right angular
z. blunt—obtuse

j. base of leaf
1. flares forward
2. curves forward
3. curves outward
4. straight across
5. curves backward and forward as a Cupid's bow
6. heart shaped
7. flares backward
8. overlapping

II. Leaf Color and Texture

a. solid green
1. new growth
x. uniform
y. flushed with some shade of red purple
2. summer color
3. winter color
4. texture
x. thin and papery
y. normal
z. thick and waxy

b. variegated—as to pattern
1. flecked
2. streaked or blotched
3. marginal
4. along veins
(for 1, 2, 3, and 4)
x. white
y. yellow
z. yellowish green
(for x, y, and 2)
1. new growth
2. summer color
3. winter color and duration
4. blue-green when present
5. texture
x. thin and papery
y. normal
z. thick and waxy

III. Color and Texture of Petiole and Young Stem

a. normal
b. flushed with red-purple
1. dull
2. bright and waxy
3. appearing later
c. very grey and felty
d. green
e. white

IV. Type of Growth

a. vining
1. climbing
2. trailing
3. branching
b. compact
1. stiff and woody
2. branching
c. "semi-arborescent"

V. Age at Which Flowering Begins

A Small Cool Greenhouse

Helen M. Fox

The word "greenhouse" raises a picture of a large glass house where skilled gardeners grow orchids, cinerarias and tropical ferns. But frequently the greenhouse is a modest one, a necessary adjunct to the garden and not in the least a luxury. If quantities of seeds are to be raised and cuttings to be made, the greenhouse is a great saver of labor and time.

Seeds can be raised in a hot bed but the cold prevents keeping the sash open more than a few minutes at a time in winter and the pots cannot be watered from below or weeded as in a greenhouse.

The greenhouse need not be a separate structure but can be attached to the dwelling or the garage and heated from these buildings.

This article is about my own greenhouse which has been run in an amateur fashion by me who originally knew nothing about handling a greenhouse and probably to this day continue in a state of ignorance as to the fine points. However, it has been possible to raise over three hundred different kinds of seedlings in a year in the little house besides making cuttings of some hundred varieties of fragrant-leaved geraniums, fuchsias, lavenders and other plants.

The house is attached to the garage and heated from it and measures eight by fifteen feet. The short end faces South and the long sides consequently run from North to South. Outside the entrance to the greenhouse and inside the garage are shelves for supplies and the potting shelf, and under it, the bins with top soil, sand, leaf mold, and sphagnum moss; ingredients for the flats and pots.

The pots are stacked in a corner of the garage and here too are more piles of top soil and leaf mold to prevent their being frozen when they are neded during the Winter. Fortunately the garage is roomy, having been a barn in pre-automobile days. Potting arrangements are far from ideal but they answer the purpose.

Inside the greenhouse the bench extends on three sides. It is 2'6" wide and pipes run below it. Besides this bench there is a ledge one foot higher which extends around the house. It is 10" wide and covered with a board and serves as a place for pots with hardy plants. A second shell has been made 16" above the first ledge and is hung from wires attached to hooks in the supports on the side where the windows open. On the West side, where the windows are closed, the shelf is supported by brackets.

There are no shelves on the South end so as not to interfere with the light from that direction. In addition, there are shelves on either side of the door, just large enough for a few pots.

The greenhouse is kept at a temperature below seventy and preferably in the low sixties.

The activities in the house take place in winter and it remains empty from mid-May to October, since labor has to be husbanded.

In late September the cuttings of geraniums, fuchsias, lemon verbenas, lavenders and so on, are inserted in a bed of sand on the bench. These root fairly quickly and are potted in three-inch pots and put on the upper shelves before Thanksgiving Day. In late January they are moved into five-inch pots and by Lincoln's Birthday are trans-

ferred to a hot bed, for by then their foliage takes away too much light from the seedlings on the benches in the greenhouse and besides the seedlings need more space.

All through November and December, plants such as azaleas, begonias, jasmines and others alternate between greenhouse and living room. The house plants suffering from too dry an atmosphere and those finished blooming are later moved into a pit, where the topmost shelf is four feet under the surface of the soil and consequently below the frost line and where other tender plants spend the winter.

By the very end of December the first seeds, those collected from plants in my garden, are sown. They are likely to be shrubs and unusual forms of fragrant plants. By early January more seeds are sown, generally of shrubs and in late January and on into mid-February the majority of seeds of perennial plants are sown. Tender annuals such as petunias, nicotianas, nierembergias (not truly annuals but handled as such), calendulas, zinnias, *Cynoglossum amabile,* annual anchusas, antirrhinums, salvias, *Verbena rigida,* as also sweet marjoram and other herbs are planted the first week in March. No seeds are sown indoors after that.

There are always seeds such as aquilegias and many members of the Mustard Family which are planted in flats or pots and stood in cold frames in January. These are mulched with salt hay. Later, many annuals will be planted out of doors where they are to bloom. The biennials, sweet william, foxglove, pansy, *Salvia Sclarea* and plants with seeds not keeping their viability long, such as sweet cicely and angelica are planted in cold frames in early August.

In the greenhouse the seeds are sown in three- or four-inch pots when only a few of a kind are wanted. Where a quantity is desired, the seeds are sown in flats. Small seeds such as the campanulas, hypericums and dianthus will yield over a hundred plants from a four-inch pot. Large seeds, as of shrubs, will not yield as many plants. Only three plants of each species of shrubs are wanted, eventually, but six are kept, to allow for the inevitable disasters.

The seeds are planted in the usual way—each type in a mixture of soil suitable to its particular requirements and they are watered from below. That is, they are stood in a pan of water and the water is allowed to rise to the surface of the pot by capillary action. After the seeds have been sown, the pots are watered and covered with newspapers, to keep out the light, until they germinate.

Every morning the newspapers are lifted to see whether the seeds under them have germinated and it is always a thrill, which repetition does not dull, to see the baby plants appear above the soil in their characteristic fashion, spears held aloft in the camassias, a bent green hair pin in the lilies and a pair of tiny round leaflets in the mints, savories and sages.

The pots with germinated seeds are moved together and turned every few days to change the direction of the light.

When the second seed leaf appears the seedlings are transplanted. Preferably they are moved into a wooden flat because it is found they dry out much less when so handled than when transplanted into clay pots. However, if there are only one or two seedlings they are moved into pots. Each variety is kept in a container to itself, for when several are grown in one flat one will mature before its neighbors and have to be moved and disturb the soil. Besides there is less danger of the labels

being confused when each variety is by itself.

When transplanted seedlings grow too large for the flats they are again moved into new flats with new soil.

By April the little house is so full it requires the mind of a Euclid to find space for another container. So, the hardy plants capable of enduring the cold nights are taken from the house, hardened by being in the barn for a few days and then put into a cold frame and mulched with straw.

In mid-April many plants can be put into the ground if the season is favorable and the earth is dry enough. Transplanting into the open beds continues until mid-May. The young plants not large enough to move before then are all transferred to a cold frame and the containers stood on ashes. These plants are later moved to their permanent homes, either right after or during a rainy spell. In the greenhouse the Ivies for the house are grown in the earth under the bench. These are now taken out and stood under the tres. Under the bench there frequently are cuttings made in late Winter in a sand-filled flat and these are potted up in mid-May, when the greenhouse becomes quite empty.

The United States Vegetable Seed Industry

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This may sound pessimistic and hopeless to some. It is not, for, in spite of the lack of labor and technical seedsmen, United States and Canadian producers are planning for a still greater harvest of seeds in 1944. The English seed-producing area, the "invasion coast," is back into production, thus reducing their requirements from the United States and Canada. North Africa, where the English and French obtained substantial supplies before the War, is being reactivated under the guidance of the Allied Governments and will be producing seeds by the time the next harvest rolls around.

No, Victory gardeners have no need to worry about seeds supplies. Not every kind and variety will be available in boundless quantities. But then, they never are. Seedsmen have crop failures of some kind nearly every season. There will be ample supplies, more than ample if they are sown in carefully prepared ground and only in the quantities necessary for a proper stand.

We have long been accused of being wasteful, a rich people who do not know what it is to have to make things stretch. This has really been true of our use of seeds. We plant at least 50 per cent more than is necessary to secure a good crop.

Another kind of waste that is all too common is the planting of a larger garden than can be taken care of. For example, it is common knowledge that a dozen well cared for tomato plants can and often do produce more and better products than 60 poorly tended. If we garden, and we should, in 1944, it is important that no larger garden should be planned than can be given adequate culture. With less wasteful buying and handling of seeds at home, and with careful parceling of supplies among our Allies there will be enough seed to go around.

In 1944 and for the duration, it should be the policy of every Victory gardener and commercial grower to economize. The Victory gardeners should make arrangements with someone to grow their plants, someone with the necessary experience, time, and equipment who can do the job for a group. It need not always be a commercial plantsman as they are short of help. Chances are there is someone

in nearly every neighborhood who can do the job. This, of course, applies to cabbage, tomato, broccoli, peppers, and similar crops, kinds for which the average Victory gardener has need and space for only a few plants of each. But, they are the kinds of plants whose seed is in shortest supply and where waste should be carefully avoided.

Mention has just been made of those vegetable seeds which are not abundantly available in light of total needs. In contrast, the supplies of carrots, spinach, kale, chard, the vitamin-rich crops, are much larger than our needs. Peas and beans, the mainstays of many gardens, radishes, squash, and others are in sufficient supply and seed potatoes—well, they won't dare ask fancy prices for them this spring.

The American Horticultural Society

INVITES to membership all persons who are interested in the development of a great national society that shall serve as an ever growing center for the dissemination of the common knowledge of the members. There is no requirement for membership other than this and no reward beyond a share in the development of the organization.

For its members the society publishes THE NATIONAL HORTICULTURAL MAGAZINE, at the present time a quarterly of increasing importance among the horticultural publications of the day and destined to fill an even larger role as the society grows. It is published during the months of January, April, July and October and is written by and for members. Under the present organization of the society with special committees appointed for the furthering of special plant projects the members will receive advance material on narcissus, tulips, lilies, rock garden plants, conifers, nuts, and rhododendrons. Membership in the society, therefore, brings one the advantages of membership in many societies. In addition to these special projects, the usual garden subjects are covered and particular attention is paid to new or little known plants that are not commonly described elsewhere.

The American Horticultural Society invites not only personal memberships but affiliations with horticultural societies and clubs. To such it offers some special inducements in memberships. Memberships are by the calendar year.

The Annual Meeting of the Society is held in Washington, D. C., and members are invited to attend the special lectures that are given at that time. These are announced to the membership at the time of balloting.

The annual dues are three dollars the year, payable in advance; life membership is one hundred dollars; inquiry as to affiliation should be addressed to the Secretary, 821 Washington Loan and Trust Building, Washington, D. C.