Another Look at The Forced Germination of Iris Seeds

By Elm Jensen

There has been much discussion lately on the internet about the germination of iris seeds regarding the soaking versus non-soaking of iris seeds before planting them as well as discussions about forced germination. There are articles in past issues of the Aril Society International's yearbooks, but more recent members of the ASI keep asking questions about this process due, perhaps, to the fact that they do not have back issues of the yearbooks in their possession.

Germinating seeds naturally from the crossing of onco-cyclus, regelia, regeliocyclus, oncogelia, and arilbred varieties of iris can be a most frustrating experience because of the germination inhibitors contained in the aril collar of the seed. Because of the inhibitors, it may take several years for the seeds to germinate, too long a wait for the hybridizer to see the results of his work. I have had some hybridizers of tall bearded irises state that if the seeds in their iris seedboxes or pots do not germinate the first year, they throw away the seeds that do not germinate. Likewise, if their seedlings do not bloom at the age of one year, they dispose of those seedlings as well. If the hybridizer of irises from aril bloodlines were to do that, there would suddenly be a dearth of aril hybrids and arilbreds. While I understand that hybridizers of bearded irises have larger quantities of seeds to work with, and have far more successful takes from their crosses, the hybridizer of arils is not so fortunate, so that is why success from the forced germination of seeds is a boon to the aril hybridizer. So, if the aril-related seeds do not germinate the first year, there is a way that the hybridizer can obtain a "jump start" on germination so that a year or years

will not be lost waiting to see the results of the cross. And, as seedlings from aril bloodlines may take one or more years to flower, it is necessary for the hybridizer to find a way to reduce the time wait. This can be achieved through the forced germination of iris seeds.

Doris Foster first began toying with the issue when she wrote an article titled "Easy Plate Culture" found in the ASI Yearbook for 1962. The article appeared on pages 83-85, and Doris covered both the embryo culturing of iris seeds as well as her experiments with forced germination. What she referred to as "plate culture" was not the use of petri dishes but rather the use of the plastic lidded containers one uses in a lunchbox to hold sandwiches or pie slices. In that method, she used paper towel sheets of a certain thickness, which had to be cut to very exact specifications, and these sheets had to be just wet enough but not too wet and also had to be rinsed and re-moistened every-so-often; she also used chemicals and activated charcoal in the recipe for the liquid. This seemed to be too time-consuming for me, but from her article I picked up the idea that drying the seeds after harvesting rather than using green seeds, and then soaking them before starting a forced germination process was vitally important. And, as I learned from Doris' article, "The arils appear to be generally difficult to embryo or plate culture. Trouble is often experienced with the embryos 'shooting' from the seed." (Foster, p. 83) In the same article, Doris pointed out as well that it was necessary to soak the seeds, and she mentioned that the seeds could be soaked for several days. Elsewhere in the same yearbook, in an article titled "Germination of the C.G. White Intercross Hybrid Seed and Seed Handling", Tom Wilkes stated that soaking seed "up to three weeks is certainly safe enough." (Wilkes, p. 47) The soaking process, if the seeds are dry, becomes most

important. One last thing I kept in mind from my original reading of Doris' article was that she removed the aril collar after soaking the seeds and then used a single-edged razor blade to remove a thin slice from the pointed end of the seed (more on that later). I remembered one other mention about seeds from a very short article in that same 1962 yearbook, "On Planting Seed", wherein Eileen Heinze of Australia stated: "I have found that the closer they are together, the more evenly they come up." (Heinze, p. 52) Whether using the forced germination process when working with seeds or planting the seeds into seedboxes to germinate naturally, I always cluster the seeds together and have found that doing so leads to having more seeds from a cross germinate.

My interest in the forced germination of iris seeds grew when I encountered Sam Norris' article "Forced Germination of Iris Seed" on pages 71-75 in the ASI Yearbook for 1975. I encourage anyone who is interested in forced germination to read this article, as Sam introduced the idea of using vermiculite as a planting medium. But most importantly, he reported why he had successes as well as failures using his method.

My interest in forced germination was spurred into action by John and Kay Tearington's article, "Germinating Aril Iris Seeds", appearing on pages 28-30 in the ASI Yearbook for 1979. In their article, the Tearingtons spoke of the need to peel the seed or germination did not occur. When I first used their method, I did this, and had very good germination. The Tearingtons experienced a germination rate of 107 seedlings out of 121 seeds from a hybrid cross. Of the 107 seedlings, 96 survived transplanting. (I have lately found that I have had equal success in seed germination without peeling the seeds. Sterilized conditions are most important for this to happen, however).

Lastly, Sam Norris wrote a terrific article, "Success Story", in the ASI Yearbook for 1980, pages 42-50. This article contained 2 hand drawn illustrations which helped me to understand what I was seeing as the seeds germinated and gave me a better idea of how deep a slice to cut from the tip of the seed. In essence, this article by Sam was actually two articles in one, as he combined the forced germination process with a colchicine treatment in an attempt to convert the seedlings to tetraploidy. Since colchicine is a poison, that part of Sam's process was not of interest to me. I then took the information I gathered from all the above-cited articles and gave it a try. I originally presented my method in an article titled "Forced Germination: One More Experience" which was published on pages 34-37 of the ASI Yearbook for 1981 and which included some black and white photos.

What, precisely is forced germination? At its simplest definition, it is a process in which iris seed are subjected to a process of warmth and cold treatment in order to obtain germination rather than being planted directly into open ground or into pots. Success in using this method involves knowing your own climate and the growing conditions you are going to introduce your new seedlings into as well as knowing what kinds of seeds you are going to work with. Everyone I have talked with and all the articles I have read speak to the fact that pure oncocyclus seeds are the most difficult to germinate, whether using direct-to-soil planting of the seeds or employing the forced germination method. It appears that Sam Norris had the most success when using the forced germination process with onocyclus seeds. The Tearingtons and I, who worked with seeds that involved regelia bloodlines, had our best success with these kinds of seeds. The Tearingtons, Doris Foster, and I had good success, too, with arilbred seeds. The steps one takes in using the forced

germination route need not be complicated, but they do, however, require serious attention and thought. The steps are as follows:

1. Knowing the seed... If the seed you want to use the forced germination on has been freshly harvested ("green seed"), you must first give the seed time to dry. Fresh seed, according to those who have tried this method with it, experienced rot. Since I am not plagued by a lot of insects here nor high humidity, I simply shell the seeds from the pods as they begin to split, write the cross and the number of seeds on the outside of a regular mailing envelope, place the seeds and the hybridizing tag inside the envelope, seal it, and put the envelopes in a box in the spare bedroom so the seeds can dry completely. I find that I do not need to use any kind of chemical to prevent mold or insect damage. I usually let the seeds dry from the time the pods split in late July until the second or third week in September. At that point, I separate out the seeds I want to plant naturally and sow them into seedboxes. The seeds I will use for forced germination I let rest until the first of January. The seeds I use in forced germination are usually seeds from crosses for regeliocyclus seedlings, oncogelia seedlings, and wide crosses for ABs. If I have any seeds of pure oncocyclus bloodlines, then these, too are saved to dry completely.

2. Soaking the seed... I choose the middle of January or the first week in February to start this process, as that allows time for the weather outside to become warmer when it comes time to plant out the resulting seedlings. It is imperative that the dried seeds be soaked before preparing them for forced germination. This allows the seeds to rehydrate so the embryos and their surrounding tissue are not shriveled. One need not fear that the seeds will rot. (If any embryos and tissue are naturally weak, they would rot in the ground

anyway.) I use either tap water or distilled water for this purpose, filling the cups half-full. I soak the seeds, one cross per small clear plastic drink cup, with the cross written on the side of the cup in permanent felt pen. I soak the seeds overnight in the cups on the kitchen counter. The next day, I carefully drain the water from the cup and refill the cup halfway with fresh water and a small bit of liquid bleach. At this time, I use my thumbnail to remove the aril collar, if there is one, from the pointed tip of the seed and soak the seeds for about ½ hour to sterilize the seedcoat in preparation for planting.

3. Preparing the seed... I take the seeds, one at a time, from the water/bleach solution. I then place the seeds between my left thumb and forefinger, making certain that the pointed end of the seed faces my right hand. I pick up a single-edged razor blade and use it to take a small slice from the pointed end of the seed. Next I examine the area I took a slice from. If I can see a small round circle, which is the embryo, in the middle of the surrounding tissue, then the cut has been successful. If I do not see the embryo, I make another thin slice. At this point, I should see the embryo by now. When the cut is made, I place each seed into a waiting dish. Occasionally, a seed is devoid of an embryo, and I throw that seed away. Too large a slice taken will result in the cutting away of the root cell area, and the seedling will not live. Too narrow a slice results in a callus forming over the tip of the cut, and the seed will not germinate. Norris has a good diagram in his article of the proper amount of tissue to cut away.

4. "Planting" the seed... After I place about 2 inches of vermiculite into a plastic sandwich baggie, (the non zip-loc type), I moisten the vermiculite slightly. Then I place a label on the outside of the baggie on which I have recorded the

cross. I cover the label with clear scotch tape so the label will not smear or the writing be erased. Then I make a small narrow and shallow dent in the vermiculite and sow the seeds in a clump into the vermiculite growing medium. I fold the flap of the baggie over and place the baggie into a vegetable bin in the refrigerator. At the end of week one, I unfold the flap of each baggie and examine the cross to see if germination has begun. Usually, without fail, each seed has pushed the embryo out about 1/16 to 1/8 of an inch. This is the beginning of the seedling. It will look like a thin piece of white pencil lead at this point. Within the third week, and often earlier, I will note that the tip of the embryo has pushed out a thick, wide, triangular-shaped white point at its side. Soon, the bottom end of the white triangle will elongate into a long white root-like protruberance. This is the beginning of the root system. One will not notice a rhizome at any of these stages. If, in the second week the small white shoot seems not to be developing into anything, I will remove the baggie from the fridge and let it set out overnight so the embryo gets a warming treatment, which seems to help germination. I have had to do this a couple of different nights with a baggie or two. When examining the seeds in the baggies, it is imperative that one not knock the little embryo so that it shoots out of the top of the seed. To do so would ruin the seed.

5. Planting the seedlings... In the past, I used to let the seedlings grow in the baggies in the fridge until they had 2 or three real leaves. Today, I plant the seedlings in pots at the stage where they have grown their little triangular point that resembles a leaf somewhat and has a long tail that resembles a root. Planting the seedlings into pots is a crucial time for these wee embryonic seedlings. One has to be extremely careful not to break the small embryonic seedling away from

the seed itself, for the seed provides the nutrients for the developing seedling. I usually bend a Q-tip in half and use it as a tweezer, picking the seedling up at the tip of what looks like a leaf. Before I pick the seedling up, I have prepared a plastic pot with a light composted planting medium to which I have added a bit of sand. I like to use a Miracle Gro product that has time-released fertilizers included. I put a plastic garden label with the cross written on it into the soil. Then I take a spoon or fork handle and wiggle it around several times in the pot, making enough shallow holes to hold the seedlings I have at hand. I then pick up the seedling and hold it carefully, making sure the attached seed and the seedling are in the small hole and gently push the soil around the seedling, making sure the small triangular tip rises slightly above the soil. When all the seedlings are in the pot, I water it with a sprinkling can, making sure the soil is well soaked. If any seedlings are a bit too far above the soil line, I carefully push them down into the soil. After about a month, I often add a light mix of Miracle Gro to make sure the seedlings have sufficient nutrients. One must closely monitor the moisture in the soil for the entire time, making sure the pot does not dry out. I should mention at this point that, if the weather is too cold to set the seedlings outside, one needs to keep them in the house. By mid-April, the seedling pots are set out among the iris plants in the garden to let them harden. If the spring turns hot, I plant the seedlings, which now have two or three real leaves, about 4 inches apart in a row into open ground and put the plant label at the head of each planting. The forced germination seedlings are usually all planted in the open ground by June first where I live.

This year was a year of poor seedbox germination, so the last week in May I dug up the seeds from several crosses for regelia hybrids and for regeliocyclii from the seedbox, soaked

them, and used the forced germination process on them. In the third week of July, I planted the seedlings in pots. By the second week of August, the seedlings had gone dormant. I carefully lifted them out of the pots to plant in the raised

Photo 1 (above): Three weeks old; photo 2 (below): After five weeks. (*Jensen photos*)

seedbeds, and was surprised to discover small rhizomes almost the size of dimes that had good root systems. I kept them watered in the beds until the rains returned in late October. The first photo shows the embryonic seedlings at 3 weeks old, taken out of the baggies and ready to plant in the pots. These are from a cross of two different *I. stolonifera* variants. The second photo shows the same seedlings at 5 weeks old, having already sent up true leaves.

About the Author:

Elm Jensen lives in Wenatchee, Washington and is the father of 6 grown children and has a 6-year-old granddaughter.

He retired from teaching high school English in 1999. For the past 4 years he has taught 2 classes per quarter at the local community college to help out there.

His spare time activities involve art, photography, reading, and the growing and hybridizing of iris. He began growing arilbreds in 1959 when he was in his second year of college.