

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.  
Our leader and teacher in hybridizing is  
Roy Pehrson.
- Editors are Chris and Lois Laning,  
553 West F Avenue, Kalamazoo,  
Michigan, 49007.

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ON PAEONIA CALIFORNICA

Chris Laning

Early in January of this year, Lois and I vacationed in California. Cold, rain, fog, sunshine, and green landscape entertained us the whole two weeks.

Part of our time was spent in hunting for *P. californica*, the wild American peony. Unless a person knows where to look, finding it must be sheer luck — we didn't have luck! This isn't a sad tale, however, since the enjoyable outing was supported by the knowledge that if all else failed, Mr. Dara Emery, horticulturist at Santa Barbara Botanic Garden could help us out.

Very few people in California know about *P. californica* and buying a plant of it at garden centers is not possible. But here is the report of California's wild peony: grows as tall as 34 inches, is weak stemmed (unless supported it falls over and continues to grow from fallen position), shade loving, light green feathery-leaved plant. Growth commences with the first rains of fall and continues until June. At Santa Barbara Gardens on January 15 we saw plants in bloom. Flowers are pretty and of heavy substance and about as large as a silver dollar — well, maybe a half-dollar, purple and brown on the outside, chocolate brown and red on the inside with yellow petal edges. Petals are cupped, stamens are short and stout, making a beautiful yellow center; also an abundance of pollen. Carpels are a hybridizer's delight. These colors could be a welcome addition to the ones we now have. One plant had four buds on one stem! The early blooming could possibly help in producing ever-blooming, or at least, re-blooming peonies.

Dara gave us excellent directions for finding wild peonies higher on the mountains. We managed to locate a few plants growing beneath the chaparral beside the road — at about 3000 feet elevation. These were not so advanced as the ones at Santa Barbara though the biggest clump had buds just beginning to show. Also, I noticed that last year's stalks had been taller than two feet, tipped with large heavy seed pods. Naturally these old stalks were flat on the ground and moldy. Pods were still filled with seeds which we collected and brought back with us. While inspecting the remains of old plants and pods, we discovered two plantlets (seedlings) growing where a seed pod had fallen to the ground and had been covered with leaves. No, I didn't dig them up. They're still there (I hope).

Dara, if at all possible, I'd like to have pollen again this year, and seeds too! From last year's pollen I believe I have hybrids and from the seeds have two plants. These are in their second year now and are still very small. Oh sure, they're indoors — growing in the basement under fluorescent lights, getting what little sunlight the basement window affords.

LETTER TO CHRIS LANING - from DONALD R. SMITH

Dear Chris,

December 14, 1973

The last copy of Paeonia which I received was the June, 1973 issue (Volume 4, No. 2). I assume that there were issues in September and December, but I have not received them. Since I moved in August the problem is probably at my end. I thought I was receiving all my mail but I guess not. I hope I can still get the September issue. In fact I would be interested in obtaining other back issues (Volume 1, No. 1 -Volume 2, No. 4) if these are available, I would be happy to pay the cost for these back issues whatever it might be. They would make the best Christmas present I can think of.

I do not believe my dues are overdue but I will send next year's dues now just in case. Before I forget, my new address is Oak Hill Road, Pepperell, Mass., 01463. (Old address was Chelmsford, Mass. Just in case you have more than one Smith.)

While I am writing I might as well ask a few questions which have been bothering me for some time, perhaps others have also been bothered by it. Roy says that all true Ito hybrids are triploids and that this makes the hybrid plants about 2/3 tree peony and 1/3 lactiflora. The next is the part I find difficult to accept and understand. He says "there are never any plants of intermediate appearance." In his article in the APS Bulletin (No. 191). Father Fiala reports seedlings with both herbaceous and tree peony foliage. In a recent article by Louis Smirnow in the American Horticulturist (Vol. 52, No. 2, Summer 1973) it is reported about the original Ito crosses that "nine of the seedlings were almost tree peony-like in appearance and the others, more resembled a herbaceous sort."

Father Fiala also stated that the cross was a relatively easy one ("from some 200 crosses over 150 plants were obtained"). My experience is much like Father Fiala's. I have 41 seedlings from 59 crosses over two years, almost all of intermediate appearance. Only a few look as tree peony-like as the "original 4" from Smirnow, but few look like pure lacti either. One second year plant has both tree peony-like and herbaceous-like leaves on the same plant. How can we explain all this? I have no idea, but surely there must be some explanation.

I am sending along a leaf from one of my two year old Ito-type seedlings. I have ten (10) seedlings from a single cross of '**Primevère**' x '**Alice Harding**', I believe all to be true hybrids. The leaf is from one of two plants which are very much larger than the other seedlings. (Maybe these are tetraploids, is this possible?) The foliage on these plants is quite variable, one stem has foliage resembling "pure lacti" while another stem on the same plant has foliage which is tree peony-like in appearance, similar to the leaf I sent. Still other foliage on this same plant appears similar to the foliage on my plant of '**Yellow Heaven**'. Surely these plants must be true hybrids. The other 8 plants have single stems with foliage of intermediate appearance.

If I am correct and all of these seedlings turn out to be true hybrids, how could we explain such a success as ten true Ito hybrids from a single cross. I have one theory which might explain all this.

'**Primevère**' must surely be the best seed-setter in all the peony world, but for such a huge success as this, one would still need to have extremely viable pollen. Bill Seidl's theory

of bud-mutations could explain these successes but I find his theory difficult to accept. I wonder how much thought has been given to the age of the pollen parents in these crosses. Many hybrids thought at first to be completely sterile will, as they grow older, set a few seeds. What part does the self-pollen play in the setting of these, seeds. Does the viability of hybrid pollen increase with the age of these plants; maybe so. It seems right that it should. If this is true it would pay to collect pollen from the oldest, best established plants we could find.

For the past three springs I have been traveling over thirty miles to the Arnold Arboretum in Boston to collect pollen from the lutea hybrids grown there. Many varieties of Japanese T.P. and Lutea hybrids are planted at the arboretum. All of these plants are very large and may have grown there undisturbed for twenty years or more. It would be most interesting to know if Father Fiala also has access to very old plants to account for his successes; if he does not then the whole theory is probably wrong.

Does all of this make any sense to you; if not, maybe someone else can put it all together and figure it out. How else can we explain such widely varying experiences. Thanks for making "Paeonia" the very fine publication that it is. You deserve a great deal of credit. Best wishes for a happy holiday season. - Donald R. Smith

P.S. Forgot to include this with my letter –

Ito Crosses:

Year of Cross	No. of crosses*	Seeds	Seedlings	"True hybrids"
1971	15	42	10	10
1972	44	227	31+	7 certain – probably more – maybe all
1973	32	94	?	?

\* crosses on "good-seeders" only

+ the final total may be somewhat higher; some seeds are just now germinating after 15 months, some others which germinated in 9-12 months are still in the refrigerator.

\* \* \* \* \*

REPLY TO DONALD SMITH'S LETTER - by CHRIS LANING.

Dear Don,

December 30, 1973

Your questions are appreciated but if you had answered them too— I'd be happy! If you are interested in, or will settle for, my opinion, I will give it to you. Roy Pehrson (with regards to the Ito cross) believes unreduced gametes are the reason for success with this cross, which means that in this case, the pollen grain has double the chromosome number of the regular ones. So – '**Alice Harding**' pollen unreduced, or double dose — and the lactiflora ova with regular chromosome count, gives offspring that is triploid. TWO PARTS '**ALICE HARDING**' T.P. AND ONE

PART LACTIFLORA EQUALS TRIPLOID — or, as you write, 2/3 tree peony and 1/3 lactiflora.

Now you say you find the next step in this logic difficult to accept; that is, "there are never any plants of intermediate appearance". Probably his conclusion is to be expected if the 2 to 1 ratio is a fact. Besides, the lutea seems dominant with regards to the phenotype (outward appearance) — surely the lutea x suffruticosa crosses bear this out.

Father Fiala's reasoning gives different results. The American Peony Society Bulletin, December 1968, (No. 191) has his findings recorded in "**Alice Harding**' and its Chromosomes" article. Chromosome breakage makes impossible crosses possible. Univalents (broken chromosomes or one armed chromosomes) have been found in '**Age of Gold**' also, and other lutea hybrids are suspected of having irregular chromosome counts. Naturally, this line of reasoning seems to offer a greater range of possible results.

We progress to your next thought; Father Fiala reports seedlings of both herbaceous and tree peony foliage. I have gone along with this thinking but have no proof that this is so. Maybe we will have to wait until the plants bloom — thereby affording proof. What Father Fiala terms Ito with herbaceous foliage, Roy Pehrson calls pure lactiflora (see "All Albiflora Out" in the December 1972 issue of PAEONIA). About 120 seedlings supposedly Ito cross but appearing to be pure lacti were given to me from Roy Pehrson. Of these, one plant bloomed in /72 — a pure lacti, of the Jap type. This year several others of this group bloomed and they too are "pure lactiflora" Japs and singles. They set seed!

We have no knowledge of a successful lacti x '**Alice Harding**' cross with lacti foliage. I know of no American who has seen such a plant although Mr. Smirnow writes of the original nine Itos that they are tree-like and others more like the herbaceous peonies. Who has seen these others"? Maybe these others are just regular lactiflora.

The problem as I see it breaks down to this:

1. Roy Pehrson's theory doesn't permit ten Ito hybrids from one seed pod.
2. Father Fiala is in an untenable position if, as Mr. Smirnow claims in his catalogue, lacti x suffruticosa plants actually exist or at least had existed in the past (or could suffruticosa also have univalents)?
3. It is too early in the game to hear the conclusion of the matter.

4. The distressing thing, as I see it, (with regards to the Ito cross) is the time lag between the first blooms and the time when the plant reaches maturity. We have no record of an F2 seedling from an Ito plant!! I would suppose that the original Ito plants are now old enough to afford at least the possibility of producing viable pollen. Also, they might occasionally produce a fertile seed. Seems to me that with Itos at an age of 25, some results may be expected. The next step in my reasoning follows naturally: any Ito hybrid we develop must pass from infancy through juvenile to the adult state which could mean a 25 or 30 year wait! Distressing! – wouldn't you say? Don, if you are so fortunate as to actually have a two year old tetraploid Ito, and if later it is found to set seed, — we will beat a path to your door!!!

Sincerely,

Chris Laning

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ps. – I have given a great deal of thought to the age of plants since Dr. Saunders stated in "The Peonies" that, given a fairly large number of plants and sufficient lapse of time, seeds will be produced (page 56). (editorial comment, 2011: Saunders was talking about probability. If you can expect 1 seed from a "sterile" hybrid every 10 years, if you grow 10 plants of it you might expect 1 seed from the ten every year, or if 100 plants, then 10 seeds per year. Age of plant had nothing to do in his reasoning.)

pps. – In "The Peonies" Professor Saunders reported 79 seeds in one 'Primevère' flower head (page 47).

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NOTE- FATHER FIALA, ROY PEHRSON, AND LOUIS SMIRNOW —

If I have given an incorrect view of this matter, please set me straight!  
I'll then publish it in the next issue (June) of PAEONIA, Please don't  
disparage this issue by your silence.

PAEONIA READERS —

Make a collection of opinions - lay them side by side - don't reject anything,  
just add it to your fount of knowledge.

NO TRUTH IS WITHOUT ERROR.  
NO ERROR IS COMPLETELY DEVOID OF TRUTH.

WRONG HELPS EXPLAIN (UNDERScores, EMPHASIZES) RIGHT.

THE FOLLOWING LETTER WAS RECEIVED from REV. JOSEPH A. SYROVY

Dear Chris and Lois:

January 2, 1974

Enclosed find my dues for 1974. I enjoy your PAEONIA and looking forward to new articles for 1974.

I am sending you a picture of Ito '**Yellow Heaven**' taken last spring. It had about six buds of real golden yellow, and opened lighter yellow and continued to bleach until it was almost white, with the red streaks predominating. I was rather disappointed with it as I expected it to hold its golden color which it showed in the bud. I hoped that the pollen was fertile and sent some to Roy Pehrson but he said he could not find any on the anthers that I sent him. The plant grew healthy and strong all the rest of the year and I expect it will send up some healthy stalks this coming year and some nice buds. I hope that as it gets older that it will give some fertile pollen. It comes up very early and we had some late frosts so I had to make a tent for it to protect it.

My '**Oriental Gold**' last year was more beautiful than it ever was. It also formed such beautiful golden buds and the blossoms were also larger and more full. It also started out as a deep yellow but also faded to white-yellow, I have tried for many years to get some seed but have never succeeded.

My "Itos" in the experience I have had with them are very "touchy" and need spraying like the Tree Peonies — and this last year was "tough" on all the Tree Peonies as we had a very wet season and I couldn't keep up the spraying. The Itos need more lactiflora blood in them. I have often wondered if '**Oriental Gold**' isn't an Ito in which lactiflora predominates. "It is an unusual plant. The eyes are bright yellow below ground and also as it comes up. The leaves have a peculiar color and form. The buds too are more golden than any other peony and the flower holds its yellow color longer than other yellows. However, it finally fades to almost white. However, I like it very much as it is very full and looks like a huge carnation. The stems are quite strong and the flower is not too heavy to bend over. Some years, however, the flowers are not too large and are only of medium size. Last year, 1973, they were at their best. The only one that I remember who got any seeds from it was Hollingsworth, but whether he sprouted any I do not know. The pollen may be fertile or the splitting of the petaloids as A. P. Spalding suggested might do the trick. Anyhow I think it might be worthwhile to work with it.

Wishing you both "A HAPPY AND SUCCESSFUL PEONY NEW YEAR!"

Sincerely,      Rev. Joseph A. Syrový  
                         Vining, Iowa.

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## MORE REFLECTIONS AND ACTION ON THE ITO-TYPE CROSS

Bill Seidl

I felt the need to advance my mutation theory (PAEONIA, June 1973) to explain the high success ratio in the "herbaceous x hybrid tree" peony cross by Mistert Ito and Pehrson. Since then, Roy Pehrson has reported (Hybridizers' Meeting, Milwaukee Annual Exhibition) that, in a conversation with him, Louis Smirnow reiterated that a thousand blooms had been pollinated in Ito's cross. This removes half the need for the mutation theory -- a low success ratio of 9 hybrids per 1200 pollinations would not require a super-good pollinator, whether it arose thru mutation or not. That still leaves a need to explain Roy's success — sixty-some true hybrids from 582 pollinations in 1969. (This was not an "initial" success as I wrote earlier; Roy did make unsuccessful previous attempts.)

In searching for an alternative explanation, older issues of PAEONIA and THE PEONY NEWSLETTER were reread and I now believe the best explanation is one that Roy himself suggested. In the NEWSLETTER of August, 1970 (Vol. 1, No. 2) he writes that the mixed pollens, used in 1969 were collected at the Mansfield Show from hybrid tree peonies brought by Gary Seaman; the flowers included not only named clones (presumably F<sup>1</sup>'s) but also F<sup>2</sup> hybrids and backcrosses (one of Saunders', the others of Gratwick's). And then; "This is mentioned as there is a rather good chance, I think, that these pollens would be more viable than those from the other named clones."

Over a year later (PAEONIA, Dec. '71, pg. 11), in discussing the making of Ito type hybrids, Roy clinches it: "F<sup>2</sup> lutea hybrids will be most effective of all if tetraploid. All pollen grains will have 10 chromosomes." And, as if to lend credibility to that statement, one reads in the same article that Saunders' F<sup>2</sup>A ranked as the most effective pollen parent in Roy's 1971 Ito type crosses.

There you have it! Use pollen of F<sup>1</sup> hybrids ('Alice Harding', 'Thunderbolt', 'Age of Gold', etc.) and expect a low success ratio, perhaps 1:100 (more about that later). But use F<sup>2</sup> and backcross hybrids and expect a HIGH success ratio of true hybrids per number of pollinations. Just how high requires further study of efforts made and to-be-made by those interested in this particular type

The 1:100 ratio is taken from Roy's article, PEONY NEWSLETTER, Jan. '71, pg. 1. In computing these ratios, the ratio might be misrepresented by the unknowing use of bad pollen (too old; killed by heat or dampness). Using such pollen, 1 seed (or genuine hybrid) per 100 pollinations might result. Had it been fresh, maybe 1 per 10 might have resulted. Quite a difference! And, if true, it would encourage more people to attempt the cross.

The size of the ratio would also depend on the hybridizing technique employed. Using a given amount of pollen, one breeder might stingily distribute it among many blooms; another might smother the stigmas of relatively fewer blooms. Assuming that in both cases the pollen is 5% effective (NEWSLETTER, Jan. '71, pg. 2, Roy writes: "Mr. Cooper has made pollen viability tests of several and apparently finds them to be about 5% viable."), the second person will report a much better success ratio. I tend to follow the latter procedure and believe I have three true

hybrids from about 30 pollinations of lacti x mixed pollen of 'Mystery', 'Chinese Dragon', and 'Thunderbolt', a success ratio of 1:10. (In my previous article, I erred in reporting no seed of my Ito-type crosses had been planted. Some were planted in pots the summer of '72 and wintered outside. Seven plants germinated and the three that appeared to be true hybrids were transplanted to the open ground. Each had two leaves and two of the three plants produced a third leaf in midsummer.) Most of the pollen came from Silvia Saunders who brought it to the Minneapolis Show in 1971. I mixed the seeds; the pollen was brought separately labeled.

Regarding the "lacti x F<sup>2</sup> lutea-hybrid tree" cross, few readers are likely to have made the cross. The problem is two-fold: (1) having the pollen available and (2) having it fresh. When Gratwick's offered number seedlings of F<sup>2</sup>s and backcrosses for sale several years ago, I was able to secure some in the quick sell-out. Although I've had blooms from them for two seasons now, the pollen was old before I used it on my later-blooming lactis. (I believe pollen of #324- on 'Age of Gold' may have been responsible for six firm seeds harvested this fall, including three from a single pod.) However, this past spring I did have fresh pollen available from another source. At the Milwaukee Show and banquet, David and Eleanor Heath invited members to tour the Reath Nursery the following Monday. And so I found myself among a small group of peony-lovers oohing and ahing our way up and down row upon row of acres of peonies in several fields nestled among the woods of Upper Michigan. I came away with a variety of pollens including some from two fertile F<sup>2</sup> lutea hybrids, thought to have tetraploid tendencies. For the next several days, this was applied to lactis coming into full bloom. Result: 650 seeds per 60 pollinations, a ratio of 11 to 1. 'Vesper' alone averaged 19 to 1 (300:16). I have to assume foreign pollen was the cause of such a high seed production since the pollen came from flowers opened in the field. Nevertheless, I am hopeful many will be true Ito-type hybrids. Most of the seed was planted outside in late October and mulched heavily with gladiolus stalks.

DR. TOD'S MLOKO-DELAVAYI HYBRID — Seed from the above hybrid was germinated out of season and I now have five plants growing on a window sill. They broke their cold-period dormancy while refrigerated and were transplanted to pots in early November. Thus the seasons are completely reversed for them; the poor devils have spindly five-inch leaf stems. They all have tree peony foliage. A couple had the first leaf accidentally broken off but a second leaf has replaced it. One sprouted with two leaves; another was a twin. A couple look ready to produce a second leaf.

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QUESTION AND ANSWER CORNER —

Question: Are the Daphnis Back Crosses any different than the best Lutea F<sup>1</sup>s? I've written Mr. Pehrson the same thing in an effort to find out if they are as vigorous, large-leafed and fast-growing as mentioned. - Jackie Janson

Answer: The six advanced lutea hybrids, the F<sup>2</sup>s, back crosses, etcetera, have for me produced no seed. The pollen has been used but results are as yet unknown. Plants aren't yet fully established so full evaluation cannot be made. They do seem more robust. - Chris

P.S. Let's have comments from readers who have some of these hybrids. How do you evaluate them?



## EXPERIMENT PROJECT

Roy Pehrson

How did I manage to convert a plant of the lactiflora variety '**Petite Rene**' into a possible tetraploid?

The whole effort was so unorganized and lacking in any sort of scientific method that my account may be of very little help to anyone else who might want to try to repeat it.

I first tried the method described very briefly by Harold Wolfe in a single paragraph on page 117 of THE PEONIES, and with which he had been successful. Alpha-naphthalene-acetamide is not soluble in water so it cannot be transported in a plant's tissues in aqueous solution. Mr. Wolfe's method is based on the fact that at temperatures above 90 degrees the material will vaporize. These vapors are then absorbed by the foliage. It is then dispersed throughout the plant, presumably still in the gaseous form.

This method is somewhat awkward of application. I had trouble with condensation and with "cooking" of the foliage within the bags. I treated about a dozen plants during each of two successive summers without results. There was a little stunting of a few plants the season after treatment, but no permanent change of any kind.

I was probably gullible in adopting another suggestion, that of injecting these hormones into the stem of the plant. Some Acenapthene was obtained to try, in addition to the naphthalene-acetamide I already had on hand. I wasted another growing season on this effort and there is no reason to go into the details. There were no effects at all.

All this time an exchange of ideas had been going on through personal correspondence and the Peony Robin which was still alive at that time. Fred Cooper of Canada hinted at a possible course of action by describing the properties of dimethyl sulfoxide, a very powerful solvent. He said that this material, placed on a plant's foliage, would be quickly absorbed, carrying with it any material dissolved in it. It would be quickly carried to all parts of the plant. It was then that I remembered reading about the stuff in the medical column of TIME magazine. Medical researchers were studying its use, both as a drug in itself and as a carrier for other recognized drugs. It seems they were using it on human subjects in just the same way as Mr. Cooper described for plants. A small amount placed in the palm of the hand would be absorbed through the skin and quickly disseminated throughout the body.

I grabbed at the suggestion and obtained a supply of the commercial grade material. It proved its reputation as a powerful solvent alright, as even the talc I had used to dilute the naphthalene-acetamide was also dissolved. I bought a small (capacity about 1 cup) hand sprayer and proceeded to spray some peonies. Some were sprayed once during the summer, others twice, and still others three times. Applications were varied from light to quite heavy. I used the acenapthene on just a few. On a few plants there was just a little evidence of "burning" of the foliage as the summer wore on.

It was only the following spring that I was able to appreciate what had been happening to these plants. Some formerly large clumps had been entirely destroyed. Digging one of these I found the roots and crown completely rotted leaving only a few bright, plump buds unattached to anything which could support growth. Other clumps were much reduced and the stems which did come were reduced in vigor. There was nothing anywhere to suggest a change in ploidy level.

It was not until yet another spring that I saw a little hopeful hint. Two of the plants I had believed dead made tiny sprouts! One of these was '**Tamate Boku**' which had been a modest sized clump when it was sprayed. There was a tiny sprout where there had been nothing the year before. What had once been a large clump of '**Petite Rene**' showed two tiny sprouts. It was the one of these two which looked interesting and raised my hopes a little. None of these three sprouts are any bigger than a second-year seedling, but that one sprout was very much darker in color than the other two. I also thought that it felt thicker.

Now, two years later still, both plants have come into bloom again. '**Tamate Boku**' was entirely normal. So was the plant and bloom on one of the sprouts of '**Petite Rene**'. The other sprout, now increased to two, has continued to exhibit ample evidence of change. The foliage is darker than normal and the leaves still seem thicker. The flowers seem more intensely pink. Compared with the other first-blooming stem, the stems were heavier and just a bit taller.

Now it is only the two blooms which continue to trouble my mind. One of these was reasonably normal in configuration, but I thought that it opened very slowly. I put lobata pollen on it but got only 4-5 seeds. The other bloom was very abnormal. It was very elongated (in a sidewise direction), almost as if from a "Siamese twin" sort of bud. I might have thought it "crystate" except that the stem was not flattened. Some of the petalage - '**Petite Rene**' is an anemone - was stunted and browned. No seeds were formed. It is this gross abnormality that makes me fear that it is not a complete tet., but only a sectoral chimera. If this is so, tetraploid hybrids could probably not be had from it.

About all I can conclude from this experience is that dimethyl sulfoxide is indeed a very effective carrier to use for translocating dissolved materials within a plant. A lot of experimentation will be needed to determine optimum controlled dosages of whatever growth modifying substance one might wish to employ. Someone with an experimental bent may like to take on the job. He would need access to quite a few plants which could be wasted.

Is there any need for me to caution that solutions ought not be gotten on the skin? Surely there is a possibility that some of these synthetic hormones might be harmful - even carcinogenic.

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SEED OFFER from ROY PEHRSON:

Come spring there will be a modest supply of sprouted seeds available to those who write me to ask for them.

1. A small supply of lactiflora x lobata and a few lactiflora x '**Scarlet Tanager**'. These are from unprotected crosses. The lacti-lobatas should be nearly 100% true. The others probably less so. I'm not sure of this as I have not made the cross previously.
2. Some seeds from tetraploid hybrids, mostly open pollinated. These should provide some very fertile breeder plants for those who don't have all they want of these types. I have a fair number of these.
3. Some suffruticosas from seed purchased at the root auction last summer. These seeds had been donated by Mr. Domoto of California. There may be several hundred. Let me know about how many of these you might want to provide space for.

I won't promise that every applicant will receive some seeds. There are not that many to begin with.

- Roy Pehrson, Lafayette, Minnesota 56054

## FERTILIZER TO HELP GROW PEONIES

Don Hollingsworth

The peony has a large appetite. It must have high fertility and hospitable soil conditions to perform well. The best of growing conditions are required in order:

1. to bring new plantings into early flower production,
2. to grow seedlings to flowering size in a minimum of seasons, and,
3. to produce exhibition quality flowers.

Without reaching these achievements in a reasonable time, recently attracted enthusiasts may shortly turn to other pursuits in their quest for rewarding experience.

For twelve years I have aimed to grow specimen quality peonies, but I started with mostly subsoil that was left after the developer rearranged the local landscape when laying out residential building lots. Based upon this experience, I have come to realize that the practices of modern residential development may be one of the biggest obstacles the American Peony Society works against in trying to expand interest in the peony.

We have seen the membership of the American Peony Society decline in numbers during a time in which the popularity of suburban living and gardening activity have grown by leaps and bounds. During the same period hemerocallis and irises, both generally adaptable to poorer soils, have become immensely more popular. If we want to enlarge the market for peonies, it will be very useful to develop means to disseminate more adequate information on the requirements for overcoming problems of new residential gardens. This information will also be useful for trouble-shooting problems found in other situations as well.

The standard publications of the American Peony Society, The Peonies and Handbook of the Peony, are excellent in many respects, but not much sensitive to the needs of inexperienced persons who do not already have suitable soils. I believe information for the benefit of such circumstances should be developed by the Society as a supplement to the other publications.

Perhaps the biggest problem I find with our standard literature is the de-emphasis of commercial fertilizers. On the other hand, reports from APS members suggest that at least some of them make extensive use of such materials. I recently decided, for several reasons, to experiment with high fertilizer applications during the coming season. In looking around for guidelines, I came up with the following which seem worth considering in the planning of specific treatments:

1. Dr. John P. Baumgardt, who answers garden questions in several publications, recently recommended to an inquirer who had some mature peonies the application of one-half cup of 5-10-5 analysis fertilizer in very early spring in a circle away from the crowns, followed by another half cup about flowering time. APS President Klehm recommended similar treatments at the Minneapolis APS meeting in 1972. If you allow for a 4-foot spacing and fertilizer weighs a pound to a pint, that figures to about 1700 pounds per acre for the year.

2. In The Peonies (pg. 129) Rutgers University research on peony bud-blight is reported. It was found that low tissue-levels of potash was one factor associated with bud-blight. Another was nematodes, which are more damaging when fertility is low.
3. On soils in my area, tobacco farmers Use up to 3000 pounds of 10-10-10 per acre. This crop makes all of its growth in 10 weeks or less and every effort is made to assure that a shortage of nutrients during that period does not limit growth. Apparently these levels of application do not result in a toxicity problem, at least for the plant.
4. An APS member was reported in a Bulletin which I read a few months ago and have not relocated so cannot give the issue. The member had used a high-nitrogen, mixed fertilizer, 10-6-4, on some peonies and said that for the first time certain plants gave flower colors comparable to that of the same variety seen at an exhibition.
5. Recent University of Illinois research showed that shrubs fertilised with nitrogen in early spring not only showed a growth advantage in the current season, but put out extra growth the following spring, as well. It would seem this, has important implications for understanding the needs of peonies, which make growth only in early spring.
6. The University of Wisconsin bulletin on peonies which was recently mailed to all members with the APS Bulletin recommends: plant in rich soil, apply annually a handful of 5-10-5 or 10-10-10 in early spring, and, for bigger and better flowers, 2 or 3 applications beginning two weeks before flowering.
7. In a 1930 RHS Journal article on peony culture, the writer says, the first consideration is the soil; no fertilizer can give best results if the soil is lacking in humus; and exhibition flowers can be obtained only from plants that are strong, healthy and well established.
8. A local extension service publication, "Fertilizing Ornamental Plants", recommends for shrubs to use 5-10-5 or 10-10-10 fertilizer at 2 to 4 pounds per 100 square feet of bed area. The 4-pound rate would be more than over 1?00 pounds on an acre basis, which compares with item 1, above.
9. I have also consulted with the University extension horticulture agent assigned to my area and have had soil samples evaluated for basic requirements.
10. Also quoted in The Peonies is the writer of an early 19th Century Japanese manual who discussed approaches to overcoming native soil deficiencies, then stated that individuals must work things out for themselves.

We do have to "work things out for ourselves" and I will be guided in the current season by the references above! plus any others I find that are interesting. I would be pleased to hear of experiences of others in overcoming soil problems of various kinds.

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SANTA BARBARA BOTANIC GARDEN  
1212 Mission Canyon Road  
Santa Barbara, California 93105  
February 27, 1974

Mr. Chris Laning 553 West F Avenue Kalamazoo, Michigan 4-9007

Dear Chris:

For some time I have lamented the dearth of the new or scarce peonies, for example the "Ito" hybrids, and have wondered if there was some way production could be speeded up and the price lowered so that more people could enjoy such beautiful flowers.

One of the newest methods of propagation is meristem culture in which, starting with about a cubic millimetre of meristematic tissue and knowing the correct culture medium and procedure, that single piece of tissue can be proliferated into any quantity of plants desired, say 2,500 or even 100,000. Could this method of propagation be applied to peonies and, if so, would it be desirable and economically feasible?

At the University of California at Riverside, and working with the agriculture extension, is Dr. Toskio Murashige who is one of the foremost authorities on developing the meristem culture techniques for different plants. From what I understand, this procedure has been most successful with herbaceous as opposed to woody plants and is being used with an increasing number of different genera. Talking with one of our local growers who is also breeding gerberas and who has taken the extension course (in meristem culture offered periodically) by Dr. Murashige, he says if one is interested in this method of propagation for a type of plant to which the technique has not yet been applied, the procedure is to pay for the necessary research and development. This R & D is done by graduate students under the doctor's supervision and the cost runs \$1000 or so. Once Dr. Murashige has developed the technique, it is given to the Company who has paid for its development. It is then the Company's exclusive until the Doctor publishes the procedure three or four years later, if at all.

Gary Gallup of Gallup and Stribling Orchids Inc., a local firm, says that though their primary meristematic work is done with orchids, they apply the techniques commercially to other genera as well. I asked him if they could and would be interested in propagating any species if the person or company desiring the plants would supply the technique particulars. He is interested in research as well as the dollar and said their company would be interested in such a project and, of course, the business. Regarding costs, Mr. Gallup said that the start up is the most expensive part of the operation i.e. production of the first couple of hundred plants. When asked for a figure on 250 of a particular clone, he said they might run as much as \$1.00 each; however, if produced in large quantities the price may drop to 10 or 15 cents each. It would all depend upon the quantities desired.

Having no idea about the quantities sold or needed of a particular peony hybrid, I do not know if having the plantlets produced by an outside firm such as Mr. Gallup's would be economically feasible; however, if not, there is not reason why a company such as Brand Peonies, Klehm

Nursery, or Gilbert H. Wilds and Sons, or you or I, Chris, could not take Dr. Murashige's course and then go back and set up our own production unit. After seeing Mr. Gallup's set-up and talking with him about the necessary equipment for such an undertaking, it is obvious that the cost and space would be very nominal, within the price range of even a small company or an individual hobbyist. Even with meristem culture, from flask to flowers would be what, four or five years? However, starting with a single plant -- new hybrid, once it has been decided the plant is good and worth introducing, how many years away is the introduction with current production methods and then what quantities are available?

When you stopped by a couple of months ago, Chris, you commented that from that from time of naming and first showing of a choice new hybrid with three, four year old divisions at that time it takes about 10 years to increase the numbers to several hundred sufficient for introduction purposes.

If the meristem method were to be applied, the time lag from first showing to large scale introduction could be cut in half i.e. 4 or 5 years depending upon the growth rate of the particular clone. Not being familiar with peony introduction and production this might not be desirable but it would seem worth consideration. If this method were used, 1 or 2 of the original divisions could be brought along by the usual method, selling along the way to whet the appetite of the few who want a plant first at a high price.

Any comments?

Best regards, Dara E. Emery, Horticulturist

P.S. Thanks for stopping by, Chris. It was nice to meet you and have someone to talk peonies with for a few minutes.

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EDITOR'S COMMENTS:

1. Meristem culture seems too good to be true I
2. This process could signal the end of garden nurseries as we know them today.
3. Could this method of propagation also offer a new tool that the hybridizer could use — actually hybridize by this process?
4. Here is a good place to start when trying to interest our Upjohn research experts. (I am thinking just now of Dr. James Parker, a pharmacist). These highly trained minds can pick up at a point where we hybridizers flounder.
5. I am thinking that quantity production may not be our great problem. High cost of distribution (marketing) is and will always be with us.
6. Sign me up for the extension course!

- Chris

DEFINITION OF "MERISTEM" - A formative plant tissue usually made up of small cells capable of dividing indefinitely and giving rise to similar cells or to cells that differentiate to produce the definitive tissues and organs.