

REQUIRED READING –

- 1. "The Peonies" by John C. Wister, \$3.50 from American Peony Society.
- 2. The Bulletins of the American Peony Society.

The PAEONIA is authorized by Miss Silvia Saunders.

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CHRISTMAS

Season for Brotherly Love

PRELIMINARY COLCHICINE TREATMENT TESTS ON TREE PEONY SEEDLINGS

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May 25 1978

Introduction - The production of tetraploid peonies is of interest for at least two reasons. In some cases tetraploid plants are more fertile than the diploid counterparts, and this would be a definite advantage in breeding the lutea hybrids or other peony hybrids which are completely or partially sterile. Secondly, the flowers of tetraploid plants are quite often larger and have more substance than the diploid varieties. Therefore, tetraploid peonies may be of interest in their own right apart from the increased fertility which they might exhibit.

My own interest centers around the production of tetraploid tree peonies, and during 1977 a program was started to attempt the induction of tetraploidy into *P. suffruticosa* seedlings by treatment with colchicine. As seedlings of the other tree peony species become available, these will also be treated. Obviously one cannot hope to induce tetraploidy if all the seedlings are killed at the drug level tested. On the other hand, if all the seedlings survive, the chances of inducing tetraploidy may be very slim. It is my understanding that as a rule of thumb many workers in this field consider the colchicine level about right if 50 percent of the seedlings survive the treatment. The initial phase of the present study, therefore, involved testing various levels of colchicine to find an appropriate concentration for the treatments. This report describes the results obtained in this preliminary study.

Procedure - Tree peony seeds were germinated in damp vermiculite using the procedure outlined by Hollingsworth (APS Bulletin, June 1975). The seeds were from the 1976 crop harvested from garden varieties of *P. suffruticosa*. Most of them were supplied by Louis Smirnow and Toichi Domoto (through Chris Laning) although a few were harvested from my own garden varieties. I prefer to treat the seedlings at a stage when the epicotyls are very immature, hoping to catch a fair number of cells in active division. Some were treated when the epicotyls were not yet visible, but the cleavage between the cotyledonary petioles was always visible before treatment. At this stage of development the drug solution should be able to penetrate to the epicotyl region.

The method of colchicine treatment used is essentially the one outlined by Reath (APS Bulletin, March 1972, p. 13) with the following modifications:

- 1) The seedlings were treated on the lab bench without the use of artificial light except for that from our fluorescent fixtures in the ceiling.
- 2) After treatment, the seedlings were rinsed briefly under running water and soaked about 30 minutes in water. They were not subjected to the prolonged soaking in water recommended by Reath.

The seedlings were placed vertically in small beakers with the epicotyls down and the roots protruding upward. Aqueous colchicine solution was then added to cover the seeds and epicotyl regions, care being taken not to get the drug solution on the root regions. (At this point, there appears to be no need for tetraploid roots so in this manner we avoid the hazard of root damage with the drug) The protruding roots were covered with damp paper toweling, and then the beakers containing the seedlings were placed in wide-mouthed pint Mason jars, which were sealed with the usual lids and rings that come with those jars. This procedure kept the roots moist during the soaking period. At the

end of 24 hours, the seedlings were removed from the colchicine solution and rinsed and soaked in water as described above. The seedlings were then potted in three inch peat pots using a soil-milled sphagnum mixture (about 2 to 1). The potted seedlings were held in plastic trays outdoors for observation.

To conserve the colchicine, which is becoming an expensive drug, the solutions were stored frozen in the deep freeze between treatments and used several times when other batches of seedlings became ready. Examination by thin layer chromatography has shown that the colchicine solutions remain stable for over a year when stored in this manner

Results and Discussion - The results from the 1977 tests are shown in the table below.

Colchicine Concentration (%)	Month Treated	Number of Seedlings Treated	Number of Seedlings Sprouting ^a	Number of Seedlings Killed ^b	Percent Surviving
1.0	June	12	1	11	8
0.8	August	6	0	6	0
0.7	September	10	3	7	33
0.5	October	45	18	27	40

Notes: ^a Seedling considered sprouted if, after potting, the epicotyl eventually pushed above the soil level.

^b Seedling considered killed if, after potting, the epicotyl never emerged above the soil level.

Although a relatively small number of seedlings were treated, the results do give some indication of the tolerance of the seedlings to colchicine treatment. It can be seen from the table that 40 percent of the seedlings survived the treatment at the 0.5 percent colchicine level. Concentrations above this level appear to give unacceptable survival rates. If we assume that a 50 percent survival rate is a reasonable target, it may be that colchicine levels somewhat below 0.5 percent would be adequate to induce tetraploidy in tree peony seedlings. The seedlings are definitely set back by the treatment and develop slowly compared with untreated controls. Reath has pointed out that the herbaceous sorts seem to tolerate higher concentrations of colchicine than do the tree peonies, so the optimum level found in the present study would probably be inadequate for the herbaceous types

As yet I have no direct evidence that the 0.5 percent colchicine concentration is strong enough to induce tetraploidy in tree peonies. This evidence will come only as time passes, and the surviving seedlings can be observed for tetraploid characteristics (thickened leaves, areas of distortion and ultimately chromosome counts). Unfortunately, most of the seedlings surviving the tests in the present study were treated so late in the season that they did not have time to mature before winter and were lost. The only seedling to come up this spring is the sole survivor from the one percent colchicine treatment of last June, and it is too early to predict the chromosome number of this seedling. The treatments are being continued this spring as seedlings reach the desired stage of development.

REPORT FROM NORTH DAKOTA

The summer of '78 had both disappointments and surprises for the peony hybridist but the pleasant surprises outweighed the disappointments.

First, the spring of '78 was just about ideal, even if it started earlier than usual. We had our last spring frost or freeze around April 10 and our first fall freeze around October 10, giving us a near record length growing season.

The European Peony "Pall", one of four received from the U.S.S.R. in the fall of '73, did real well for the first time since I have grown it and produced several single purple flowers and five seeds. It may have some value for hybridizing but I do not think there is much merit in the plant. I used its pollen on double *Tenuifolia* without any result. "Pall" is a rather coarse-leaved fern-leaf plant with very *Tenuifolia*-like root system.

The ANOMALA plants grown from seed from the same source as "Pall" was received also gave me a few flowers — very similar to "Pall" in color and it also gave me five seeds. POCEDA, the third U.S.S.R. plant, a seemingly pure *lactiflora* which had a very good double dark pink flower as a two year old, again had a number of blossom-buds that did not open — same as last year. It reminded me of the old variety 'Solange', which I grew for some 25 years and had good flowers only one year. Other years it developed very large blossom buds which never opened right. The fourth and last of the U.S.S.R. plants was "Novostj", a hybrid single of purplish color and for me was completely sterile. These last two were discarded.

The probable ITO I mentioned last year was a puzzle to me and I doubt that it is a T. P. hybrid. The four plants I had this year each had one bloom. The first to open was bagged before it opened and left that way for some ten days. No seed developed. The next two had 'Alice Harding' T.P. pollen and 45 seeds. The fourth one to open was left to open pollination and produced 25 seeds. The large milky-white single flowers had good pollen and carpels. Last year this plant had two above ground level buds in the fall and both sprouted and grow. This fall none was to be seen. This was the only reason I thought it was an ITO type hybrid. No such sign this year.

We had 12 two-year old plants of 6414 this year, which I registered as '**Dakota Princess**', that really put on a show of its own. The flowers are a medium to light pink, very full double, and this year were almost ball shaped and huge. I showed three blooms at the Fargo Flower Show and since there was no three-bloom class, I entered two blooms in that class and the other bloom by itself. All won first in their class plus Best Peony Flower in the show, plus the special award Excellency in Horticulture. The best bloom measured a full nine inches across, as nearly all of the primary flowers did.

'**Goldilocks**', a seedling of '**Oriental Gold**', which in the past years has had only medium-sized, rather flat pale bright yellow flowers, no pollen but good fertile carpels and has had only its color and inherited possibility of producing our much sought after good yellow double flowered peony, was truly fantastic this year. We had only a few two year old plants growing but they came on with very large and very full ball shaped pale bright yellow flowers on all the primary stems and a very few laterals. We had nothing yellow to pollinate with on the early bloom but had forced one plant of '**Oriental Gold**' into earlier bloom so that I had its pollen for the three lateral blooms. The big primary bloom had only misformed carpels or none at all so there was nothing lost there, but the laterals did have carpels and I was fortunate in getting five good seeds from this cross of '**Oriental Gold**' x '**Goldilocks**'. It is my guess that when we got a good, real yellow peony, it will come from an '**Oriental Gold**' base.

Now this year there were two-year yellow pure lactiflora plants, very similar to '**Laura Dessert**', but larger and with a more brilliant yellow center tuft. I am not sure that this type of yellow is at all useful in developing a good yellow double but since it is so much easier to get yellow color into the guard petals than the main center of the bloom it may be of some importance that we work toward this end.

A new hybrid, from '**Laddie**' x '**Early Scout**' pollen, came a full bomb type double of a rather dull medium red. Not much to look at, but a vigorous upright grower. It was left open but no seeds developed.

A '**Claire de Lune**' open seedling I mentioned last year had one first bloom, a rather light bomb type double, off white and showing a very little yellowish, was pollinated with '**Alice Harding**' T.P. pollen unprotected and produced 28 very good seeds. This plant seems to be very fertile. I will not register it but will call it Claire de Lune 2 in my notes and records. It has at least one-fourth Mloko in its makeup. It could be of some value for breeding.

We also had a number of third generation Tenuifolia plants of Double Tenuifolia x single Tenuifolia; that is the third cross of these, each time using pollen from the proceeding cross — and one of them is a quite good semi-double and I used pollen from that one on my double Tenuifolia this year which will make their offspring 15/16ths of double breeding and I hope to eventually produce a new double Tenuifolia as the end product. I dug the very vigorous plant and it had an enormous root system which weighed over two pounds. I could have made 12-15 standard divisions from it easily. It was six years from seed.

In summarizing the summer's events, I feel that we may have made a very tiny step in the right direction towards that evasive real double, honest-to-goodness, yellow peony with the five seeds of '**Goldilocks**' x '**Oriental Gold**' and the discovery of a highly fertile Mloko offspring.

The old Mloko I mentioned in last year's notes that I cut into four equal sections and replanted, gave me four nice new Mloko plants and I hope that I will have a bloom or two for pollen next year.

Season's Greetings to you all. Ben Gilbertson
Kindred, North Dakota

L. J. DEWEY OF RICHMOND. VA. SAYS:

You are probably aware of the near flood of articles on peonies this summer. To make sure you don't miss any, I'm listing the ones I know about below:

- 1) "Tree Peonies" by Michael Dodge in Horticulture, Vol. LVI, #8, pg. 36, August, 1978,
Also "A Tree Peony Portfolio" by Minor White in the same issue, pg. 41.
Both articles have beautiful pictures
- 2) "Recent Trends in Garden Peonies" by Donald Hollingsworth, pg. 6.
"The Tree Peony, King of Flowers" by Gertrude S. Wister, pg. 7.
Both articles in American Horticulturist, Vol. 57, #4, Summer, 1978.
- 3) "Perennial of Perennials - Peonies" by Lorraine Burgess in "Flower and Garden", Vol. 22, #8, pg. 30. August 1978.

(Also see cover for a fetching picture of Nancy Klehm holding '**Paula Fay**' blooms and the paragraphs about peonies in the Letters to New Gardeners column, pg. 8)

I can't be sure, but have they incorrectly labeled the white peony pictured at the beginning of the article as '**Krinkled White**'?

ALBIFLORA x OZIERI ALBA

From original cross, seven plants were gotten. While similar, they were not identical. For the sake of convenience these seven plants were introduced as a strain and named '**Halcyon**'. As so often is the case, differences in genetic makeup of each of these plants present problems to hybridizers such as these:

1. What plant from this group do I have? (mine doesn't set seed).
2. Which plant or plants did set seed for Dr. Saunders?
3. Where can I get a '**Halcyon**' that sets seed?

Does this sound like the old familiar story of "if only we knew"? Well, Paeonians, this story is different. We are not at the end of the line with this strain!! Miss Silvia Saunders gave to me an F₂ plant of '**Halcyon**'! This one stands up straight and tall, has dark green leaves that show its white veins very prominently, very acceptable! The flowering is another feature that delights me. The main bloom on the stem is of heavy texture though slightly smaller than the one on my '**Halcyon**'. Three and sometimes four very small single flowers bloom three or four inches below the main bloom. These are no bigger than a 1950 silver dollar. They are little darlings, early too!!

Is that all there is to say? No! The great thing is that this F₂ sets seed with fair ease and a number of these seeds have already started rooting. The twenty five or twenty six seeds that were produced were from open pollination along with a dab of pollen from Laning's Best Yellow. Maybe protected pollination is needed on self pollinated blooms so as to get a maximum of *P. ozieri* out of this blood line. But for now, anything is welcome.

If anyone of you active hybridizers needs a piece of this plant for your project, let me know and I'll try to divide it next fall. Several stems were produced this year so it should be possible to divide it. Only one piece of it will be given away at that time. Thanks to my friend, Silvia, for this treasured plant.

The following information is from Prof. Saunders' notebook on Albiflora x Ozieri Alba:

Ozieri alba came from Vilmorin. They thought it was related to officinalis, but from its foliage it is apparently in the group corallina - broteri - cambessedesii.

Ozieri alba now in 9.21 r 4 (3)

14835-7 3 1302 x Ozieri alba

14635. 1940 This group very lovely. One mauve, one white; both with onglets and having fine substance

1941 Divided. In 10.20 r 4 (3 + 1)

14837. 1941 Divided. in 9.21 (1 + 1)

14838 40 3 917 x Ozieri alba

14841 1 667 x Ozieri alba

F₂ 1942 10 seeds of albi x Ozieri alba in 10.12, r 11

1940 (?) 6 seeds of albi x Ozieri alba in 9.10

seedlings (4) set out 1944 in 5.12, r 8 16840-3

- Chris Laning

Q U A D

What is a quad - hybrid?

A mlokosewitschii - macrophylla hybrid was crossed onto officinalis and the resulting triple hybrid was in turn crossed onto an albiflora (albiflora was Prof. Saunders, name for lactiflora). Mlokosewitschii gives them their golden ivory sheen and macrophylla gives them their big leaves and early blooming time. And that is a quad.

Quad F₂, F₃, F₄, etc., what are they? They may not be quads at all since the original F₁'s produced seedlings from open pollination — and that means anything can happen, and it usually does! These plants cannot be called mutts since too much is known of their parentage for that. But can they rightfully continue to be called quads? Can anyone think of a better label? This is very important because future generations of quads will soon be showing up at our shows —

Quad F₂ x '**Roselette**' F₂

Quad F₂ x '**Moonrise**'

Quad F₃

Quad F₃ x '**Archangel**'

'**Archangel**' and '**Moonrise**' x Quad F₂

Named lobata hybrids x Quad F₂ etc.

These are now growing in my garden and a host of other gardens. Seedlings from these groups are giving some excellent plants with beautiful flowers, and some of the colors are very close to the goals we have set for ourselves — peach, pink, puce, ivory, pale yellow, lavender, and white, with singles semi-doubles, and doubles found in the garden very early in the season. Almost all of these "quads" set abundant seed which is viable and germinates readily. The tall plants with broad leaf foliage and generally with massive root structures divide readily - are prolific - what more do you want?? — A name for this arm of peony hybridizing, that's what we want!

This is not an article on "what the other guy is doing", it is what you are doing or should be doing. If you don't have quads in your garden, ask for seeds and plant them. Each one of us should aid in further developing the future quads for the sake of peony lovers.

Don Hollingsworth describes "Laning's Best Yellow", which is a seedling from this vast group:

"Laning's Best --- I can't organize a comprehensive description yet — an assembly of various notes includes the following: two stage double (only semidouble but, genetically, two-stage is very significant) — heavy substance — soft yellow with red flares — 2 side buds — flowered May 20 with '**Good Cheer**', '**Bravura**', '**Cardinal's Robe**', '**Janice**' and '**Carina**', - '**Arcturus**' and '**Spellbinder**' out the next day. This probably not the right season for it as the others had been growing in place for a year and it was first growth from division. Altogether it is a striking and beautiful creation! Right now (Aug. 12) its foliage is holding up very well while much foliage of midseason hybrids and some of others has "gone to pot" ".

- Chris

CULTIVATE

Peonies need care if they are to thrive. Cultivation gives the roots an environment that helps to make them happy. Walking between rows while inspecting the plants and flowers during growing season compacts the soil. This soil is dead, zero aeration. Spading in late fall followed by regular spring cultivation makes peonies smile. When spading, cutting a few roots won't hurt.

Our Peony Bulletin of March, 1978, has an article written by Carl G. Klehm. On page 30 it states that they space their peonies 4 ft. x 4 ft, thus enabling them to cultivate their rows both ways, eliminating a good share of hand weeding. Starting in early spring, they continue cultivating all summer.

Another thing, if peony tops are cut off and burned in late fall — that's a good thing — what about humus? Organic matter is one of the best soil conditioners available. Vitality of the soil and organic content go hand in hand. Four percent by weight is not too much for good growing conditions. In checking for organic content, a sample of the soil is heated to a point where the vegetable matter is burned off. Loss of weight of that sample indicates the percent of humus that had been in that soil sample. How do you add humus to a garden of growing peonies? I don't know! If only a small plot is involved, a compost pile could be the answer. But for a big operation that method won't do — so what is your answer?

Did you notice the Ohio Kingwood Center peony patch? This dejected display had been very carefully planted in a raised bed, soil covered with black plastic to eliminate the need of hand weeding, and covered with wood chips (or something) to make the whole thing look natural. The whole thing is a complete failure. As if to add further insult, peonies growing in people's yards and in gardens seem to flourish, are beautiful, and seem to say, peonies are easy to grow.

I close by saying, cultivate!

-Chris

1978 NOTES FROM OBSERVATIONS IN THE PEONY GARDEN

Laning's Best Yellow used as pollen parent should give its yellow to pink flowered plants, thereby developing seedlings with peach color potential.

Beautiful '**Mikado**' x '**Good Cheer**' seedling only good as a plant — not for hybrids.

'**Sable**' gives tall red blooms on the F₂ and doubles and semi-doubles when '**Silver Dawn**' F₃ pollen is used on it.

Quads for ease of seed germination.

Roy's double flower tet and. my '**Archangel**' x '**Nancy**' with jap or anemone flowers along with my double of yellow best are tools of the latest sort — with great seed potential.

My pink and peach-pink singles and semi-doubles on tall, stout plants offer hopes of seedlings of desired design, eliminating expensive clone propagation (sell 'em as a strain).

'**Dad**' set a good crop of seeds and 20-25 of them are developing roots.

Silvia Saunders' '**Halcyon**' F₂ produced 26 seeds which are starting to root.

Roy's "Husky" gave seeds, a small handful, many of which are rooting. Such big hypocotyls (roots) on these seeds!!

Many of Roy Pehrson's Itos are staying at my garden place. Really though, they aren't Itos since their parentage is lacti x suffruticosa, not lutea hybrid pollen.

Roy P. has given to me (this year): His tetraploid with giant, single, white flowers. In two or three years it should be back to normal and give flowers that he described as opulent!

Also his tetraploid with double flowers will cause excitement.

'**Junior Miss**' came this year from Roy P. and should be introduced though he says the flowers were too large this year to be thought of as "Junior Miss". How about "Miss Big"?

His "Red Pod" is good — single flowers of dark red color.

"Blistered" foliage — a hybrid that is slow growing and has not yet bloomed as a five year old seedling. Wouldn't it be grand if it produced blistered flowers to go with the blistered leaves! Prof. Saunders wrote that he had a plant like that though he failed to report on its flowers.

Quad F₃ oddity produces a host of very small buds. Only one leaf per stem below which is a bud. Looks like a thicket of small leaves. Proliferation of buds will probably prevent its ever blooming since there are no stalks. Maybe 200 to 400 buds per square foot. Crazy!

There's something fishy about Roy's "True Salmon" plant! The flowers were pink instead of salmon this year. Too Bad!

I think that tetraploid hybrid clones which are very desirable can produce offspring that are larger, more robust and more prolific as F₂ 's than the parent.

Probably '**Halcyon**' F₃ (when produced) will be superior to '**Halcyon**' F₂ which is superior to '**Halcyon**' F₁. This year '**Dad**', Husky, '**Nosegay**' F₂ and '**Archangel**' x '**Nancy**' set a good crop of seeds. From these seeds I expect to get an even more vigorous, superior generation of plants. Maybe what I'm expecting is only "hybrid vigor" but I believe there is more to it than that!

It may be a few years in the future that the most advanced hybrid plants can be made available to the hybridizer, but right, now you can get seeds that will produce some plants for you that will be equal to the ones with which I'm working. The more people working on a project, the faster the progress.

- Chris Laning

Letter from: Mrs. Ernest Hardison
1950 Chickering Road
Nashvilles Tennessee 37215

Dear Mr. Laning,

November 1, 1978

Many many thanks for the seeds and root of '**Archangel**'. They are planted according to your instructions. I just pray this will do the trick and I have six seedlings by June 4, 1979. Did you say that if all else fails, you'll have some seedlings? (Yes - Chris)

You were more than gracious and extremely prompt in responding to my plea for help. Now I have another question. Where can I obtain a picture of '**Archangel**'? A catalogue picture would be alright or a slide I could have a print made from. This is needed to send to the Garden Club project so they can make a chart this winter.

Next spring I plan to take a picture to actually exhibit with the six seedlings and the herbarium sheet.

I've just thought of another question — are the seeds of '**Archangel**' you sent me open or self pollinated?

Thank you again for your help and interest. I enjoyed reading PAEONIA though it is over my head.

Sincerely,

Louise Fort Hardison

ED: Paeonians, where can this lady get a picture or slide of '**Archangel**'? Help her out!

Mrs. Hardison — Seeds sent to you are from '**Archangel**' and are open pollinated, but very little stray pollen is around at the time '**Archangel**' blooms. Contamination is possible, but not probable.