

SAVING THE NECHES RIVER ROSE MALLOW, *Hibiscus dasycalyx* –

One of the very first endangered plants studied at the SFA Mast Arboretum was *Hibiscus dasycalyx* – and after informal propagation and cultural work in the late 1980s and early 1990s, the SFA Mast Arboretum initiated the MS thesis work of Ms. Stacy Scott. The germplasm plots Stacy established in 1995 still survive after 14 years -and continue provide a very low maintenance resource at Mill Creek Gardens for seed and cuttings. The site is appropriate enough that we have allowed the colony size to grow via young seedlings outside the original plots. Many of our propagules were used in the reintroduction of the species into plots at Davey Crockett National Forest.

Hibiscus dasycalyx, the Neches river rose mallow, is one of the rarest of East Texas plant treasures and is known from only three locations in Pineywoods. The narrowest-leaved of all the species in Malvaceae, this mallow sports white flowers during the summer and is threatened by interspecific hybridization with encroachment of *H. laevis* and *H. moscheutos* into its range, as well as loss of preferred wetland habitat along the Neches river and her tributaries.



The Neches river rose mallow is a species of conservation concern with a history of declining numbers and interspecific hybridization problems at the three sites. This project reports on an “introduction” plot at Mill Creek Gardens, a 119-acre natural area and conservation easement under the PNPC’s umbrella. This brief report provides a status report after the sixth year of establishment.

The goal of this project and all introduction/reintroduction projects is simply to determine if an endangered species (i.e., Neches river rose mallow) can be introduced into a site that is similar to and near the plant’s original provenance - and survive as a self-sustaining, long-lived plant community. Whew. We call that the PNPC’s “Three R’s” – Rescue, Research and Reintroduction – which is an endangered plants



conservation strategy to find those simple horticultural treatments that result in healthy plant growth "in the wild" during the first two years. Since the establishment year, only minimal maintenance has been utilized for the plots (annual weedeating – and burning - during the winter).

The original study: Ninety-six Neches river rose mallow plants were introduced into a full-sun, wetland habitat at Mill Creek Gardens, during September and October of 1995. Four rates (0, 20, 40, or 80 grams per plant) of slow-release fertilizer (Osmocote 14-14-14) and two mulching regimes (with and without) were tested using a randomized complete block design, with three blocks, thirty-two plants per block. While the plots enjoy full sun and tight soils in this location, there are varying microhabitats caused not by changing topography, but by the immediately hydrology: water seepage atop bedrock that surfaces unevenly within the experiment area. The south end of the experiment area is relatively dry while the north end contains standing water much of the year. This became most evident during the extended dry period in the fall 1995 and the summer of 1996, as well as during the long, hot dry summer of 1998. While change in topography between all the plants in the experiment varies less than one foot, some of the plants are in standing water much of the year; others are not.

The above-ground stems and leaves were harvested 1996 – 2001 after the first frost by cutting the plants off two inches above the crown. The data remains fascinating: even after six years in this wetland site, plants originally receiving the medium and high rates of fertilizer at planting are still outperforming plants that received the zero and low rates of fertilizer. There was not a significant difference in the growth of plants with or without mulch amendments and mulching at planting. Other data collected at harvest time included number of stems arising from the crown and stem height.

RESULTS:

Figure 1 illustrates the influence of mulch on stem number during the first six years of establishment. Essentially, mulch did not influence stem #.

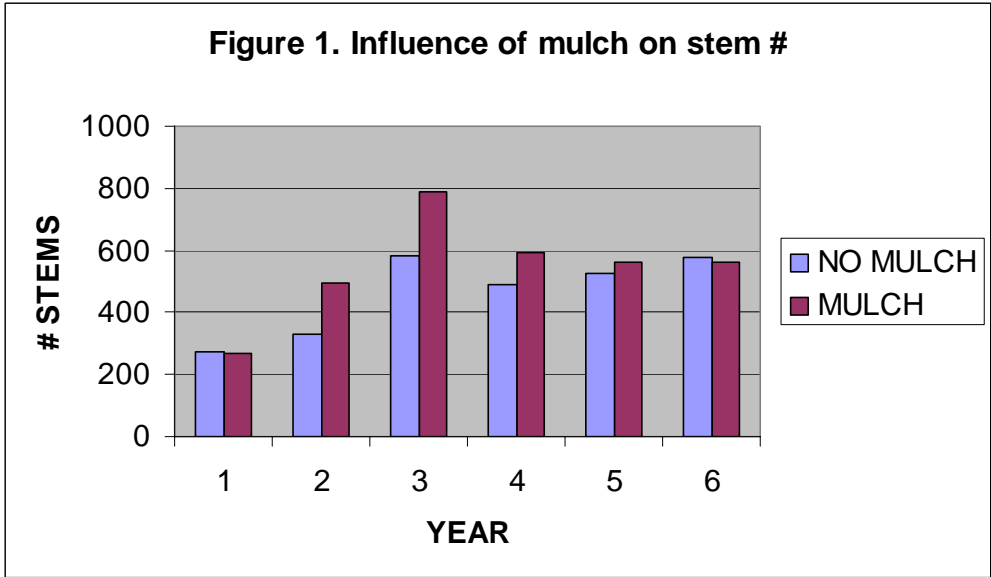


Figure 2 illustrates the influence of fertilizer rate on stem number. Most surprising after six years is the superior performance of plants treated at the 40 or 80 gms per plant rate at planting in 1996. The plants have not received any additional fertilizer in the past six years.

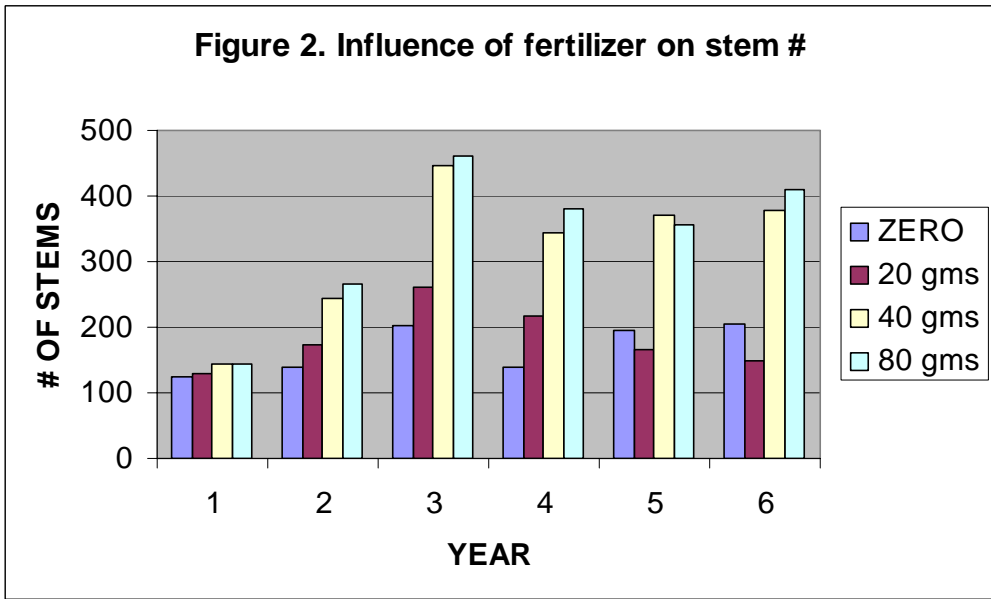


Figure 3 illustrates the influence of mulch on the dry weight of plants in each of the six years. While there is a trend in the early years, it is not statistically significant.

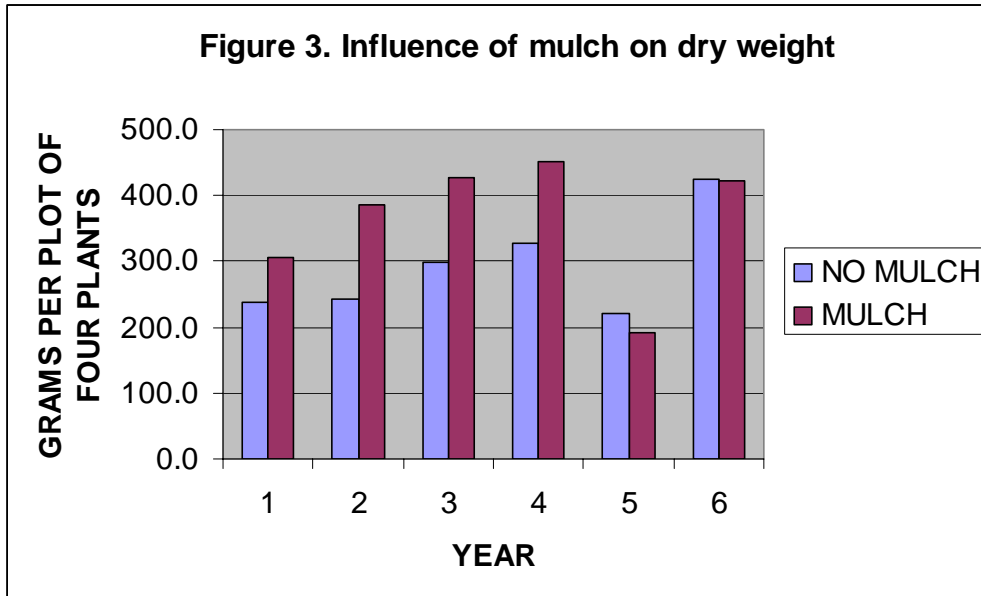
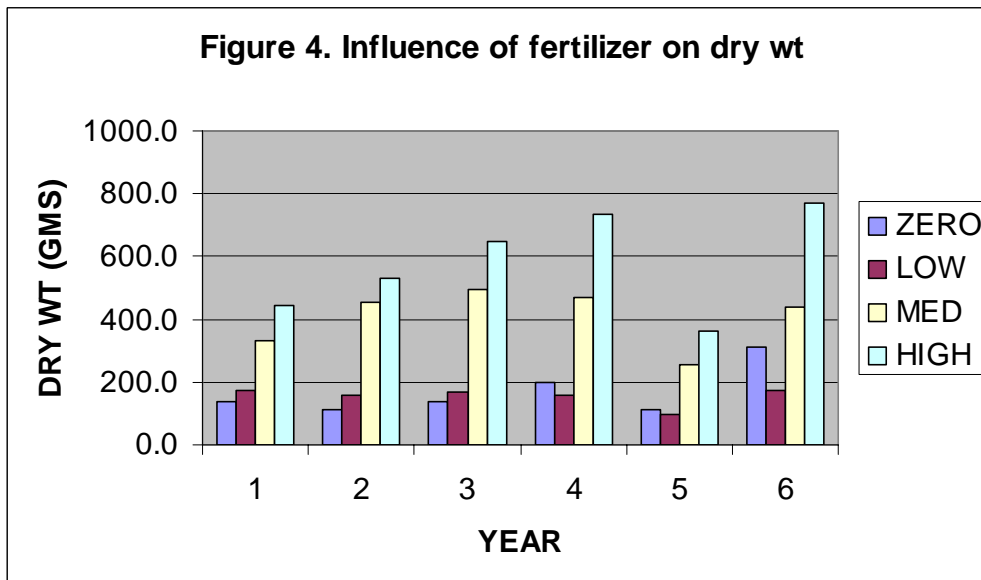


Figure 4 illustrates the influence of fertilizer rate on growth of plants as measured by dry weight in grams. The above-ground parts of the plant have been collected after the first frost in the fall in each year, dried in the SFA Soils Lab Oven, and weighed. Plants treated with 40 or 80 gms of Osmocote 14-14-14 at planting have produced more biomass in each of the last six years.



Poor plant performance in the fifth year of this study (2000) is not fully understood. The summer of 2000 was exceptionally hot and dry with many record high temperatures set (i.e., September 1, 2000 saw a high of 112° F). That may partially account for the 2000 results. The continued good showing of plants treated with the medium and high rates remains a bit of a puzzle. While the forty and eighty gram rate

are significantly different than the zero and low rate – in all of the years sampled, an explanation for this is not readily available. In the first few years of establishment, one might expect some carryover effect, but the fact that the trend has been maintained for six years is difficult to comprehend. Possible explanations might be that plants fertilized heavily at planting develop into robust and competitive adult plants, and in later years, these plants are better able to compete for nutrients and shade competing weeds.

The plots have become difficult to analyze because of seedling development and a 25% mortality of the original plants. Future work in 2002 is planned that will study the movement of seedlings in and away from the plots.

Seedlings from capsules collected at this site have resulted in phenotypically correct plants. Over 900 plants were planted in the spring of 2000 in two wetland sites on the Davey Crockett National Forest. Both introduction sites have been monitored by USF&W and TP&W and other agencies responsible for plant conservation. Another important associated research effort is the genetic characterization of *Hibiscus dasycalyx*, encroaching species and hybrids. Dr. Bea Clack, SFA Chemistry Department and Director of the Biotechnology program, will be leading the charge in this exciting arena. Genomic DNA from *H. dasycalyx*, *H. syriacus*, and *H. grandiflora* was purified and analyzed using PCR resulting in a DNA fingerprint for characterization of pure species and hybrids. Randomly amplified DNA fragments were generated using 20 different single ten base pair long oligonucleotide primers. Unique DNA bands were observed for all three species. These bands will be used as genetic markers for characterization of hybrids between the three species. Work underway will be used to determine differences between the more closely related *H. dasycalyx*, *H. laevis* and *H. moscheutos*; this will be extremely useful in settling on a "type" specimen for future conservation work.

A real understanding of the biology of this (and other) endangered species in an introduction site – or reintroduction site - will only come after many years of monitoring and observation. It's a different kind of horticulture, one that focuses on reduction in inputs and timely interventions to favor a particular plant community. Research trials with *Phlox nivalis* ssp. *texensis*, Texas trailing phlox, and *Gaillardia aestivalis* var. *winklerii*, the white firewheel, are underway with a research strategy similar to the mallow - except plants are located at Mill Creek Gardens in an upland, sunlight-dappled loblolly pine forest with very sandy soils and a fire regime in place. Let's plan and plant and conserve for a better Texas.