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SCHULTZ - INSTANT FERTILIZER - 20-30-20

Some time ago I received a carton containing twelve one- pound jars of Schultz's Instant Fertilizer. After carefully reading the label, I decided this may be a big help in stimulating my peony seedlings without burning them. After this year's growth of these seedlings stimulated with Schultz's, I'll report the results. It might be a good idea that all you PAEONIA readers also try it.

Ten or eleven of these jars will be taken to the National Show at Champaign, Illinois, for display and/or prizes. Anyway, be sure to come to the Show in June!

JOHN SIMKINS' PEONY SEEDS

This Canadian fellow, John Simkins, sent a box of peony seeds for distribution. These came too late for fall planting so now is the time to include the list in this issue. There are two groups — the first is the P. suffruticosa. These seeds are labeled with the pod parent's name and a reference number, each done in a separate plastic baggie. The second group is the herbaceous hybrids, mostly from the Cousins' seedlings and maybe named varieties.

Because Simkins has spent a lot of effort in listing and packaging these seeds, the recipients should keep records, otherwise his efforts are in vain (love's labor lost).

Some Notes on Growing *P. californica* in Richmond, Virginia

L.J. Dewey, February 1985

In May of 1983 I received four *P. californica* seedlings from the Las Palitas Nursery of Santa Margarita, California. The plants were in small plastic containers. The potting mix was like small gravel and may have contained perlite but there appeared to be very little soil or organic matter in the medium. The plants had medium green, dissected leaves which were more rounded at the ends of the segments than those *P. lutea* for example.

Bert Wilson, owner of the Las Palitas Nursery, was kind enough to send me a note on the culture of the plants and I am quoting him here:

"These plants grow in full sun, in sandy loam (decomposed granite) with very little or no organic matter.

Your biggest problem will be root rot in the summer rains. If in containers you might use sandy loam and keep summer rains off the container (you will need to water them occasionally to keep the soil from going bone dry during summer months).

"These plants will go dormant in about one month - that would have been late June or July. Winter conditions here are not much different from your area (these grow in snow)."

From these sparse notes and from the suggestions of Betty Halas (*Paeonia* 14, #1, p6-7, March 1983), I had to concoct a potting mix for these plants, since I planned to grow them in containers. I finally settled on the following recipe:

3 parts coarse sand

3 parts perlite

1 part garden loam

These ingredients were thoroughly mixed and the seedlings were potted in larger plastic containers using this mixture. We had just added a glassed in porch (euphemistically called a Florida room in these parts) to the back of the house and I found a spot on it with a southern exposure for the potted *P. californica* seedlings where they will remain year round. (I did not want to trust them out in our summer rains or in our winters when the temperature can dip below zero (F) on occasion.) During the plants' growing season, I occasionally water with a complete nutrient solution which I prepare at the lab.

So how have the plants responded to this tender loving care? As predicted, the first year (1983) they had all died down by the end of July and I drastically reduced their water supply. By the second week in October (a rather brief dormant period, I thought) the plants started sending up new leaves. The plants remained green through the winter and the following spring (1984) and began to go dormant again in July. They showed considerable variation in this respect with some plants retaining a few green leaves into August. By September and October 1984 the plants had started to put out new growth from the soil line. One exceptional plant had a viable terminal bud on last year's stem and this bud produced a new terminal shoot on the old stem in October. This plant also sent up a new shoot from the soil line (see more detail on this plant in the next paragraph). During the growing season these plants continue to produce new leaves from the terminal buds on occasion. I have also observed this habit here with *P. lutea* (particularly *Ludlowii*). To sum things up, the plants grow under my unnatural conditions but I would not say they are thriving vigorously. Only time will tell whether I can get the plants to bloom, which is my ultimate objective, under these artificial conditions.

Chris, I remember being in your garden a few years back and, as we inspected your specimen of *P. californica*, we pondered the faint resemblance of the plant structure and habit to that of some of the tree peonies (the dissected foliage and the tendency to form axial and terminal leaf

buds). I was reminded of that occasion this past fall when the exceptional *P. californica* seedling described above broke dormancy in October and began to send out new leaves. The plant in question had two short stems one of which had died back to the soil line and was removed. The previous season's leaves had died back on the second stem and were removed but the stem itself was left on the plant because it had a viable terminal bud which eventually began to expand and produce leaves. In addition the plant also sent up a new shoot from the roots. The question arises, do stems and terminal buds on these plants survive from one season to the next and send out new growth in nature or did this occur in this case because of the very sheltered conditions under which this plant was growing? In any case this experience indicates that this species has the potentiality of developing leaf buds on the stems which can eventually give rise to new' shoots.

One is tempted to speculate on the possible distant relation of this species to the tree peonies. I do not know if anyone has put forth a hypothesis about the origin of the two native American species on the West Coast. Did they actually originate and evolve on the West Coast or were their ancient ancestors carried over some land bridge from Asia? Whatever the evolutionary history of the California peonies or their family relationship to the species of Europe and Asia, I think there are a number of us today who are quite interested in trying to produce hybrids from crosses between these native species and the other *Paeonia* species both tree and herbaceous. It would be fascinating to be able to observe the characters which might be expressed in these new hybrids. It is to this end that I am attempting to grow *P. californica* and to get it to flower here in Richmond. Now if we could only find a source of *P. brownii* plants, or seeds, I would try to grow that species here also.

* * * * *

A number of years ago, Roy Pehrson came up with the thought that *P. californica* likely was more akin to *P. delavayi* than to the herbaceous peonies. He suggested crossing *P. californica* with *P. delavayi* might be more productive than almost any other species. This may be in line with your thinking, L.J.

It seems there is a continual evolving of plants and animals. *Lactiflora* seems to be more advanced than *P. delavayi* and *P. californica*, it having lost the ability to form buds in the leaf axils, but as Don Hollingsworth suspected, the buds are still there though they are dormant. This means that *lactifloras* have no branching ability. However, as an experiment, if all the leaves and terminal tip are removed — leaving only the bare stem — you will find side shoots will develop from these dormant buds!! Try it, when in spring the *lactifloras* have developed shoots about a foot high, remove the leaves and note what happens. From the two or three bottom leaf axils shoots develop — and as long as you have gone this far with the experiment, try, rooting them, I plan to try it this spring, I want to know too if hybrids and T.P.'s have this ability!

- Chris

THE PEONY CALIFORNICA

(From PEONY NEWSLETTER - edited by Don and Lois Kozak, Vol. 2, #1, Jan. 1971)

Question: by Chris Laning Answer: by Roy Pehrson

Chris Laning is baffled by the behavior of his plant of *P. californica*. Here is his account; "The californica plant is a strange one! It came up in February, grew many stems to the height of about four inches and then did nothing more. It can take the cold weather but does not prosper. In July the tops disappeared. To thoroughly confuse me, it started growing again in the latter part of September. Do you think I should dig it up and grow it indoors? Also, along with the root, Miss Saunders sent nine seeds of californica. These were planted in a pot and three came up. Exactly the same thing happened to them! They died down in July and are now growing again indoors. Do you suppose they are winter bloomers in the land from where they came, California?"

This mid-summer dormancy and autumn regrowth sounds something like the habit of the Oriental poppy and the Madonna Lily. Do you suppose this plant is so specialized in adaptation to a Mediterranean type of climate that it just can be grown successfully east of the coastal range?

P. CALIFORNICA

(Article by Father Fiala, pages 5 and 6, Vol. 2 #1, Jan. 1971 issue of the PEONY NEWSLETTER, edited by Don and Lois Kozak)

Received some roots from Miss Silvia Saunders and some seed, about 3 years ago. Very early, pale bluish-green very incised leaves - very low plant not more than 4 to 6 inches. No bloom - leaves remain green in April, May and begin to dry up in June - are completely gone by July and plant disappears. Seems to be a very weak and delicate grower for me. If the fall is warm and moist it reappears again and grows until frost. Seedlings have same constitution and I do not believe they will long survive.

In 1942 to 1949 Brown made a study of the various colonies of *p. californica* in its native habitat in the mountains of California and found at least 10 to 15 separate "colonies" of the species. When the chromosomes of these various colonies were counted they were found to have varying chromosome counts for the separate colonies all the way from 5 (diploid count) to 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. This extensive study is most interesting as it shows that the chromosome count differed and increased as the colonies of *P. californica* spread from the supposedly original diploid center of origin. It is genetically most interesting as it shows irregularities in chromosome counts by chromosome fractures in the centromere, with both losses and additions of individual chromosomes. (This same thing genetically is evidenced in *Lutea* hybrid 'Alice Harding')

and other similar hybrids. See the article in the Peony Bulletin on Lutea Hybrid 'Alice Harding' - 1969. It is interesting that the conclusions in this article scientifically correspond to the extensive work of Brown and his conclusions. That we should expect many other irregularities of chromosome counts in other hybrids and even in isolated species should be the expected norm and not the exception. (Brown's work is highly technical but most interesting to the scientific geneticist).

The chromosome count of *P. californica* that was sent out by Miss Saunders to my knowledge has not been counted and could be any one of the many variants. It may well be that *P. californica* with different counts has somewhat different habits of growth and accommodation to slightly differing climatic conditions.

It would be most interesting if several forms of the species from various parts of the State of California and the West Coast could be collected before it becomes extinct, as it is most certainly on its way to extinction without ever being properly tried and hybridized. Some concerted effort should be made to obtain many of these plants to be tried in several climates. The leaf habit and fleeting nature of *P. californica* is interesting but unless it can be made to bloom and worked with, it will be a total loss very soon.

LARGE POTS FOR HUSKY SEEDLINGS

Indoor germinating of peony seeds is a good method for constant evaluation of the rooting process. Twins (two plants from one seed) and triplets can easily be spotted and given special attention. They need the extra care since they usually lack the vigor found in their sister seedlings.

The size of the pot used in this winter germination does have a decided effect on the success (and survival) of the resulting seedlings. I have found that in small pots (less than four inches in diameter), many die before the transplanting stage. Please use six inch pots or larger for good results! — 20 germinating seeds in a 6 inch pot is better than one in a two inch pot.

- Chris

SEED PRODUCTION

Don Hollingsworth

Seed production was interesting in some unusual respects this year. For one, I had several seeds on '**Carina**' and on '**Ludovica**', two which have so far resisted my efforts to get seeds for 10 years or more. Why is this? Ludo was pollinated but I didn't bother to mark the pollinated stems because I didn't expect results anyway, so now I can't tell whether it was my chosen pollen or something the bees were carrying around. If it was pollen compatibility, then self seems the least probable because it has had self pollen all the time, without results, for years on end. Or was it due to better germ cell formation in our unusually long cold spring? There has been speculation that the latter can do it, dating at least to the early 1930's when Stebbins and a man in England, S. O. S. Dark, were studying meiosis in peonies and found that in certain hybrids the findings were different between the pollen mother cells developed in England and those on plants in the Saunders collection in cold upstate New York. Some of the varieties were the same, others were hybrids of the same species, and plants of the same species, so the contrast was attention-getting.

My '**Carina**' seeds were produced on some plants grown from scraps put out several years ago and there is little question the pollinations were entirely natural — chances are, I didn't even look at the flowers, let alone pollinate them in this frantic season!

Other than such aberrations as above, seed production was diminished in both quantity and quality in 1984. All seeds are started for indoor germination, although due to other competing demands most of them were not harvested until quite dry and/or they got dry while others were being accumulated before the various starting dates. This means a later development of rooting.

I planted out about 1300 seedlings from indoor germination last year of about 3000 seeds started of all kinds, including early tets, lactiflora and some suffruticosa, as well as the F1 hybrid crosses. This is probably the best results I have ever obtained.

In contrast, the year before (1982) when I also had a large seed production, I gave up being able to carry out the winter work on indoor germination and tried putting the seeds out in later autumn, in beds which I insulated well over winter to reduce freezing. The results were disastrous. Only a few of the earliest planted made plants (these were handled such that I expected a fair germination, or better); there were a half dozen or so plants first year from another frame planted mid-fall, and, none in a third bed planted very late. If there were any germinations in the second spring (1984) I couldn't tell the difference between them and those of older seedlings which were smallish. Was the failure of second spring germination due to winter failure of seeds or to overlooking watering on them during the extremely hot and dry summer of 1983? I can report that it is

easy to overlook watering in a place where there is nothing growing, and this may be precisely the reason these seeds failed in such overwhelming proportions.

Now that I feel comfortable with the quality of my results with indoor germination (using moist vermiculite in sandwich plastic bags and the refrigerator for giving the necessary cold period to reduce bud dormancy in the rooted seedlings), I hesitate to subject my seeds to the risks of outdoor planting. However, any system that works is good enough, operators choice!

FACTS ON POLLINATION

Chris Laning

We understand that Saunders' 'Moonrise' is a second generation (or F2) lactiflora x lobata seedling. The pollen when applied to a lactiflora (this is a backcross) produces mostly hollow seeds and some soft seeds but very few good ones. Many reports have come in that indicate that Laning's Best Yellow behaves in the same manner. Also, I will say, many of our advanced tetraploid clones perform in much the same way. Please do not conclude that the pollen is faulty, since it performs in a good to excellent manner when applied to tetraploid kinds.

"Principles of Plant Breeding" by R. W. Allard has a paragraph on page 426 that sheds light on this subject, though other plants are used as examples:

"Differences between reciprocal crosses are often observed when the species that are hybridized do not have the same number of chromosomes. Greater success usually attends hybridizations in which the species with the larger number of chromosomes is the seed parent. In the cross of hexaploid x tetraploid wheats, the combination [4x](♀) x [6x](♂) often produces badly shriveled seeds which fail to germinate. The seeds from the combination [6x](♀) x [4x](♂) are reduced in size but nearly normal in germination. Thompson (1930) attributed the difference to the chromosome balance of the endosperm. The endosperm in the combination [6x](♀) x [4x](♂) has 21 + 21 + 14 chromosomes, or 88 per cent of the chromosome complement of the hexaploid endosperm. In the reciprocal cross, the endosperm has 14 + 14 + 21 chromosomes, or only 78 per cent of the hexaploid complement. The abnormal endosperm may be due in part to quantitative relationships between the chromosome numbers of the endosperm and embryo, but it seems likely that unbalance of gene dosage may be responsible for some or perhaps even all the difficulty in some crosses. If the growth of the embryo is inhibited by the endosperm, the hybrid can sometimes be obtained by dissecting out the young embryo and growing it in nutrient culture. Success was obtained in this way by Brink, Cooper, and Ausherman (1944) in the hybrid between *Secal cereal* and *Hordeum jubatum*. It has also been used with success by Blake in making peach hybrids, by Laibach in flax, and by various investigators working with nonagricultural species."

SOME SPECIES

Identifying a particular species is a profound study in research! Differentiating between species, sub-species and varieties leaves a great area for opinion and supposition. So involved and complicated is this area that Professor Saunders went to such great extent as to record the source of seeds, their location and the contributor's name (also using this same care with roots he received).

Professor Saunders felt so strongly on this matter since, said he, variations within a species give entirely different results in the hybrids that are produced when using them in various crosses.

The following notes from the Saunders Notebook afford valuable information since I have received species seeds from Mr. Kees Sahin of Holland (Netherlands).

1. *P. steveniana*
2. *P. anomala*
3. *P. Veitchii*

and from Hermann Krupke,? Sweden –

- P. peregrina*
 2. *P. officinalis* (Monte Baldo)
 3. *P. anomala intermedia*
- and open pollinated species seeds from Scotland, England, etc.
-

FROM A.P. SAUNDERS NOTEBOOK:

P. anomala - Leningrad, Altai, Schennikov
Rochester - (true)
Van Turbergen
Hesse
Peter Barr
Variety tipica
intermedia
insignis

14705 1939 Purple red single, leaves have an officinalis look but are dull above.

Albiflora x anomala 7082-7105 , 8051-2

- 7082 24 #463 x anomala Rochester in 9.2
7083 June 18, 1932. 2 pinkish blooms like albi-Woodwardi
7084 Polycarpy. 13 on one, 14 on other
7085
7086 This was crossed by albi in 1933 and gave 1 seed. 0 germination.

7087 This strain is very much all alike
7088 Single flowers, fairly large, very mauve
7089 pink. Not good color. Always a
7090 lot of polycarpy. A very unattractive
7091 race.
7092
7093 Apparently I have no F2 plants from
7094 this cross,
7095 and I can find no record of seeds though I
7096 am pretty sure I have had some.
7097 Yes, 1 seed 1939 in 21-3 row 5
7098 1 germination #16737 in 6.17 r 9
7099
7100 May 29, 1933 No anthers. Wildest polycarpy.
7101 June 11, 1934. Laterals have some pollen,
7102 enough , for chromosome slides.
7103 June 6, 1934. Pollen 5% good.
7104 May 29, 1933. Like 7100, no pollen. June 2, 1934 no pollen.
7105
8051 2 Silvia x anomala (Rochestar) in Frame 12. May 29 1933.
Double purple, No anthers. Perfectly good carpels in
8052 the center and in place of stamens a row of purple abor-
tive carpals. But the laterals are almost normal and
have a few anthers.

Reciprocal Anomala x albiflora Seedlings from 1937 21.5

15464 In 8.12 No bloom up to 1941.

15465 Stebbins wanted me to make this reciprocal cross to find whether the resulting hybrids showed polycarpy.

Earlier notes:

In 1927 #463 (albi single white) x anomala gave 86 small seeds from which I got 24 plants.

In 1928 Silvia x anomala gave 6 + 2 + 3 + 4 small seeds from which 2 plants. The small seeds produced were no doubt like those that result from albiflora x Woodwardi, Veitchi, Emodi.

P. VEITCHI

Letter of July 14, 1933, from Otto Stapf to Ledyard Stebbins —

"I must apologize for not having answered your letter of June 4th before now, but at this time of the year I find it very difficult to cope with my correspondence.

P. Woodwardi. I suggested this name many years ago in a letter, but never published a description of the species, if it may be called a species. As to this I am not even sure now. It comes very near to P. Veitchii but you like to read what Mr. Stern says about it. The Journal of the Royal Horticultural Society LVI p. 76 (1931). You asked me whether it is a good species. Surely this is entirely a matter of opinion. It comes certainly so near to P. Veitchii that anyone holding a somewhat broader view of the species would be entitled to classify it under it as a subspecies or some such minor group.

P. Beresowskyi. I have seen very little of this, but Komarov treats it as a distinct species near intermedia and Veitchi. You might read up his fairly full description and then decide for yourself.

P. anomala. I consider this definitely distinct from intermedia as well as Veitchi, not only on account of its glorious carpels, but also for their correlation with certain differences in the foliage which are rather difficult to describe, but quite evident in the plant.

What you say about the pubescence of the carpels varying from one horticultural race to another in other species puzzles me. Dealing with field specimens I find that the hair character of the carpels is remarkably constant within large areas and does not fluctuate from individual to individual.

Yours truly,

O.Stapf.