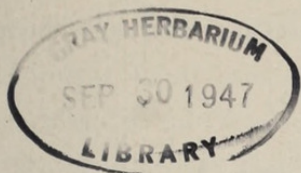


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AMERICAN HORTICULTURE NEEDS TO ADOPT UNIFORM COLOR STANDARDS

THE time has come for American Horticulture to adopt some uniform standard by which color can be accurately measured and uniformly judged and described the country over. Many industries have done this. Horticulture seems to be far behind. The advent of color advertising in magazines of national circulation, and the production of moving pictures in color have clearly emphasized the fact that sometimes colors are accurately portrayed and sometimes they are not. Color photography for the amateur has done still more to educate people to the fact that colors can vary, and that it is very difficult to select the proper words or terms to describe them. Those of us who are constantly studying plants realize better than most, the necessity for having an accurate standard by which we can compare the colors of flowers, foliage and fruits, and afterwards to describe those colors in uniform terms understood by other individuals who have not seen the flowers themselves.

Color photography is one means of recording colors. A slight over-exposure of film will give a light color or tint, and a slight under-exposure will give a slightly darker shade, so that this method of recording color is not satisfactory. The other day a color positive was brought in for criticism. The plant photographed was *Rhododendron mucronulatum*, but the film had been slightly over-exposed so that it was not the true color of this species, but rather the much better color of *Rhododendron Albrechtii*. Such mistakes are easily made. Then, too, the development of most color films takes time, so that eventually when they are returned fully developed, the plants photographed have frequently lost their flowers or fruits.

Reasons for Adopting Uniform Color Standards

There are many good reasons for the adoption of a good horticultural color chart by the horticultural organizations of this country. Some of the more important ones are :

1. One term refers to one specific color throughout the country.

As an example of the present confusion in attempting to describe the colors of flowers without a color standard, let us take two plants and see how various authors describe them:

Cercis canadensis

pink flower bud, deep red calyx—Werthner, "Some American Trees"

rose pink to purplish—Rogers, "The Tree Book"

pink to purplish pink—Lamson, "Gardening With Shrubs"

reddish purple or pink—Graham and McMinn, "Ornamental Shrubs and Vines of the Pacific Coast"

red—Wright, "Garden Trees and Shrubs"

rosy pink—Van Dersal, "Ornamental American Shrubs"; Rehder, "Manual of Cultivated Trees and Shrubs"; Hottes, "The Book of Trees"; Bailey, "Cyclopaedia of Horticulture"

bright pink to purple—nursery catalogues

Compared with the Horticultural Colour Chart it is "Fuchsia Purple 28/3 to 28/2."

A new variety of *Cercis canadensis* was brought to our attention this spring. In view of the above descriptions it was not clear to say that it was merely a "lighter pink." On comparison with the Horticultural Colour Chart, however, it proved to be "Rose Madder 23," or five full hues removed from the color of the species itself. The use of this terminology and a glance at the Colour Chart are sufficient to clearly denote the difference between the species and the variety.

Another plant widely grown by nurserymen, is a clone, and is variously described as follows:

Cornus florida rubra

bright rosy red—Bean, "Trees and Shrubs of British Isles"

pink or rose—Bailey, "Cyclopaedia of Horticulture"

red or pink—Rehder, "Manual of Cultivated Trees and Shrubs"

pink—Lamson, "Gardening with Shrubs"; Wilson, "If I Were To Make A Garden"

red—Wright, "Garden Trees and Shrubs"

bright pink to deep red—nursery catalogues

Compared with the Horticultural Colour Chart it is "Empire Rose 0621." Numerous other examples could easily be given, but these should be sufficient to show the confusion now existing in the description of plant colors.

2. Colors can be properly and uniformly described in popular articles, scientific descriptions and plant patents.

In writing of a new crabapple which is described in Boston as having scarlet flowers or fruits, some one interested in this description in Seattle, Washington, can consult a color chart and quickly find the exact color, shade or tint referred to. Merely stating that the flowers are pink to purplish, or a light purplish pink is not enough and is certainly not satisfactory to the individual who knows of several varieties which could be in this general class. But to state that the buds are "crimson" and the flowers are "Chinese Rose" when fully opened, according to a certain standard color chart, is a definite observation worthy of permanent recording. New plants should not be named unless the flower and fruit colors are compared with those in the color chart and described in the same terms used in the accepted chart. Plants should not be patented unless their colors are likewise compared and described. There are many situations occurring in flower shows when reference to known color charts would be most helpful to those making displays as well as those who have to judge them. Botanists especially could use the chart to good advantage in describing the colors of flowers and fruits of new species. Those who write for the national horticultural magazines should freely make use of color charts and their terminology, so that when "Dexter's Pink" azalea is referred to as "crimson," it should mean the same exact color to everyone reading the article, regardless of the part of the country in which the article is read. The word "crimson" may now mean "red" to one, "bright red" to another, and "scarlet" to a third individual. If the terminology of the color chart is uniformly adopted, each one of those terms will refer to a specific color in the chart—and only one. Everyone having access to the chart will then know the exact color which is meant by the specific term used.

3. Color comparisons can be quickly made with plants grown in widely separated areas.

Hybrid seed is often grown simultaneously in several areas and comparisons in color can be easily made by use of the chart. New varieties can be tested in several areas and uniform color comparisons can be made.

4. Color comparisons can be made of the same plant in different years.

Also in comparing colors of varieties that bloom at different seasons, the colors can be uniformly compared by use of the chart.

5. Color comparisons based on a uniform chart would be an asset in describing the results of certain experiments with plants.

In selecting the better varieties from a large group of *Chaenomeles*, or sweet peas, or petunias, the color chart is an ideal means of assisting in the segregation of these varieties that have identical colors of flowers, fruits or foliage. This is a

very important point for many times a "new" variety appears which is merely an old variety that is unknown to the plantsman or which may have disappeared from gardens for some time. By properly recording the colors of all varieties according to color chart standards, much of the present confusion dealing with "new" varieties might be eliminated.

It might be argued that different people see the same color in different ways, hence a color chart is not a good means of comparison. In order to check the ability of one individual to determine color properly and accurately with reference to a number of other individuals, thirteen of the people in the office of the Arnold Arboretum one afternoon were given a petal from a single peony blossom and asked to compare it with the color chart, taking all the time they wanted but not comparing notes or suggestions, one with the other. It is interesting to note that of the 800 color blocks in this chart nine people selected the same identical block, 627/1. Two people chose the next hue, 527; one chose a hue four blocks removed, 26/2, and one chose a hue seven blocks removed, 625/1. Translating this to the colors, the majority called the color fuchsine pink, two called it rhodamine pink, one called it solferino purple and one, phlox pink.

Translating this still further, 75% of the people chose the same identical color block. In looking at the other colors chosen, it is important to point out the fact that they are very similar. Consequently colors can be compared reasonably well by various individuals.

Available Color Charts

Several color charts are available. "Color Standards and Color Nomenclature" by Robert Ridgway, published in 1912, contains 53 color plates with 800 different colors, tints and shades. The "Munsell Book of Color" published in 1942, has been considerably used by various professions in the United States. The pocket editions, conveniently sized, contain 42 color charts with 906 colors, tints and shades. Neither of these charts has been found completely satisfactory in our work with plant colors at the Arnold Arboretum. Ridgway's chart contains many blues, greens, browns, and purples, but not nearly enough of the reds and yellows for our type of work. One is frequently confronted with the annoying fact that there is no color in the chart comparable to the one in the flower or fruit being studied. The same is true of the Munsell chart.

The Horticultural Colour Chart

The "Horticultural Colour Chart" has been used in the horticultural studies at the Arnold Arboretum for the past nine years. It is highly recommended (and published) by the Royal Horticultural Society of Great Britain. This contains 200 color plates, each representing a color plus three graduated tints. The colors themselves and the names of the colors have been primarily selected for the purposes of horticulture, a very important fact. There are a sufficient number of the

right colors from which to choose so that one can usually find just the right hue, tint, or shade. New terms for certain colors have been selected from the names of well-known flowers whenever possible. This color chart has been most useful in assisting with the study of many plant groups in the Arnold Arboretum, and it can well be adopted by the horticultural organizations of North America.

The compilers of this color chart have selected those colors most frequently found in garden flowers. Each of the 200 colors is carefully numbered and named and has three lighter tints shown as well. Color names for corresponding colors in four other color systems are given whenever there is a corresponding color. These systems are the British Colour Council, Ridgway's "Color Standards and Nomenclature," Oberthür et Dauthenay's "Repertoire de Couleurs," Ostwald's Colour System. It may be interesting to those who have used Ridgway to note that of the 200 colors (colors, tints or shades) used in that chart only 72 were found sufficiently common to be selected for the Horticultural Colour Chart. This emphasizes the fact that well over half of Ridgway's colors have not been selected for this strictly horticultural color chart.

A brief history of the color name is given together with foreign equivalents in Dutch, French, German, Italian, Latin and Spanish. Most important of all, horticultural examples are given for each color, shade or tint whenever it is possible to do so. For instance, the horticultural example for the color "Spiraea Red" is *Spiraea bumalda* var. "Anthony Waterer"; for "Mandarin Red" three examples are given: *Lychnis chalcedonica*, *Lilium chalcedonicum*, *Tulipa Korolkowii*. The horticultural example for "Phlox Purple" is *Primula Sieboldii*; for "Lobelia Blue," *Muscari armeniacum* and *Lobelia tenuior*. Such notes are most helpful and are not given by any other color chart.

Then too, the horticultural names given to the colors will probably be of much more interest to horticulturists in general than is the number system of the Munsell plan. A comparison of a few color names will illustrate the emphasis which has been placed on horticultural terminology in the English Chart:

Identical Colors

English Horticultural Color Chart

Primrose Yellow
Buttercup Yellow
Apricot
Plum Purple
Veronica Violet
Lobelia Blue
Gentian Blue
Carnation Green
Pea Green

Ridgway

Pale Lemon Yellow
Light Cadmium
Capucine Yellow
Cotinga Purple
Light Violet
Blue Violet
Phenyl Blue
Gnaphalium Green
Yellow Green

How It Works

The English Horticultural Colour Chart consists of 64 "full hues" or color tones comprising equal gradations of the spectrum range together with 136 lighter tints and deeper shades of these 64 selected hues. In this chart the numbering system is very simple. The 64 selected hues are numbered 1 to 64. The bottom color on each of these sheets is the full hue, and the three blocks above are three progressively lighter tints. All other of the 136 sheets are either tints or shades of these selected hues and are so numbered that they can be easily distinguished and the hue to which they refer readily identified.

The simple comparison of colors is the same for all the charts. Specimens should be examined and matched indoors in a good north light immediately after cutting. It is essential to obtain a composite picture of the flower color from several blossoms, or to take specific readings for the flower bud, another just at the time it is fully open and another when it starts to fade. It is usually advisable to study the color at arm's length for a moment or two, and in comparing it with various colors, use a black mask to keep all miscellaneous colors from affecting the final estimate.

Color can vary in three different ways, i.e., in hue (that attribute by which one color is distinguishable from another); by tone (by which it appears to hold a certain position in a light to dark scale); and intensity (by which the brilliancy of a hue is revealed). Tints are considered to be lighter tones of any certain color, and shades are considered to be darker tones of any certain color.

Tints and shades are noted (as well as the colors) by a numbering system. Each color block in the chart has its own number. In describing the color of *Begonia fuchsioides*, it would be given as "Porcelain Rose 620/1" which means that it is the darkest of the three lighter tints of "Porcelain Rose." Rose "Coral Cluster" would be "Porcelain Rose 620/2." a tint once again lighter than that of *Begonia fuchsioides*.

Grouping Colors

There is still another feature about this chart which seems very good, especially to those who wish to be accurate, but not alarmingly so. If the chart is adopted and the terminology used, the colors can be grouped so that a very fine color differentiation in color names is not necessary. For instance, the yellows are listed below with the grouping as given in the chart:

Primrose Yellow	601
Sulphur Yellow	1
Mimosa Yellow	602
Canary Yellow	2
Naples Yellow	403

	Barium Yellow	503
	Empire Yellow	603
	Aureolin	3
	Straw Yellow	604
Yellow	Lemon Yellow	4
	Amber Yellow	505
	Chrome Yellow (Light)	605
	Buttercup Yellow	5
	Chinese Yellow	606
	Indian Yellow	6
	Egyptian Buff	407
	Orange Buff	507
	Maize Yellow	607
Orange Yellow	Saffron Yellow	7
	Yellow Ochre	07
	Cadmium Orange	8
	Apricot	609
Yellowish Orange	Tangerine Orange	9
	Majolica Yellow	09
	Nasturtium Orange	610
	Orpiment Orange	10
	Spanish Orange	010
	Persimmon Orange	710
	Marigold Orange	11
	Salmon	412
	Peach	512
	Carrot Red	612
Orange	Orange	12

From the above list it will be seen that there are 32 different colors up to the orange (and it should not be overlooked that three tints of each of these 32 are given, making a total of 128 yellows). This may be much too fine a differentiation for general purposes. These 32 colors can be condensed into four general groups, namely, "Light Yellow," "Yellow," "Orange Yellow" and "Yellowish Orange." In each general group the color limits are sufficient to make allowances for slight variations in the fading of flower colors. The color nomenclature is still accurate and bounded by very definite color limits so that in using these general terms one can often be sufficiently accurate for many purposes.

If lumping these colors together is too general, "Yellow" can be broken down and more accurately defined as "Lemon Yellow," "Buttercup Yellow" and "Indian Yellow." If this is not fine enough, these three hues can be broken down even further so that "Indian Yellow," for instance, can be defined as "Egyptian Buff," "Orange Buff," or "Maize Yellow." Each one of these colors has three additional tints. So it is seen that the system of giving color names need not be too general nor too simple. It all depends on how accurate the users wish to be. This system of naming colors should have many obvious advantages.

A Study of *Chaenomeles*

It might be interesting to see how this chart has helped in the study of the varieties of *Chaenomeles*. In the collection of the Arnold Arboretum are growing about fifty named varieties of this genus. Only two or three are of value for their habit; the rest are grown primarily for their bright spring flowers. Many are practically identical. In making comparisons with the Horticultural Colour Chart, the following notes were taken in 1947:

Color of *Chaenomeles lagenaria* varieties at Arnold Arboretum May 15, 1947

	Corresponding Color in Chart
<i>alpina</i> (<i>C. japonica</i> var.)	Fire Red 15/1
"Vermilion"	" " 15/2 to Vermilion 18/1
"Knaphill Scarlet"	Poppy Red 16/1
"Incendie"	" " 16/1
"Double Orange"	" " 16
"Apricot"	Mandarin Red 17/1
"Kermesina semi-plena"	Begonia 619 to 619/2
"Semperflorens"	Scarlet 19/1
"Versicolor lutescens"	" 19/1
"Columbia"	" 19/1
"Foliis rubis"	" 19/1
"Sanguinea semi-plena"	" 19/1
"Rosea plena"	" 19/1 to Geranium Lake 20/1
"Cardinalis"	" 19/1 to " " 20/1
"Atrococcinea plena"	" 19/1 to " " 20/1
"Baltzii"	" 19/1 to " " 20/1
"Rubra grandiflora"	" 19/1 to " " 20/1
"Blood Red"	Signal Red 719/3
"Phyllis Moore"	Porcelain Rose 620

"Bonfire"	Delft Rose	o20/1
"Early Apple Blossom"	" "	o20/1
"Atrococcinea"	" "	o20/1
"Crimson and Gold"	Blood Red	820/1
"Enchantment"	Carmine Rose	621
"Pink Beauty"	Carmine	21/1
"Eximea"	" "	21/1
"Cathayensis" hybrids No.319, 331	" "	21/1
"Simonii"	Turkey Red	721
"Leonard's Variety"	" "	721
"Atrosanguinea"	" "	721
"Umbilicata"	Currant Red	821
"Contorta"	Dawn Pink	523
"Apple Blossom"	White to Carmine Rose	621
"Grandiflora semi-plena"	" " "	" 621
"Marmorata"	" " "	" 621
"Moerloesi"	" " "	" 621
"Versicolor"	" " "	" 621
"Rosea grandiflora"	" " "	" 621
"Grandiflora"	" " "	" 621
"Grandiflora semi-plena"	" " "	" 621
"Alba"	White	
"Candida"	" "	
"Falconet Charlet"	" "	
"Nivalis"	" "	

The Chaenomeles varieties listed above have nineteen different colors, hues, tints or shades—far too many for the general run of display gardens. Hence it becomes necessary to study these varieties and their colors and see how the number of varieties can be reduced. The first step is to study the color nomenclature in the Horticultural Colour Chart within this color range.

Colors Listed from Orange to Camellian Rose

Orange	Orange	12
	Saturn Red	13
	Mars Orange	o13

	Indian Orange	713
	Chinese Coral	614
	Nasturtium Red	14
	Burnt Orange	o14
	Fire Red	15
	Capsicum Red	715
	Orient Pink	416
	Shell Pink	516
	Shrimp Red	616
Reddish Orange	Poppy Red	16
	Brick Red	o16
	Mandarin Red	17
	Dutch Vermilion	717
	Azalea Pink	618
	Vermilion	18
	Jasper Red	o18
	Garnet Brown	oo918
	Begonia	619
	Coral Pink	o619
Orange Red	Scarlet	19
	Signal Red	719
	Orient Red	819
	Venetian Pink	420
	French Rose	520
	Porcelain Rose	620
	Geranium Lake	20
	Delft Rose	o20
	Blood Red	820
	Carmine Rose	621
	Empire Rose	o621
	Carmine	21
	Claret Rose	o21
	Turkey Red	721
	Currant Red	821
	Camellia Rose	622

By studying this listing of colors it is obvious that the 19 colors into which the *Chaenomeles* fall can be grouped into seven general color groups:

1. Orange (12-616)
2. Reddish Orange (16-619)
3. Scarlet (19-620)
4. Geranium Lake (20-621)
5. Turkey Red (721)
6. White to Carmine
7. White

Then, if the above are to be the color "classes," a re-study of the varieties falling into each class is necessary to determine "the best" for each group. Because of similarity in size, habit, fruit and ease of growth, many of these varieties are similar to others in ornamental usefulness. Hence the classification of the varieties according to flower color affords an excellent basis on which to judge them for the purpose of selecting a few of the better varieties. If twelve varieties have practically the same flower color, then profuseness of flowering, size of flower and singleness or doubleness are the criteria on which the best are selected. Working over the large group in this way, the color classes and the varieties can be arbitrarily reduced in the following order:

1. Orange—*japonica alpina* (S) (lowest of all)
2. Reddish Orange—"Apricot" (S); "Double Orange" (D)
3. Scarlet—"Kermesina semi-plena" (SD) (tallest of all) "Cardinalis" (D); "Baltzii" (S); "Sanguinea semi-plena" (SD)
4. Geranium Lake—"Phyllis Moore" (D); "Bonfire" (S); "Blood Red" (S); "Rosea plena" (SD)
5. Turkey Red—"Simonii" (SD); "Umbilicata" (S)
6. White to Carmine—"Marmorata" (S); "Moerloesi" (S); "Grandiflora semi-plena" (SD)
7. White—"Nivalis" (S); "Falconet Charlet" (S)

Note: S=single flowers
SD=semi-double flowers
D=double flowers

Seven color groups instead of nineteen and seventeen varieties instead of forty-three—quite a reduction!

So it is seen how the use of a color standard helps materially in the study of a group of plants, grown chiefly for the bright colors of its flowers.

It is hoped that the horticultural organizations of this country will take up this important problem and do something about it. It may be that all are not uniformly agreed upon the adoption of one particular chart, but certainly all should be agreed that the present chaotic condition of color nomenclature in Horticulture should be immediately rectified.

DONALD WYMAN

Note:

Republication of Sargent's *Silva* of North America

This standard very beautifully illustrated work was originally published in 14 volumes quarto between the years 1891 and 1902. Its original price was \$350.00 for the complete set. It has long been out of print, and naturally the selling price advanced as copies were occasionally offered by dealers. The work contains 740 magnificent plates illustrating the trees of North America north of Mexico.

Now, thanks to the initiative of Mr. Peter Smith, Publisher, 351 Fifth Avenue, New York, this basic work is again available. Official permission to republish Sargent's *Silva* was granted to Mr. Smith in 1945. The work has been reproduced by the modern offset lithograph process and is an exact replica of the original text. It is printed on very excellent paper. This new issue is of the same size (quarto) as the original, but is bound in library buckram, two volumes in one, i.e., forming seven volumes instead of the original fourteen.

The new issue sells for \$200.00 a set. For all practical purposes this re-issue is as valuable as the original edition. The lithoprint work was done by the Murray Printing Company, Cambridge, a firm noted for its high quality of excellence. The offset work on this book was so well done that it was selected, by a competent committee of judges, to be among the best books by offset in 1947.



Wyman, Donald. 1947. "American Horticulture Needs to Adopt Uniform Color Standards." *Arnoldia* 7(7-8), 41-52.

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