

# Creating “Perfect” Boswellia

**I**t was early 2000 when Frank Olvey approached me with the proposition of donating a couple of *Boswellia sacra* to the arboretum of Arizona State University (ASU). He had heard that ASU was in the process of certifying the Tempe campus as an arboretum because of its rich plant history and diversity. I was involved in this process, not only as the campus architect for over 20 years but also as an avid preserver of plant life on the campus.



*Boswellia sacra*: This is one of the original seed grown plants I received from Frank Olvey and it was the pollen of this particular specimen that I used to cross-pollinate *B. nana* and *B. popoviana*.

Frank had grown *Boswellia sacra* at the University of Arizona (UofA) extension site in Maricopa, Arizona, for nearly ten years. After working for the Yemen government, Frank was able to bring a bag full of seeds upon returning to the USA. He began sowing the seeds by the thousands and by the time I met Frank the plants were nearly two and half meters tall and in fifteen gallon containers. He was interested in giving the plants some exposure and eventually he planned to sell them in the open market. It was during this collaboration

that Frank also gave me three plants in five gallon containers for my own collection in exchange for assisting him with starting his plant sale.



The seed pod of *Boswellia sacra* is a 3-4 lobed pod with protective shells containing a single seed in each lobe. Seeds are brown and flat with a persistent wing. Once the seed pod ripens, the protective shell will fall off exposing the seeds.

That same year, Dan Mahr brought me his small *Boswellia popoviana* hoping that our favorable Arizona climate would give his plant a new growth spurt. I agreed to keep the plant as long as necessary and within a year's time the plant was over 25 cm tall and back to a healthy state. As we had initially agreed, I took a number of cuttings for myself. I grounded the cuttings, and within one year all of them reached over a meter in height and over 25 mm thick at the base.

During the same year Guy Wrinkle was selling a



*Boswellia* is one of the fifty four genera of the Burseraceae family and *B. sacra*, one of the seventeen described species native to a vast area stretching from the Arabian Peninsula (Yemen and Oman) to Somalia and Ethiopia. This species has tremendous economic value to the country of its origin and the gum resin (Frankincense) is a major item of export for Somalia. The gum is used as incense, in the perfume industry, and in traditional medicine.

*Boswellia sacra* is a semi-pachycaul tree with an exfoliating trunk and pinnate leaves. It branches from the swollen base and it can be trained as a bonsai. It readily flowers and sets seeds, and since the flowers are complete and self compatible (both male and female), one plant will produce seeds with little effort by hand pollination. If the plant is outdoors, the bees will do the pollination naturally, however, the germination rate of the seeds is very low and often less than 10%.

The flower of *Boswellia sacra* is cream colored at first and then the fleshy tubular disk will turn orange within a day or two to attract insects. The flower stalk can reach 30 cm in length and usually appears at the end of new growth. —All photos by the author—

few *Boswellia nana* that he presumably had received from John Lavranos. I purchased a small one from Guy that initially appeared to be dead. However, upon closer inspection, I noticed a very small tip with live tissue. It was the end of summer, with cool nights and warm days, perfect conditions to root cuttings. I removed the tip, dipped it in root gel and potted it in my cutting mix. It took a few weeks but the small tip-cutting began to leaf out. It took the entire winter to fully establish and eventually gain enough substance to become a viable specimen plant.

Within a two-year span I had gathered three of my favorite species of *Boswellia*, each with a story of its own. Now I had a chance to do some



*Boswellia popoviana*: This plant is one of the several cuttings I made from the original plant loaned to me by Dan Mahr. This photo was taken just over two years after the cutting was made.

propagation and cross-breeding with the hope of creating a new hybrid capable of producing new Frankincense and perhaps a plant with attributes



*Boswellia popoviana* is native to Socotra, Yemen and grows on limestone cliffs reaching over six meters in height. The leaves are semi-glabrous on top with a white pubescent underside. Leaves are regularly crenate in some areas and simple or deeply lobed in other areas of the region. There are some plants with both entire and simple leaves. It is believed that this is due to a natural hybridization with *Boswellia elongata*.





The flower of *Boswellia popoviana* is rose in color; it is a complete flower - very typical of most *Boswellias*. The raceme consists of 20-30 individual flowers.

new to the *Boswellia* species. I had been hybridizing burseras and commiphoras for over a decade and the results have been more than promising. My primary interest had become these three genera of the Burseraceae family and I found the plants happy to be in Arizona, soaking up our endless sun and I began to enjoy them without becoming a slave to their care.

In the fall of 2005 we had a late monsoon season with 2-3 weeks of low barometric pressure which allowed all three species to flower. Sitting only a few feet apart in the same greenhouse, cross pollination was easy. With consideration to the low germination rate of *Boswellia sacra* seed, it was only rational to pollinate the *B. popoviana* and *B. nana* with the *B. sacra* pollen.

Each of the plants produced only a dozen seeds, which I carefully collected and, prior to sowing them, allowed them to dry for a few weeks. Although it was mid-winter, in Arizona, winters are a relatively good time for germinating seeds that cope with these environmental conditions. The high humidity of my greenhouse and bottom heat combined with an abundance of daily sun enabled the seeds to germinate. Over one half of the seeds germinated, six from each cross, but by the end of winter, due to my own neglect, only one seedling of the *B. popoviana* x *B. sacra* cross and three from the *B. nana* x *B. sacra* cross had survived. Frustrated with a lack of space in my backyard and the limitations that were compromising my goals, I joined into a partnership with Mike Finley and Patte Lanus and created the Miniature Garden. Now having access to half an acre and ample room to grow, the doors were wide open for experimentation.

By spring, when the seedlings had gained some height and acquired several secondary leaves, it became evident that the seedlings were indeed new hybrids. I planted the small seedlings in the ground under partial shade. While the plants continued growing and showing tremendous potential as new hybrids, each began to show a



*Boswellia nana* x *B. sacra* (*B. 'Tierney'*): This is a three-year old plant about 60 cm tall, keeping its compact form of the *B. nana* gene, which dominates even the size of the leaves. The leaves clearly look like *B. sacra* with a strong influence of *B. nana*, from the color to the size and texture.



**LEFT:** *Boswellia nana* is native to Socotra, Yemen, and grows on lime-stone and rocky crevices. This photo was taken by Bruno Mies and shows the plant forming its growth into the rock formation in perfect camouflage. However, the plant grows elsewhere as a small vertical shrub or sometimes totally prostrate. The leaves of *B. nana* vary from simple to pinnate with winged rachises. The variations of the forms are attributed to natural hybridization. In cultivation, especially when grown in the ground, the plant can reach several feet tall with a thick base hardly resembling the plant in its natural habitat.

**RIGHT & BELOW:** The flowers of *Boswellia nana* appear singularly at the end or side of new growth or as a flower stalk with multiple, complete flowers. This condition is environmental, and the health and condition of the plant in cultivation determines the results.



number of significant differences from either of the parent plants.

I named the *Boswellia nana* x *B. sacra* hybrid *Boswellia* 'Tierney' and named the *Boswellia popoviana* x *B. sacra* hybrid *Boswellia* 'Shealynn' after my two granddaughters. I do not expect these names will be confused with any described boswellias. I

hope to continue the process from F<sub>1</sub> hybridization to F<sub>2</sub> this spring. All three plants are known to flower in the winter when we have low pressure moving in followed by a heat spell. I have already begun vegetatively propagating the new hybrids to test them under different environmental conditions.

*Boswellia* 'Tierney' produces leaves with a blend





*Boswellia* 'Tierney' leaves

of lavender and green. The lavender starting in the center with the young leaves and gradually progressing to amber and avocado green. The terminal leaflets are somewhat similar to the leaves of *B. nana* but the entire leaf is pinnate like *B. sacra*. The surface texture is much smoother than either of the parent plants. It appears that the crinkling and crenate effect of *B. sacra* was somewhat reduced. The size and structure of the plant as a whole was greatly influenced by the *B. nana* gene, making the plant short and compact. It is a beautiful container plant, and it seems to like the container as much as being planted in the ground.

*Boswellia* 'Shealynn,' on the other hand, turned out to be robust and a fast grower. Within a few months, it grew over several feet tall with dark green leaves and became an upright tree very much like *B. popoviana* with yellow peeling bark. The solitary trunk has a much denser wood and is able to hold itself up. Unlike *B. sacra*, the branching of the *B.* 'Shealynn' occurs several feet from

*Boswellia* 'Shealynn' close-up



its base looking very much like a typical cliff-growing *B. popoviana*. The new leaves are pink to lavender in color when young, and then turn into dark green with an incredible glabrous shine. However, they do retain some of the pubescence on the underside.

Regarding the use of the word "Perfect" in the title of this article: it was not until 2007 that I realized that the "hybrid vigor" of these two new plants were cold tolerant and unlike other boswellias, they withstood 19° Fahrenheit (-13°C) temperatures for three consecutive nights. These plants were outside with no cover and the only protection they had was the enclosed backyard



*Boswellia* 'Shealynn' flowering

fence. To my astonishment, I realized that both hybrids were cold hardy new boswellias from cold sensitive parents—making "perfect" specimens for future experiments.

In the spring, both plants set flowers and the flowers were clearly hybrids with the distinct form of the parent species, but they varied substantially in size, color, configuration, and many other fine criteria. The flowers were complete, but not yet tested to see if they were truly bisexual.

In June of 2008 John & Murielle Lavranos spent a few days with my wife and me, and amongst many conversations we had, John spoke fondly of the gum resin of *Boswellia frereana* and how wonderful it was to chew. After John and Murielle left, I just had to test the gum of the two new hybrids and compare them to that of the *B. frereana*. Although taste is subjective, I found the gum resin of *B.* 'Shealynn' to be similar to the *B. frereana* but more aromatic. The gum resin of *B.* 'Tierney' is similar to the gum resin of *B. sacra*, but with the texture of *B. nana*.

Now a few years old, *Boswellia* 'Shealynn,' nearly

eight feet tall with a three inch trunk, is dominating my garden. *Boswellia* ‘Tierney’ remains petite by comparison, but stunning for its total balance, proportion, color, texture, and form—truly a natural bonsai. With the incredible results at the F<sub>1</sub> stage of hybridization, I am looking forward to



Above: *Boswellia popoviana* x *B. sacra* (B. ‘Shealynn’): This is a three-year old plant standing over 2.5 meters tall. Like *B. popoviana*, it is an upright tree, branching at the top. In three years its height has exceeded the many *Bursera* and *Commiphora* that have been in the garden for nearly ten years.  
Below: *Boswellia* ‘Shealynn’ leaf detail



taking the two new hybrids into the F<sub>2</sub> stage this year, and so on with hopes of unveiling new wonderful surprises.

In conclusion, I believe that in the future we humans will plan, control, and expedite our own evolutionary process. I hope that we will work toward developing new ways to do the same for all other living things so that they may evolve to survive the adversities we have created on earth. Perhaps preservation is to engineer new species



This photo was taken in the first week of May 2010 showing the plant successfully setting seeds with the start of the F<sub>2</sub> hybridization process

that take the place of the old and fit into the ecology of the future. If two cold-sensitive plants can produce cold-hardy hybrids, can a new generation of species withstand man’s endless abuse? Perhaps we need to create “perfect” plants that can survive us.

The Miniature Garden: By 2006 I had used up every inch of my backyard and side yards and was desperate for expansion. I joined Mike Finley, a long time friend and succulent collector in Arizona, and Patte Lanus, with whom we worked, valuing her administrative skills. We formed a partnership called the JMP Development Group, LLC, and The Miniature Garden became a division of our investment. The Miniature Garden is a small mail order succulent nursery on a half-acre property in Tempe, Arizona. We hope to open to the public as a nursery and an educational garden to advance the understanding of the three genera of the Burseraceae family: *Boswellia*, *Bursera* and *Commiphora*. 🌿