PÆONIA

An International Newsletter for Peony Hybridizers

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CONTAMINATION IN THE INTERSECTIONAL CROSS

Donald Smith

In the last several issues of the newsletter I have reported on my experience and results with the intersectional cross (p. lactiflora x p. lutea hybrids). Many of you have no doubt interpreted these reports in the light of your own experience and have assumed that many, if not most, of my seeds and resulting seedlings were not true intersectional hybrids. You have probably concluded that there were far too many seeds produced to be consistent with the intersectional cross and therefore, that many of these seeds must be the result of contaminated crosses. Such conclusions would be consistent with the numerous reports by many others over the years describing typical results such as " one or two true hybrids appearing among rows of contaminated pure lactiflora seedlings". However, these conclusions are not correct when applied to my results. Over the past three years I have produced more than 150 hybrid seedlings from the intersectional cross . At this point, I am quite convinced that all of these plants are true intersectional hybrids, with not a single pure lactiflora seedling appearing among the entire group. This result is, of course, in marked contrast to the bulk of the reports in the literature over the years. I have no definite answer to explain this wide disparity in results, but can only state that I remain extremely confident in my published results and conclusions. As more and more of my young plants grow towards maturity their hybrid identity is completely unmistakable. In addition, my experience with this cross has been remarkably repeatable from one year to the next.

At the same time, I do not question the results reported by others, including various statements that no true intersectional hybrids were mistakenly discarded in the belief that they were pure lactiflora from contaminated crosses. So how do we resolve such dramatic differences in results from the same cross? I am not sure I have the answer to this question, or that there is some single factor involved, but I do have some thoughts and observations on the matter which might be of interest to those hoping to duplicate my results with this cross.

If there is a secret for success with this cross I believe that it lies with obtaining viable T.P. pollen and maintaining it's fertility over a long enough period to complete all desired pollinations. Here are some tips for doing this:

1. Use the most effective T.P. pollens available (specifically this means using pollen from Reath's A-199 and/or A-198). These two pollens have proved to be far more effective than any others in the intersectional cross.

2. Dehisce the pollen quickly (from flowers just starting to open) and then keep it in a refrigerator at all times except when in use. I spread the anthers on a small sheet of aluminum foil and place it under a 60 watt incandescent light for 1-2 days. By gently folding the foil in half, the pollen can then be "poured" into a plastic 35 mm film can (the opaque black cans are preferable to the clear ones). The cans are then covered, labeled and moved directly to the refrigerator until needed.

3. Do not allow the pollen cans to heat-up in the hot sun while working in the garden. Keep the pollen cans shaded and cool at all times and return the cans to the refrigerator as soon as possible after use.

4. Open and strip the flowers of the selected seed parent 1-2 days prior to normal opening and pollinate them immediately. Check carefully for anthers struck between the carpels and remove them with a sharp tool being very careful not to damage the carpels. This is an extremely common occurrence (for example it occurs on practically every flower of *M. Washington*). If your eyes are not good, use a small magnifying glass to help find these trapped anthers. Contrary to the believe of many, there is no advantage or reason to delay pollination. The stigma are highly receptive at this time. Using your (little) fingertip transfer pollen from the can to the flower being careful to cover the entire stigma with liberal amounts of pollen. Label the stem and bag the flower immediately using a small paper envelope with one edge cut off. The envelopes can be removed after 2-3 days. This step is very important. If you pollinate early, before the self pollen appears, and completely cover the stigma with fertile pollen, and then "bag" immediately, there is almost no chance for contamination to occur. So long as you do not contaminate your pollen source through careless handling or practices you will be all set. To avoid contaminating your pollen cans, use only one pollen type at a time (i. e. only T.P. pollens). Make all your intersectional crosses first, then cover and put away your T.P. pollen cans (preferably back in the refrigerator or, at least, in a small portable cooler). Then, you can switch to herbaceous pollens for your other crosses. Be sure to lick and wipe your fingertip clean whenever switching pollens. Also, it helps to keep your finger nails cut very short to prevent trapping pollen grains under your nail. So, that's it. I hope this is all specific enough?

If you follow these procedures carefully, I am quite confident that:

- you will get many true intersectional hybrid seeds,
- you will also get a high percentage of ruptured seeds,
- you will have few, if any, non-hybrid (pure lactiflora) seedlings among your progeny.

I believe that self-pollen (in crosses where pollen-bearing flowers are used as the pod parents) is not the major concern for contamination in many cases including the intersectional cross. In my experience, most peonies are relatively self-sterile, although probably not completely so. This includes many of the best lactiflora seeders such as plants like *Martha Washington* and *Miss America*. Last year, I rejected a flower of *M. Wash.* which had opened too far and was obviously contaminated with its own pollen prior to my arrival. This flower was stripped and bagged (to avoid contamination

to other flowers), but was not pollinated. I expected to find these pods loaded with seeds in the fall. However, when I harvested the seeds from this plant in September, this was the only stem with completely empty pods (out of a total 26 stems). Nevertheless, it is best not to count on this, and to strip and protect all of your crosses meticulously. I should also point out here that my plants of *M. Washington* are in a separate location with no other lactiflora varieties anywhere nearby. This factor might be the most important one of all in preventing contamination of my crosses.

REPORT ON INTERSECTIONAL HYBRID SEEDS GERMINATED DURING THE WINTER OF 1995/96

Don Smith

All together there were 110 seeds which germinated (out of a total of 187 started) from various intersectional crosses made in the spring/summer of 95. (see Pæonia, Vol. 25, No. 3). These have resulted in 104 hybrid seedlings, my largest single year total to date. Of these, 75 were from A-199 pollen, 15 from A-198, 8 from *Nike*, 5 from *Autumn Harvest* (Seidl's A-42) and 1 from *Ruffled Sunset*. Of this total, 25% (26 plants) were obtained from ruptured seeds. By contrast, in the two previous years, I have only 3 surviving seedlings from ruptured seeds. On the pod side of the cross, 80 of the seedlings were from *Martha Washington*, while 17 came from *HP1-61*, and 7 from *Alice Roberts*. All of these seedlings are true intersectional hybrids. Notable among these seedlings are the *M. Wash.* x *Nike* and the *HP1-61* x A-199 groups. Each of these groups are characterized by their own distinctive-looking foliage. A detailed summary of the 1995 class of Intersectional seedlings is presented in the following four tables.

Table 1

Cross	No. of Crosses	Total No. of Seeds	No. of Firm Seeds	Seeds/ Cross	No. of Ruptured Seeds	% of Ruptured Seeds	Germination Rate (%)	Plants/ Cross
M. Wash. x G. Era	20	91	85	4.6	32	35	65.9	2.8
M. Wash. x A-198	7	35	33	5.0	10	29	51.5	1.4
M. Wash. x Nike	4	10	10	2.5	7	70	90.0	2.3
M. W. x A. Harvest	4	10	10	2.5	2	20	50.0	1.3
M. Wash. x All T.P.	35	146	138	4.2	51	35	63.0	2.3

Table 2

Cross	No. of Crosses	Total No. of Seeds	No. of firm Seeds	Seeds/ Cross	No. of Ruptured Seeds	% of Ruptured Seeds	Germination Rate (%)	Plants/ Cross
HP1-61 x G. Era	2	22	22	11.0	2	9	77.3	8.5
HP1-61 x G. Era*	6*	22	22	3.7	2	9	77.3	2.8

* indicates number of crosses adjusted (increased) to include crosses on flowers with no functional stigma (on *HP1-61*, ~ 1 in 3 flowers have normal functioning stigma)

Table 3

Cross	No. of Crosses	Total No. of Seeds	No. of firm Seeds	Seeds/ Cross	No. of Ruptured Seeds	% of Ruptured Seeds	Germina-tion Rate (%)	Plants/ Cross
Others x G. Era	11	15	15	1.4	1	7	40.0	0.5
Others x A-198	3	3	3	1.0	0	0	33.3	0.3
Others x R. Sunset	3	9	5	3.0	1	11	20.0	0.3
Others x Aut. Harv.	2	0	0	0.0	-	-	-	0.0
Others x Nike	1	0	0	0.0	-	-	-	0.0
Others x All T.P.	20	27	23	1.4	2	7	34.8	0.4

"Others" = *Alice Roberts, Gertrude Allen* and *Miss America,* but all plants obtained this year were from *Alice Roberts* seeds

Table 4

Type of Seeds	No. of Seeds Started	% of Total	No. of Germ. Seeds	Germ. Rate %	No. of Plants Surviving	Plant Production Rate %
Good Seeds	132	70.5	79	59.8	78	59.1
Ruptured Seeds	55	29.5	31	56.4	26	47.3
Sinkers	162	86.6	103	63.6	97	59.9
Floaters	25	13.4	7	28.0	7	28.0
All Seeds	187	100	110	58.8	104	55.6

Plant Production Rate = Percent of started seeds which resulted in surviving plants

Ruptured seeds handled according to procedures described in Pæonia (Vol. 25, No. 4)

LETTERS TO THE EDITOR OF PÆONIA:

The following article was submitted by Vesa Koivu, Metsän reunassa, Finland, 1/3/1996

ROOT SUCKERING PEONIES

It would be nice to establish a breeding program trying to produce peony varieties easier to propagate with branching or multiplying crowns or with rootstock that produces eyes freely.

Allan Rogers says in his new book PEONIES that the herbaceous peony, variety *SEA SHELL* often has an eye at the top of each root where it comes off the crown, and moreover that varieties like *LOVELY ROSE* and *ELIZA LUNDY* are easy to divide since "their crowns branch". In Swedish TRÄDGARDSAMATÖREN (4/1995), Allan Dahlbom writes about his vigorous Potanini- type" tree peony that develops root suckers. Unfortunately we don't grow any of these plants. We have made some observations of our own, though.

I divided P. SMOUTHII in autumn l995, (first planted in autumn 1990, source Klose nursery,

Germany). The plants had been growing in a thin garden soil. Acid moraine begun just eight inches below the surface and the plant's root system was very horizontal and knotty. About six inches from the crown there was a single eye coming up from a root that was crawling over another root (figure 1). There was no visible damage on the roots and the eye was fat, good and sleeping.

We have an unidentified peony plant from the home garden of my partner Rea (Peltola). We have filed the plant under the name "P. arietina, "KESAHAMONEN" because it reminds us of the description of P. arietina (Anderson). It has flowers with 14-16 petals though, so apparently it is not the species itself; maybe just a chance seedling.

We had sowed some seeds of "KESAHAMONEN" in the spring of 1991. When transplanting the seedlings in the autumn of 1994, I found that there was, among many normal looking seedlings, one seedling which had an eye on a root about three inches from the crown (figure 2). There was no visible damage on the rootstock and the eye was behaving similar to the P. SMOUTHII eye mentioned above: it was fresh and healthy and sleeping.

Rea said that she had never seen such a thing before, and the mother plant is vigorous as well. "KASAHAMONEN" does make those "sausages" to its rootstock and if they are cut from the crown they will produce new eyes and new plants sooner or later.

So peony lovers, I am wondering whether these unusual eyes are just random occurrences or whether there is a systematic tendency (which might be inheritable) for certain plants to regularly produce such eyes. It would be most interesting to hear <u>your</u> experiences concerning peony root systems. Do you know of peonies with rootstocks that produce eyes a little more freely or plants suitable for my purposes in some other way?

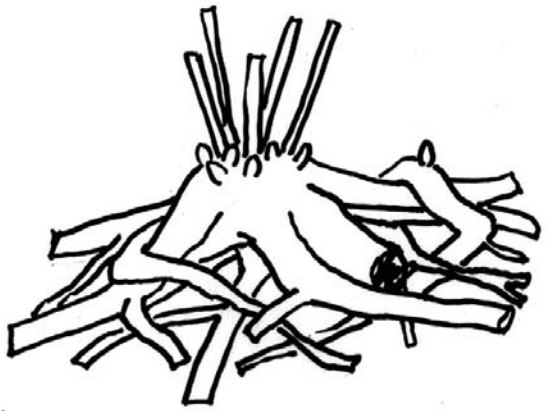

Figure 1, p. Smouthii

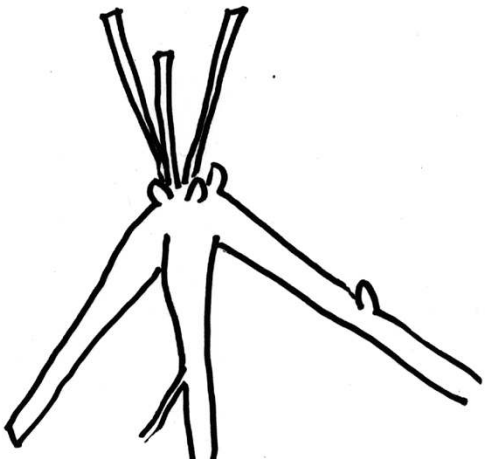

Figure 2, Seedling

Editorial Note:

Recently I came across the following paragraph in an article written by Don Hollingsworth for the June, 74 issue of the newsletter (Vol. 5, No. 2)

It is generally known that many hybrid peonies will initiate "eyes" on root pieces. The Saunders lobata (Perry) hybrids frequently do this as does a P. peregrina I have from Ben Gilbertson. I plant all of the root pieces found loose in the packing when recieving plant deliveries from other growers. From one such scrap came a nice surprise -- a lovely semidouble red hybrid colored like *Carina* but with *Red Red Rose* form. Some root pieces lay over without growing for one season and put up a shoot the second spring.

The following article was recieved from Nancy Halas of Windor, Ontario.

REPLY TO WILL McLEWIN's SATIRICAL TAXONOMY OF BABEL

By Nancy Halas

1. Will McLewin is a rather famous grower of Hellebores and does provide for those much interested a very comprehensive range of species Hellebore seed, some of it very difficult to obtain from Bosnia and the former Balkan countries.

2. I enjoy satire as much as the next person and the British are very famous for their wit.

3. As one of the foremost Hellebore specialists in the world, Mr. McLewin might refer to the works of Stern who was equally at home with Hellebores and with Peonies and made excellent contributions to both in the literature.

4. As usual there are always some who would be purists and would be offended that there would be a ancestral relationship between Peonies and Hellebores. Perhaps Mr. McLewin may be in that vien , but I hope not.

5. What is the relationship between woody and herbaceous peonies? Well, rootstock of some herbaceous peonies can be used to graft woody peonies into, and in fact the two can be compatible. Some rootstock does not need freezing to trigger the next season's growth, but others do, to get the woody peony to transgraft into it.

6. It is difficult, but not impossible, to obtain hybrid seedlings by using the pollen from woody peonies on the herbaceous types. These hybrids are called Intersectional or Itoh hybrid peonies. The leaves of the resulting seedlings resemble the tree peony pollen parent. The characteristics of the Itohs include, as a rule, better displayed flowers on stiffer stems and an interesting range of new colors.

7. It is much much more difficult to obtain a seedling by using herbaceous pollen on a woody peony to produce a plant most likely with leaves resembling the herbaceous type. In fact, it appears that Mr.Smith may have recently been able to produce, perhaps the first, one this winter.

8. Mr. McLewin does grow Hellebore Vesicarius which, it is just possible, could be a latent peony, closely resembling Peony California. The flowers of H. Vesicarius are small, perhaps more like strawberry flowers with a very large pea type pod some three inches long. The seeds very much resemble Peonies. So does the growth habit. The stem does have leaves on it and the new shoots appear from the ground similar to the characteristics of peonies. The flowers are half colored and half green, as if the Hellebore isn't quite certain who it wishes to mimic, either peonies or Hellebores.

9. Certainly Mr. McLewin could have the opportunity to place Peony pollen on some of his Hellebors and see what happens? The Point in making a cross of that type is that even if the flowers of the H. Vesicarious are small by peony stand ards, in a hybrid there is no way of knowing how the next genetic code will be interpreted by the master creators. It sometimes comes as a surprise what new forms do evolve, in the first cross.

10. Again we send our very best to our English cousins, and would encourage him to get into the fun of it and let us know what the royal stock of Hellebores will breed with the common peony.

OBSERVATIONS THAT RUN COUNTER TO WIDELY-ACCEPTED ASSUMPTIONS

Assumption:

Good peony seeds can be separated from bad ones prior to germination by placing them into a pan of water. Those which float are hollow (or at least partially so) and are, therefore, no good. These "floaters" should be thrown away, as it would be a waste of time and energy to attempt to grow these seeds.

Observation:

This year as in past years, I started my "floaters" along with my ("sinkers") good seeds (but only after separating and labeling these seeds). And again this year, as in past years, some of these seeds germinated right along with the "good" ones. In some years the germination rate of these "floaters" has been as high as normal seeds. This year it was quite a bit lower than normal (see Table 4, p. 3, this issue) at only 28.0%. Nevertheless, over the last several years I have at least a dozen true intersectional hybrids which would not exist if I had followed the generally accepted advice stated above.
