PÆONIA

AN INTERNATIONAL NEWSLETTER FOR PEONY HYBRIDIZERS

Volume 28, No. 2 **Spring 1998**

Editor and Publisher:

Donald R. Smith
46 Exeter Street
W. Newton, MA 02165

Subscription Rates:

U.S.	Outside U.S.
5 yrs. -- $25.	$35.
10 yrs. -- $45.	$65.

Table of Contents:

BREEDING TREE PEONIES FOR FRAGRANCE; PART III

by Don Smith

A list of approximately 120 Chinese tree peonies sent to me by John Simkins (see Letters to the Editor, p. 6) includes fragrance as one of 14 descriptors for each variety. Fragrance is described as intense, dense, much, slightly dense, light or delicate. After reviewing this list and the accompanying letter by John Simkins, I was intrigued by the fact that all varieties in each color grouping are listed as having the same fragrance (e. g., all whites are listed as having "much" fragrance). Although, it seems very unlikely that these generalized descriptions can be accurate in all cases, it is nevertheless interesting to note that color and fragrance in tree peonies may be generally correlated. If this were the case, this information would be quite useful to the hybridizer who is interested in breeding tree peonies for fragrance.

A summary of the information concerning fragrance is given in Table 1. Fifty-one (51) of 116 varieties (44%) are listed as having either intense, dense or much fragrance. Fourteen of the 16 fragrant varieties listed in Part II of this article (see Vol. 27, No, 4) also appear on the list of 116. This gave me an opportunity to check this new list against the one published earlier in Part II. The descriptions regarding fragrance were found to be in good general agreement with only one or two notable exceptions.

Unfortunately, we do not know precisely what the terms "intense", "dense", etc. really mean. They seem to address only the amount or intensity of the fragrance (odor?) and not the type of fragrance and/or the degree of "pleasantness". In my view, all fragrance is (by definition) agreeable (i.e., a pleasant odor). The dictionary

definition of fragrant is "sweet or agreeable in smell'. Therefore, I use the words fragrant and fragrance to refer to a pleasant smell only. Odor, on the other hand, can be either pleasant or unpleasant, but is more generally used to refer to an unpleasant smell or at least one that is not particularly sweet or pleasant. Unfortunately, some seem to use the terms fragrance and odor interchangeably, so we must be a little careful about what we assume here. In addition, an unpleasant odor to the nose of one person may be considered quite agreeable by another. Hopefully, John Simkins will report further on this subject in the near future.

Table 1. Correlation of fragrance and flower color in Chinese tree peonies.

Flower Color	Fragrance
Purple	Intense
Black, Black purple, Purple-red	Dense
White	Much
Red, Silver red, Light red	Slightly dense
Green, Changeable	Light
Pink, Yellow, Multi-color	Delicate

It is interesting to compare the above observations with those made for herbaceous peonies.

In an article republished in APS Bulletin No. 300, Dec. 1996, Prof. Saunders distinguished four types of odor (fragrance) in peonies. These are

1. Rose Fragrance
2. Honey Odor
3. Lemon Odor
4. Bitter Odor

Saunders claimed that most stamen bearing flowers have a bitter, disagreeable odor which he described as "soapy". He stated that "almost all singles possess it in an unmitigated form, especially the single reds, in many of which it is quite repulsive". He indicated that this odor was most disagreeable in young blooms when it was at its strongest. He classified most flowers with stamens in the bitter category.

In another old article (APS Bulletin No. 75) republished in the same issue of the Bulletin (No. 300), Edward Auten made a number of similar general statements concerning the fragrance of peonies that are also worth repeating here. According to Auten, all singles (without exception) fall into the disagreeable (bitter) category, as do most, if not all, semi-doubles that have many stamens. He also put Japanese-type peonies into this category as well. On this subject he stated "True Japanese-type peonies seldom if ever have agreeable fragrance".

"Anemone-type Japanese peonies, however, often are pleasantly fragrant" according to Auten. As a group, he claimed the regular anemone-type peonies have "probably the largest proportion of rose fragrant members than any other type of bloom. Next would be the full doubles; and there are more fragrant whites than any other color".

Both of these authors have associated fragrance in herbaceous peonies generally with flower type or form, but also to some degree with color. To check these conclusions, I examined the list of herbaceous peonies given in the supplement of the book "Peonies, Outdoors and In" by Arno and Irene Nehrling (Hearthside Press,1960) beginning on page 237. Of 1289 herbaceous varieties, only 54 (4%) are listed as having a pleasant (rose or sweet) fragrance. There are many more varieties (237 in all, or 18%) that are listed as fragrant, but I have only included those varieties that are specifically listed as having a sweet, rose or pleasant fragrance. Broken-down by flower type, 51 of these are doubles, 2 are anemones and only one is a Japanese-type flower. When separated by color, they divide nearly equally into three color groups; White/blush (32%), light pink (33%) and dark pink (28%). Only 4 (7.4%) are red. These four rose-scented reds are listed below:

Longfellow (Brand, 1907) - Dble, bright crimson

Phillippe Rivoire (Riviere, 1929) - Double, red

Marion Pfeiffer (Pfeiffer, 1911) - Dble, D. Crimson

Rashoomon (Unknown) - Japan.-type, Rose red

The general correlation of pleasant fragrance with flower type is clearly supported by this data. However, Auten's observation that there are more fragrant whites than any other color does not seem to hold-up. His conclusion regarding anemone type peonies is harder to evaluate, since what Auten regarded as "regular anemone-type" peonies are often listed as doubles by others. As for any correlation of fragrance with flower color in the herbaceous group, it is difficult to find any connection other than that rose fragrant reds are rare. With this in mind, it will be very interesting to find out whether the "intense" or "dense" fragrance descriptions assigned to the dark purple and red Chinese tree peonies also fall into the Saunders "bitter" category, similar to virtually all of the single and semi-double red herbaceous peonies.

It is also interesting to note that there are very few fragrant members among the large group of herbaceous hybrids, which are mostly F_1's. The low number of fragrant F_1 hybrid tree peonies was pointed out previously in Part II of this article. I suspect that the presence of odor in flowers (but not necessarily only pleasant odor) is somehow generally related to fertility, since the primary purpose of a scent in flowers must be to help attract bees and others insects so that pollination can occur. This being the case, F_1 hybrids might be expected to exhibit a corresponding reduction in odor that is consistent with the reduction in other sexual functions that is so common among the F_1 interspecies hybrids.

The strong correlation of stamens (and pollen) with an unpleasant odor in herbaceous peonies clearly presents a interesting problem for the hybridist breeding for fragrance, since all crosses require both pollen and pod parents. Fortunately, several of the more fragrant hybrid tree peonies (e. g. Leda and Alice Harding) have adequate amounts of pollen that is at least sometimes of sufficient fertility.

BREEDING FOR THE COLOR ORANGE

by Bill Seidl
732 S. 19 th St.
Manitowoc, WI 54220
(920) 684-8414

Recent articles re 'Tessera and P. potaninii var. trollioides have moved me to review my experience and ideas concerning the title subject.

c 1986 I received from Roger Anderson some seeds, already rooting, of various crosses; one of these was labeled "Tessera x Martha W." Since I had never known the intersectional cross to be successful in the reverse direction -- i.e. the shrub hybrid (SH) being the seed parent -- I guessed the lacti pollen had been contaminated by that of another SH. But that was OK. I had never obtained any seeds from my own plant of 'Tessera' in crosses with SH's and it would be nice to add a new bloodline to my inventory of SH seedlings.

However, after 2-3 seasons it was apparent this was a genuine i-hybrid with the typical shrubaceous (sub-shrubby) habit of its kind. It was given the seedling number SB-8 (SB = Shrubaceous) but later, in the early 90's when it first bloomed, I gave it the garden name "Peach Boy" (after a Japanese children's story) for it's attractive peach-ivory coloring. The flower was single and rather fleeting, the color faded after one day to a rather nondescript, washed-out pastel. Therefore I do not consider it to have much commercial value and have been slow to propagate it. The flower is not deformed -- as happens with so many i-hybrid seedlings -- and after one division it still exhibits normally-formed blossoms. I've made no serious attempt to hybridize with it. But if any reader wants to try, I shall share divisions at a modest price or, preferably, in trade for something of value to me.

Meanwhile, back in the garden, 'Tessera' has vexed me for many years by blooming sparsely in spring and then blooming (or reblooming) in mid-to-late summer. So I bade it good riddance when I gave it away to a hybridizer-collector who approves of that sort of behavior.

On the subject of SH's.... This past February (1998) I received from Mr. Bernard Chow, Australia, photos of first-time blooms of SH's raised from seed purchased from me. One in particular caught my eye because of its orangey coloring - as good or better than that of 'Tessera'. I thought it might be a color aberration of photo-processing, but Mr. Chow's letter said, "Many people like its orange color." Its pedigree is SH-16 x Golden Era. My index card on #16 says: flesh blended rose, single, from A198 x Chinese Dragon, drips pollen. Additional notes indicate it has set seed by #38, Golden Era, and #127 (23 seeds in 1991). [I don't know who got the latter

seed; somebody in NZ or it was unplanted. SH-127 is 'Brassy Lady' which is proving to be an excellent parent, esp. for peach coloring.] The flower in Mr. Chow's photo is single and exhibited in a complementary deep blue vase, it appears rife with pollen. My original plant of #16 was destroyed when my landlord expanded his garden at the expense of part of mine, but a graft was made in time to give me a new plant, now very large, that can be used to repeat the cross. However, I'd rather try 16 x 127 for a better chance at orange color. 127 is a double 'Harvest' color from GE x (GE x Chinese Dragon). See the 1986-96 APS Checklist, p 34, or Bulletin #299. I will make available scions of #16 and/or seeds of 16 x 127 (barring a crop failure) to Pæonia readers at a reasonable price or (preferably) in trade for scions, roots, or seeds of something of value to me. (Scions can be successfully grafted two weeks, or more, after harvest, contrary to some accounts I've read. I have sent scions to New Zealand and Australia where some are "taking", but it is nip-and-tuck due to reversal of the seasons. Scions pass through customs as easily as seeds.)

Perhaps a true orange is impossible in the above SH or Lutea Hybrid approach because (as Mr. Entsminger says, Pæonia, Vol. 27, No. 4) carotenoids and anthocyanides can't mix, but it's worth a try. I keep thinking of the progress made in daylily breeding where new colors of increasing clarity continue to be developed, but only after many generations. Also, this progress has been made by many people who had no knowledge of the chemistry of colors, but chose their parent plants on the basis of tiny increments of improvements they observed in the phenotypes of the flowers.

On the herbaceous front, last summer I pollinated all the blooms on my one plant of 'Coral Charm' (triploid; Minnie Shaylor x peregrina?) with pollen of 'Sunny Boy'. As expected, no seeds; not even close. Perhaps it would be better to try lacti pollen, preferably from a white cultivar like 'Minnie Shaylor'. (It probably blooms later, so plans should be made to obtain pollen from a gardener whose season is ahead of yours.) An unreduced triploid gamete of 'Coral Charm' (ggn) uniting with a normal, reduced diploid gamete of the lacti parent (n) would produce a tetraploid of genotype ggnn, where "g" represents the gene for orange-coral (or something akin to it) and "n" the gene or allele for the non-expression of that trait.

Now here I tread on unfamiliar, scientific ground: such a tet could be a special kind called an "amphidiploid". My understanding is that the genes will then always segregate evenly (not randomly) at meiosis, that is, one each (gn, not gg or nn) appears in the male and female gametes. Therefore, on recombination with its own kind, two genes for orange (never 0,1 or 4) would reappear in the fertilized egg. So amphidiploidy locks the tet progeny into a "2 out of a normally possible 4" situation with regard to genes for orange. However, "2 out of 4" may be sufficient to produce a good orange color, especially when refined and clarified by several generations of sib-crossing. But it may take "4 out of 4" to produce deeper, more opaque, unfading colors. The most direct path to this condition would be to backcross to peregrina (gggg?). Thus gn + gg = gggn, a tetraploid which has to yield some gg gametes. Oh, it's so easy on paper.

The first step though is the pollination of 'Coral Charm' (or cultivar of similar genotype) on a large scale. A commercial planting raised for roots could be pollinated with relative ease since bagging and labeling would not be needed.

The amphidiploid condition in peonies is not entirely unfamiliar to me. I once spent nearly a decade (ending in 1977) breeding gladiolus for fragrance. I began with a fertile tet (comparable in peonies to a tet out of C. Charm x M. Shaylor) called 'Lucky Star' originated in New Zealand by Mrs. Joan Wright. It was modestly fragrant and fertile, derived from non-fragrant tet garden glads (nnnn) and a diploid fragrant species (ff), then called Acidanthera murielae. I failed to achieve maximum fragrance in crosses with garden glads, sib-crosses, and backcrosses to 'LS' because 'LS' was (I now believe) an amphidiploid of genotype ffnn and incapable of passing on more than one "f" gene in a cross. I finally gave up when I developed an allergy to gladiolus pollen; how do you sniff hundreds of seedlings for fragrance without overloading your system with pollen?!

I have crossed 'Salmon Dream' (Reath, 1979) with various yellows in an attempt, more hopeful than serious, that some coral-orange colors would result, but no such luck. When paired with 'Sunny Boy' it produced some very fine double yellows in New Zealand where I sent most of the seed. I'm sure 'Salmon Dream' was also used by David Reath in pursuit of orange but am unaware of any significant advances. I once suggested tet white x 'Good Cheer' or peregrina. I don't recall his exact answer, but my sense of it now, many years later, is that his tet lacti's (developed from colchicine treatment) did not

fulfill early expectations. Perhaps, like the earliest tet daylilies, they were stubborn parents. What with also breeding daylilies, iris, hosta -- and geese, running a commercial nursery, and maintaining a veterinary practice, I doubt he had much time to deal with such recalcitrance.

Several years ago P. potaninii var. trolliodes was well established in the sandy soil of my garden on rented land. It grew only 6" high but was spreading vigorously into the paths on either side. Unfortunately, annual weeds hid it from view when my landlord tilled through it in a well-meaning effort at weed control. It recovered enough to bloom again the next year when I finished it off with Round-Up. Too bad; in both seasons it was setting a few seeds by ludlowii pollen received from hobbyist-growers in California and New Zealand. I had hoped to obtain a seedling with the flower-quality of ludlowii on a plant of small-enough size that could be easily given winter protection. I did not know then that the presence of chalcones (see Entsminger article) made it a candidate for orange breeding.

Reviewing all of the above, I think my own best chances for orange are to acquire 'Nike' ("coral peach" color) and 'Hélène Martin', reaquire trollioides, and incorporate with the SH seedlings I already have, especially 'Brassy Lady', hoping that "dusky hues and shades" can be eliminated in advanced generations. A modest degree of fertility is already there, something not true of the other approaches discussed.

THE SUFFRUTICOSA X LACTIFLORA HYBRIDS: A PROGRESS REPORT

By Don Smith

The two suffruticosa x lactiflora seedlings mentioned in the previous issue of the newsletter have both survived winter storage and are now growing nicely under artificial lights. It is interesting how very different these two plants are. One of these hybrids, (RC-96-02), is a good size plant with dark green foliage that is very healthy. I will refer to this one as "the big one". The other is much smaller and also less vigorous. The big one is about 5 1/2 inches tall with very handsome herbaceous-looking foliage that is approximately 5 inches across. This size is fairly typical of second-year intersectional hybrids. One interesting characteristic of this seedling is that the entire stem is dark red. The leaf pattern exhibits little or no tree peony characteristics. The shallow leaf-cuts that were so apparent in the first-year seedling (see figure 1, Vol. 28. No. 1) are completely absent in the second-year plant. Only the color and texture of the foliage gives clues to the true intersectional heritage of this seedling. Overall, the foliage closely resembles it's pollen parent, *Martha Washington*, but the color is a much darker green. Its plant habit seems completely herbaceous with no tendency to produce the above ground buds that are characteristic of the tree peony group and most of the intersectional hybrids. These characteristics are similar to those reported recently by Harold Entsminger (Vol. 27, No. 3) referring to his reverse-cross seedling from the cross *Tessera x Prairie Moon*. He described his seedling as looking "very much like" the pollen parent, *Prairie Moon*.

My other seedling from this cross (which I refer to as "the little one") is very different in both size and foliage. This little one is barely 3 inches tall with foliage that is only about 2.5 inches across. Its size is far more typical of a first-year intersectional seedling than a second year plant. This seedling has tree peony-like foliage and more generally resembles the seed parent, *Stolen Heaven*. However, the leaves are quite twisted and curled and are not especially attractive. Similar to other intersectional hybrids, it has already set an above ground bud for next year's growth. I will continue to report on the progress of these plants as they continue to grow to maturity.

PEONY HYBRIDIZING NEWS

It has been reported to me by Walter Good that a hybridizer in Germany by the name of Joseph Stinglhammer (Pfarrkirchen, Germany) has successfully crossed P. mlokosewitschi with P. suffruticosa and has a number of young seedling growing. I have no details on when this cross was made or how many plants have been produced. I also do not know which direction the cross was made. Since "mloko" blooms very

early (along with many suffruticosa varieties), this cross probably could have been made in either direction. Walter has contacted Mr. Stinglhammer and asked him to write a report about these hybrids, which he has agreed to do. Walter has promised to translate the report into English for publication in the newsletter. Mr. Stinglhammer has apparently indicated that his seedlings resemble my (suffruticosa x lactiflora) seedling which was shown in the previous issue of the newsletter (see figures 1 & 2, Vol. 28, No. 1). I look forward to getting more details on this new and exciting hybridizing development in the near future.

LETTERS TO THE EDITOR:

Letter from John Simkins
Oakville, Ontario, Canada
received Feb. 25, 1998

Re Breeding Tree Peonies for Fragrance.

In the fall of 1997 the Royal Botanical Gardens planted 230 Chinese Tree peonies purchased from Luoyang Huafeng Peony Co. Ltd., Luoyang City, China. These were two each of 120 varieties. In the cultivar list of these peonies one of the 14 columns under which they were described was fragrance. The dark colored purple and red varieties have intense or dense fragrance. The yellows delicate, the whites have much, the light and silver reds have slightly dense fragrance and the pinks have a delicate fragrance. There is none listed with no fragrance. When these flower this spring as we expect, we will sniff them and check the listing at least to find what the words mean. There are eight flower forms listed so some should have pollen and others pistils, so crosses could be made. We will try some and also with some Japanese and even lutea hybrids that are there.

Mr. Wu Jing Xu whose articles on Chinese Peonies appear in the Bulletins is General Manager of Luoyang Huafeng, where we bought the peonies. He may like to comment on this idea. I will send him a copy of this letter.

John Simkins

Letter from Theresa Griesbach
Iron Ridge, WI
received April. 20, 1998

Re Stimulated growth of recalcitrant seeds.

Dear Mr. Smith

In Norman Deno's book, First Supplement to the Second Edition of Seed Germination Theory and Practice, he mentions using gibberellic acid to stimulate leaf development on rooted Pæonia suffruticosa seeds at 70° F. This may be a treatment you could use on seeds which have stalled so long after rooting you fear they might die. I have had occasion to try GA-3 on three of my seedlings under different circumstances. Four p. steveniana seeds had rooted with leaves just visible between the split of cotyledons coming from the seed when I moved them to a warm windowsill. Growth stopped and I became concerned. I moved them back to a cold area, but to no avail. After a couple of months I was fearful they would die so I treated two seeds with GA-3 leaving two untreated. The two grew promptly upon treatment. One of the two untreated seeds later died and I treated the remaining seed which also grew. Growth was not entirely normal as each seedling put up three leaves, the first of each normal in size while the other two were smaller. I tried to make the GA-3 solution 1000 ppm, but cannot vouch for the accuracy of my measurements. Sorry, I'm a housewife not a scientist! Packets of GA-3 and GA-3 kits are available from:

J.L. Hudson, Seedsman
Star Route 2, Box 337
La Honda, California 94020

Best of luck,

Theresa A. Griesbach

P.S. If you're interested in Mr. Deno's books you can buy directly from him. His address is:

Norman C. Deno
139 Lenor Drive
State College, PA 06801
