PAEONIA

Volume 24, No.1 March 1994

Editors: Chris and Lois Laning
553 West F Avenue
Kalamazoo, MI.

Suggested yearly contribution:
$2.50 in the U.S.
$3.00 in Canada
$4.00 in Europe, New Zealand, and Australia.

FERTILE ITOHS NEEDED

Now that a number of named and unnamed Itohs have been developed by various hybridizers, it seems that there should be some of them that differ genetically, that one or more with protection be stem and bud hardy if protected in the way the late Roy Pehrson suggested. If such a clone is discovered, it may be that grafting would work. Then grafting and root division would help in making available more of them.

Also, we must try to locate an Itoh that has fertile pollen and also one that will set seed using other pollens. It has been reported that Roger Anderson is being successful in this line.

Eventually the genes of this type of cross must be added to our advanced generation tetraploid peonies gene pool. Exciting possibilities are increasingly becoming available.

- Chris

RECORDS VERSUS NO RECORDS

Keeping records is so very important! You have been reading that line for years. Whether you believe it or not depends somewhat on your abilities in systematic thinking. Record keeping is very time consuming and frustrating too! Along with this, it takes special talent to produce records that can be useful to others.

Probably more information is gleaned from Professor Saunders' three notebooks than any other source. These notebooks are the main source of information and understanding for me in my hybridizing program. He systematically crossed all species (wild) peonies onto the albifloras (now known as lactifloras) and then made reciprocals on many of them, e.g. albiflora x P. macrophylla; the reciprocal would be P. macrophylla x albiflora. Also, his articles written in magazines and the American Peony Bulletin, and there are a host of them, gave meaning to the notes (notebooks) which recorded his hybridizing program, his successes and failures.

Many of Professor Saunders' peony species crosses have been lost, mainly due to their lack of fertility. All is not lost with these dropouts, however, since he has shown that the desired results can be accomplished in a roundabout fashion. We know he could not cross albiflora with P. mlokosewitschii but was successful in crossing P. mlokosewitschii with P. macrophylla, also with P. tenuifolia and finally through his persistent efforts the quads became available: the quads are albiflora x (officinalis x (mlokosewitschii x macrophylla)) Saunders Quads afforded possibilities for yellow in their descendants.

But here is the problem with keeping records: how many people have access to these Saunders' three notebooks? Maybe two or three of us. And how to make them available to all interested hybridizers is more than I can see.

Orville Fay, Edward Auten, Jr., W. S. Bockstoce, Lyman Glasscock, Walter Mains, and a great many other hybridizers have given us many outstanding varieties and clones but where are their records? Where are the records of Roy Pehrson? Will Don Hollingsworth publish his records? Will he make them available? When he leaves this scene to enter the Higher Realms, will we accept the time and expense of reproducing what he has invested hundreds of hours in producing?

Records are not very interesting reading literature and cannot be of great value unless well indexed. Of primary importance, I think, is a complete list of every species peony with its description, place of origin, and what it has to offer the hybridist. This information will possibly come from an organization in Germany called "SPIN". A sampling of one of their "Contact Letters" made me believe a few years down the line we will find this information to be offered, maybe even in book form. And judging from the various species seeds Mrs. Irmtraud sent to me, species plants (roots) in years to come will become available through this source.

I'm wondering if the "SPIN" organization knows the beauty and blessing our tetraploid advanced generation seed has to offer. Flowers in pastel colors of pink, yellow, white, and the dark red, cerise, and near black singles on stalwart plants make materials for beautiful arrangements. Oh sure! some of them stink (don't smell too good), but they are pretty.

Dear Germans, I have a large amount of seeds available for June planting if you are interested. The Riecks could be the distributors.

- Chris (Peter C.)

— —

PRESERVATION OF PEONY SPECIES

There is an organization in Germany that is dedicated to the collecting and study of species peonies, their characteristics and propagation requirements. This is of great interest to us in the U.S.A. since we have only limited success acquiring and raising them. The German group is known as SPIN. The "Contact Letter #20" which I received has a lot of information on tenuifolia and varieties of it such as P. tenuifolia 'rosea', also P. lithophila which may be a species in its own rights or maybe just a miniature form of tenuifolia.

Mr. Kees Sahin, a good friend of mine who lives in Holland (Netherlands), was the person that first gave us information on P. lithophila and provided seed for the SPIN organization and later sent me a generous amount. What excites me is his statement that this species or form of tenuifolia (or whatever) has more than one flower per stem. Also, it is even more dwarf and much more rare and daintier in all aspects of plant and flower.

SPIN "Contact Letter #20", edited by Mrs. Irmtraud Rieck of Germany, contains descriptions of a number of peony species, many of which were impressive since she also sent seeds from them. Some of the seeds, rather a list of them, is as follows:

1. P. hybrida - which probably is not a hybrid at all
2. P. anomala
3. P. biebersteiniana
4. P. parvifolia, probably a variety
5. P. normalis
6. P. brevifolia
7. plena
.8. P. lithophila
9. P. carthinica
10. P. majko
11. P. woodwardii
12. P. veitchii, and maybe others.

Irmtraud gave me a nice division of her P. mollis plant, an unusual species since hers sets seed! The plant is not tall so it will be crossed with my tenuifolia x mlokosewitschi (according to Wister's description P. mollis does not set seed). What is wanted is clones that can be used in my dwarf project.

MLOKOSEWITSCHI X TENUIFOLIA

There is a strain of mlokosewitschii x tenuifolia F_4's in my garden that is fertile and offers great possibilities for hybridizing or just raising future generations by planting their seeds.

These plants, sixteen in all, have pale yellow flowers and some of them, five plants, have red flares, rather large round leaves and are about 20-24 inches tall. Because of their physical appearance (phenotype), I think of them as amphidiploids * but at least they are tetraploids in behavior. Their pollen is fertile on all peonies that are not completely sterile. They are hardy here in Michigan. I find, though, that seeds from these F_4's need a little extra protection as one and two year old seedlings.

Parentages - ancestors - anticedents:

From Professor Saunders' notebook #3 the following information was gathered: Mlokosewitschii (#2786) x tenuifolia cross (in 1932) produced 8 plants which he numbered 6905 through 6912, one of which he named '**Playmate**'.

From '**Playmate**', or at least from this strain, a seedling he produced was named '**Nosegay**' which therefore is an F_2 numbered 15502 and set out in the nursery in 1940.

* Amphidiploid: A hybrid between two species that has at least one complete diploid set of chromosomes derived from each ancestral species.

— —

PROPAGATION BY DIVISION

When considering dividing herbaceous peony roots, some things should be remembered:

1. Make 3 to 5 eye divisions with roots 4 to 8 inches long.
2. Do the dividing in early fall — August 15 to September 30.
3. Divide plants that have 4 years' growth since last division.

The logic seems to be that large divisions are reluctant to set new white roots so while they look great the first year after division, in succeeding years there is decline — almost like wasting away. It takes at least four years for a 3 to 5 eye division to develop into a plant ready for division.

See the American Peony Society Bulletin No. 284, December 1992, for more detailed information.

GROWING FINE PEONIES ALMOST ANYWHERE--

Peonies are among the elite of ornamentals. When well provided for they give increasing rewards for years and will continue to do so indefinitely. Peonies which were planted long ago are often seen flowering around older homes. They are sometimes seen at abandoned house sites where they continue to flower regularly. When suitably positioned, peonies planted today will give similar results.

In order to perform well peonies must grow well and attain mature size. New plants may require two or more seasons to reach the state of growth necessary for them to give typical flowering, depending upon the growing conditions they are given, and upon the natural habit of the individual variety. While they will tolerate poorer soils, provided their other needs are met, it may take several seasons to see a flower.

What it means for a peony to grow well is that during each growing season the plant stores as much food as possible, producing big storage roots. This enables the annual increase of stems and flowers until the plant reaches an equilibrium with its environment. While the same things can be said of many garden perennials, what is special about peonies is that they produce relatively very large plants during a short period of rapid growth. As with spring bulbs, this growth comes mostly from stored food.

Peonies grow best in a fertile, well-aerated and well-drained soil, such as will grow a good vegetable garden. Since they are long-lived perennials any modification of the soil in their root zone must be done before they are planted. That is where the idea of a "hundred dollar hole" for a "ten dollar plant" gets its merit. A most prevalent problem around many new residential developments is low humus levels of the soil. Any substantial correction will have to be made as part of the initial site development.

Although peonies may tolerate low fertility, they develop accordingly slower in poor soils. Peonies growing under such conditions will benefit from periodic top-dressing, possibly needing sources of both the major nutrients and the minor nutrients (trace elements). Depending upon the availability of suitable materials, either organic sources and/or more refined products may be used.

Peonies also tolerate dryness, but don't expect them to be producing and storing food while the soil is dry. Further, prolonged moisture stress can be expected to bring on early die-off of the foliage and the end of development for the season. If this does not occur until the last half of summer, the effect on long term performance may be minimal, but the foliage deterioration will be unsightly for the remainder of the season. In chronic moisture-stress climates, sites protected from direct sunlight during the "heat" of the day and sheltered from hot, dry winds will offset some of the adverse effects of low soil moisture, while judicious irrigation can give the plants the moisture they need to function. Avoid watering around the base of stems. Especially when using high volume water delivery, it is best applied around the circumference of the leaf canopy, as in a shallow moat meant to moisten the outer half of the root zone.

Peonies may benefit from treatment for leaf and stem diseases, which become more pressing under conditions of prolonged high humidity. While the plants are generally tolerant of partial leaf loss to summer leaf diseases, early spring infestations as occur during cool, humid periods may be more devastating, sometimes leading to stem death and crown rot. Under such conditions, the plants may benefit from a timely application of suitable fungicides. However, the first level of disease management is prevention. Select sites having good air circulation, especially during early spring. Sanitization is next—clean up and dispose of old foliage and dead stems in the autumn to reduce carry-over from one season to the next.

Peonies will not tolerate poor aeration of the root zone. In order for the plant to extract what it requires from the soil it expends energy, which is released through respiration, requiring oxygen. Any time the soil pores (the voids between the soil particles) are loaded with water, the air is excluded. Peony roots may reach 18 inches deep, or more, depending on habit of the individual variety. There needs to be someplace below the root level to where excess water can percolate away. For good plant health the excess needs to drain away within hours after cessation of rain or irrigation.

For an unknown site, you can determine the drainage characteristics by a percolation test, as might be used to evaluate a site for a septic tank absorption field. Dig a hole 18 inches deep, fill it with water enough times that the surrounding soil is well wetted. Then refill it and time how long it takes for the water to get away. An hour or less suggests an excessively droughty site. Three to six or ten hours may work very well with an ordinary calendar of rainfall. However, if water remains in the hole after 24 hours, you have a chronic wet-land. Either install mechanical drainage measures to change the situation or select another site for your peonies. Raised bed strategies may also be of help, depending upon site and design.

Remember, naturally excess water is often seasonal. A site which may look just fine in the relative dryness of autumn may be wet next spring when the plants are making their most important growth. That is where the percolation test comes in.

Some peonies are more sensitive to poor aeration of the soil than others. The so-called tree peonies (actually shrubs) and many of the natural species are (or act) as alpine plants and may do best in a coarse soil having good drainage, provided they are adequately protected from moisture stress, as discussed earlier, which will be especially important in hot locations. Shade and shielding from hot summer winds may enable better performance, particularly in the midwest United States.

To join the American Peony Society, send $7.50 annual dues to Mrs. Greta Kessenich, 250 Interlachen Road, Hopkins, Minnesota 55343. Members receive the quarterly Bulletin and information on other reference publications and Society activities. Send $5.00 for a copy , of the 98-page Handbook of the Peony, postpaid.

Hollingsworth Peonies, RR3, Box 27, Maryville, MO 64468. Telephone 816/562-3010

About 'MOONRISE'

Most of the hybrid peonies named and introduced to the trade by A.P. Saunders and others are very sterile triploids and of very limited use by aspiring hybridizers. A good share of those others, not triploids, are also sterile for one reason or another. So it was that from the beginning '**Moonrise**' seemed to possess properties which were almost ideal. It was big and fine, it was fertile, it was tetraploid, and most important of all, it was an F2 seedling of a plant from the famous Saunders "lobata hybrids" strain. Because of this last fact it seemed logical to believe that some of its seedlings would revert in color to those wonderfully fine red colors found in the F1s. In these one would then have a fertile free breeding strain which could be raised in the numbers which might be needed to greatly improve the strain.

This was bad reasoning. There simply were no reds of any shade among the advanced generation seedlings. Instead all were light in color; mostly white, cream, palest yellow, but also a few pale cool pinks with no suggestion of a lobata heritage. Foliage too has been of the broader, rounder form of '**Moonrise**' itself, without the more divided form of lobata or of the F1 lobata hybrids.

While it was disappointing to realize at last that '**Moonrise**' was not to be the direct vehicle for the production of improved "lobatas" there were compensations too. The seedlings from such crosses as (Quad F2 x '**Moonrise**' F2), ('**Archangel**' x '**Moonrise**') and others, have produced strong growing, extremely fertile, tetraploid plants which should prove useful to anyone who does not now have enough such plants. I am now compelled to discard two year old plants because people don't ask for them. Some seeds will be sent to Chris again and I'm pretty sure he would be glad to send a few to those who request them.

If my original guess concerning the genetic make-up of '**Moonrise**' was incorrect, what do we really have there? Here's what I now think:

1. The parent plant of '**Moonrise**' had color-inheritance factors or genes from both its parents; "lobata red" from its lobata parent, and the opposite allele or "not lobata red" from lacti.
2. That inbred seed could have had one of three possible combinations of these color genes. It could have had both as the parent plant did. It could have had a double dose of "lobata red" or a doubled dose of the "not lobata red". In both of the last two situations the seedling would have become ''homozygous" for that particular inheritable trait (color) and the opposite color gene would have been dropped out. It would not be found again in any future inbred generation.
3. The red gene has dropped out from the '**Moonrise**' chromosomes. This particular red will not reappear in any of its future descendants unless re-introduced through the other parent.

If '**Moonrise**' is not suitable for this line of experiment, then perhaps one of the other lacti - lobata F3s would be all right. There are '**Paula Fay**', '**May Delight**' and perhaps several others. The sort of breeding which Don Hollingsworth is doing, and describes in the September Bulletin is sure to give a very good start in the right direction. That fertile strain of "lobatas" will still be realized.

SELF – INCOMPATIBILITY

Roy Pehrson

Self-incompatibility is something which needs to be of no concern to one who is hybridizing peonies, since it occurs only in pure species plants, and possibly only in those plants which are nearest to the true "wild" condition. It WOULD be an annoyance to someone who has a species plant which he would like to increase faster than would be possible by division of the plant he has.

Because of the relative unimportance of self-incompatibility to us in our activities, this treatment of the subject will be very superficial. Anyone with a real wish for a more complete understanding of the subject will read about it in his favorite textbook. I don't know where the best treatment of the subject is to be found. In his "PRINCIPLES OF PLANT BREEDING" (John Wiley and Sons), the author R. W. Allard devotes nearly six pages to this topic; enough to give a fair treatment of this rather complex subject.

The reason for the existence of incompatibility is of course to prevent inbreeding in those kinds of plants which have evolved this method. Several thousands of species of plants are known to prevent inbreeding by incompatibility systems and very many more have not been tested. There are also many kinds of plants which suffer no harm from inbreeding, and in some of these self-pollination is the normal method of fertilization. The tomato is just one example. Then there are plants which defeat the possibility of self-pollination by having flowers of such elaborate construction that selfing by any means is impossible, but still permitting crossing by insects or other vectors. Still other methods are known.

It could very well be that the peony is one of those plants which has been studied for incompatibility. Since I don't know about this, if true, I shall just assume that the system used by the peony is the one termed the "gametophytic" system. The following is lifted bodily from the Allard text: — "In this system incompatibility is controlled by a single gene, S, which is usually characterized by the very large number of allelic forms in which it exists. In the gametophytic system, pollen tube growth is usually very slow in a style that contains the same allele of S; consequently plants are virtually always heterozygous at this locus. The situation of two alleles with gametophytic control and no dominance is, of course, impossible because all plants would be incompatible and the species sterile".

Now for the purpose of illustration let us make an assumption. Let us guess that the species *P. mlokosewitschii* possesses 20 alleles of the incompatibility gene S. These could be denoted S_1, S_2, S_3, S_4 • • • S_{20}. Now let us say that the clone we may happen to have has the first two of this series. Since both the style and the pollen tubes would have the genes S_1-S_2, pollen tube growth would be very much slowed and fertilization would seldom occur, even though the receptivity of the egg cell is in no way reduced by the existence of those incompatibility genes. If we should now purchase another plant of *P. mlokosewitschii* to cross with the first one, what might happen? There are several possibilities. First of all it could happen that the new plant is just another division of the same clone that we had before. This could happen even if we purchased it from a different supplier. The two plants would not really be different plants at all and crossing them would be no better than before. With a little luck we might get a different clone; say one with the genes S_1–S_3. If we were to cross this plant with our former one, the pollen tubes with the S_1 genes again would not get through but the S_3 genes would. We would then get a half-crop of seeds. Half of these would be S_1–S_3 and the other half S_2–S_3. These siblings in turn could be half fertile if intercrossed.

If the new plant we have just purchased,, instead of being S_1–S_3 should happen to be, say S_5–S_{16} our two plants would now be freely interfertile just as in a colony of plants in the wild.

Just for fun we should consider yet another possibility. What if our proud owner of the S_1-S_2 plant (or any other) should be an obstinate type and. think to himself, "I'm gonna wait for the few seeds I will get from this plant and develop my own freely fertile strain from it. Well, it COULD be done. The few seeds from self-pollination should be S_1-S_2, S_1–S_1 or S_2-S_2. The two last of these should intercross freely but nothing else would work. He could mix all his pollens to discover those plants which would set seed. The old mama plant would, of course, be as poor a seed maker as before.

To get a freely fertile strain, where all plants would seed generously would require more than just those two incompatibility alleles. Allard puts it this way: — "Regarding the cross compatibility of sibling matings and general cross compatibility in a population, all that need be said is that with tri-allelic control only half the matings are compatible, whereas with multi-allelic control, cross compatibility rises rapidly as the number of alleles increases, exceeding 90% with five or more alleles. All the incompatibility systems are therefore efficient at preventing selfing, and the multi-allelic systems in particular are seen to be efficient at allowing all or nearly all plants, even in small populations, to set a good crop of seed."

As stated at the beginning, unless for some reason you should wish to propagate some rather rare species more quickly than can be done by division, then this discussion has no practical implications for you. It may however assist you in understanding just why it should be that your plant of mloko, of lobata, or of some other species, makes seeds so very poorly to its own pollen. Incompatibility should never be confused with sterility in its many forms. The two things are not synonymous at all.

Editor's Note: In "THE PEONIES" by John C. Wister, see page 52 - Albiflora x Emodi.

PEHRSON'S PROBABLE POLLEN PROBLEM

Roy Pehrson

I would like to tell about an experience I had with *P. mlokosewitschii* this year. I have suggested elsewhere that mloko makes a self-set seed or two only infrequently. Other pollens I have tried on it have not worked either.

Some years ago Silvia sent me a wisp of a plant, saying she did not know for certain what it was. She had been calling it "pink" mloko. I planted it sort of in the shade of a large peony clump hoping to nurse it along to a better size if it should have a will to grow. The plant has lived, but has been very slow to increase in size. This year it had a single small bloom. Looking at the small plant for several years it seemed to me that the foliage was almost identical with that of mloko except that the leaves were distinctly wider. I wondered if it might be the plant described in "The Peonies" as *P. daurica* or *P. triternata*. This plant is said to be very closely related to mloko and to be completely inter-fertile with it.

I could not be very confident of this identification for the reason that Silvia herself had taken a picture of *P. triternata* for "The Peonies". Nevertheless, when that bloom appeared I used its pollen on most of the blooms on my plant of mloko. The result was very good. I got 29 very nice seeds. Three or four blooms not pollinated gave nothing.

MEMORANDUM

FROM: Don Hollingsworth Nursery
RR 3, Box 27
Maryville, Missouri 64468

Supplemental Information on Peonies for Very Mild Climates

We are receiving much inquiry for peonies which will perform in the Gulf coastal areas of the Southern states. Unfortunately, little is known as to specific varieties which are known to succeed regularly under the limited amount of chilling temperatures which can be counted on in some mild climates. However, there are reports that some, more so among the tree peonies, will cycle with limited winter chilling.

Like many temperate zone plants, peonies have a winter dormancy phase which is broken by prolonged chilling, the shoot buds are then released to grow again when suitable temperatures return. The duration of chilling required varies from variety to variety, especially among those long bred for domestic use, particularly in accordance with the climate where selected.

While many of the herbaceous peonies commonly grown in more northerly locations are known to perform very well in the northern parts of the gulf coast states, most of the information from further south is of failure. However, those kinds which do release dormancy early enough to succeed in the deep south tend to get into late freeze problems in the north, because they are liable to break into growth too early. Since peony plant production is almost entirely in the north, it is the varieties adapted for there, which get propagated. Thus there is a need for more testing of varieties at southern locations and propagation specifically for that area.

Persons wishing to trial peonies in low chilling climates are encouraged to select from among the tree peonies, most of which were originated in the mild climate of Japan, and from among the early flowering American herbaceous hybrids. Better yet, grow seedlings from these types. Those which survive to flowering maturity will do so only if adapted locally.

Seeds are available through the American Peony Society. Write the coordinator of the seed program, P. C. Laning, 553 West F Avenue, Kalamazoo, Michigan 49004.

To join the American Peony Society, send $7.50 annual dues to Mrs. Greta Kessenich, 250 Interlachen Road, Hopkins, Minnesota 55343. Members receive the quarterly Bulletin and information on other reference publications and Society activities.