Breeding Cold Hardy Hibiscus: Techniques and Suggestions©

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INTRODUCTION AND OBJECTIVES

The genus *Hibiscus* has approximately 41 species that range from tropical herbaceous and woody plants to cold-hardy herbaceous and woody plants. Colors range from white, yellow, pinks, orange, red, purple, and near blue. Colored foliage and cutleaf forms add to the mix. Many of the new forms of *H. syriacus* from the National Arboretum are sterile as are two selections from the Winterthur Museum and Gardens, 'Tosca' and 'Lohengrin'. Breeding efforts have centered on the production of sterile, seedless selections of *H. syriacus* which is the main species used by the late Dr. Don Egolf at the National Arboretum and the late Hal Bruce at Winterthur Museum and Gardens. But to date the colors for sterile cultlivars so far have been white, pink, magenta, and light lavender with no sterile forms with blue flowers. The intent here is to begin the initial phases to breed a blue flowered sterile form of *H. syriacus.*

BREEDING EFFORTS

The breeding of plants depends upon many different variables such as chromosome numbers, overlapping flowering periods, degree of kinship of the respective parents, and the maturation processes of the parents' flowers. Observations from this undertaking show that stamen maturation is delayed in comparison to pistil receptiveness. This situation is often a normal occurrence and limits the degree of selfpollination.

Self-pollination being the lesser of desired consequences for pollination as the introduction of new genes is nearly always the preference.

One of the lesser known problems in crossing *H. syriacus* is the role that predator insects play on plants growing in the landscape. Japanese beetles (*Popillia japonica*) are especially fond of *H. syriacus* flowers even though they rarely make use of the leaves. They also have a liking for other types of hibiscus flowers such as *H.* 'Tosca' and the Fleming Brothers hybrids. One feature of Japanese beetle attack on flowers is for the insect to eat the unopened flower bud at the apex and burrow down to eat the top of the pistil off. Once this is accomplished the Japanese beetle moves onto a new flower. It should be noted that the flower of hibiscus is different from many other flowers in that the stigma portions of the flower is attached basely to the pistil.

One mechanism to circumvent the Japanese beetle problem is to remove the petals from an unopened flower bud, thereby exposing the pistil with the accompanying stigmas, since the pistil matures first, this does not present any particular difficulties. After a day or so, the bumpy surface of the pistil become shiny, thereby signaling receptiveness for pollen. Bagging is not necessary because once the flower petals are removed pollinating insects and Japanese beetles have no further interest in the flower. Casual observation will show that hibiscus does not offer any significant nectar rewards and so without the petals the emasculated flowers are

completely ignored. Hibiscus pollen is heavy and very sticky and is not prone to wind-borne cartage and so windy conditions will not usually affect an emasculated flower either.

Pollination is rather straight forward; first an emasculated flower is selected and checked for the glistening surface of a receptive pistil. Second a nearby flower of the male parent, in the case, H. 'Tosca' is selected for mature pollen, evidenced by a change in color from pure white to a dull white yellow. The entire combined sexual apparatus of the male parent can be then pinched out and taken to the receptive female parent. If both the pistil and the pollen are of the correct maturity the pollen will immediately adhere to the pistil. Moving the stigmas around the pistil several times will ensure a complete coverage with the male parent pollen. A wire marker is attached so that the particular cross is noted for that flower. If more than one male parent is used for the various flowers of the female parent, then small labels with codes should be attached along with the wire twist, so that individual flowers can be monitored for their repective male donors.

If the process is complete, the sexual parts of the fertilized flower will change color from white or near yellow to a dull dirty looking brown. The pistil will start to shrivel and change color as well. At the same time the ovary at the base of the pistil will begin to turn yellow. After a few more days the ovary will be noticeably swelling and gaining a deeper yellow color. If the fertilization is not complete the process will look normal but the ovary will cause an abscission layer to form and the petiole and sepals of the flower will turn yellow as well as the ovary and the entire apparatus will fall off.

After about a month the fertilized ovary will have expanded about 10× and completely filled the void inside of the sepals. The ovary will now be bright green and should be about 3–4 weeks old. They are left undisturbed until late fall when they change color from green and start to undergo senescence.

At maturity marked by color changes indicating senescence, the fruit can be removed and allowed to dry in a safe environment. Once thoroughly dry the fruit will crack open revealing a number of small flat-shaped seeds.

The collected seed should be dried for a few more days and then stored dry and cold until the time of stratification. Seeds should be blended with moist well drained perlite (1 : 10, v/v) and put into plastic re-sealable bags. Seed bags should then be held for 5 days at room temperature to allow for imbibition of water into the seed. Once this is accomplished, the seed bags should be placed in a refrigerator at around 4 °C and held for approximately 90 days.

Upon removal the seed should germinate in about 2 weeks unless it shows signs of being active in the bag prior to sowing. Premature germination can be troublesome so seed bags should be checked frequently to look for this.

Finally once seedlings are up and about the resultant hybrids should be grown out as the F1 generation and allowed to flower. If the desired results are not present, the next process would be to back cross the F1s with either of the two parents or to each other. Once another set of seedlings are obtained, they become the F2s and are grown on to look for planned characteristics. If still no luck, F3s can be bred and the search continued.