

RESTORATION AND CLIMATE CHANGE PART II

As noted last month, climate change will continue to bring an increase in extreme precipitation events as well as summer droughts and heat waves. The overall effect of these changes will be a decline in mesic or medium moisture levels in natural communities. Plant species adapted to mesic conditions are the ones most likely to suffer as the climate continues to change. This effect is amplified in storm water best management practices such as rain gardens and bio-retention basins. The runoff from extreme precipitation events like those of the spring 2011 in the Ohio Valley will cause anaerobic soil conditions to develop in basins that are unable to drain during days of repeated heavy rains. Conversely, the well-drained soil medium required for these BMPs to function during wet weather will exacerbate the effect of summer droughts and heat waves, resulting in extremely low soil moisture levels that will stress all but the most drought resistant plants.



Bio-retention Basins at Butler University recovering from the extreme rainfall of June-July 2008.

My observations of the plants here in the nursery as well as installations of native plants in storm water BMPs have led to the development of a list of “bulletproof” species that seem to tolerate the worst extremes of weather. Overall, graminoids (grasses and sedges) are more tolerant of wildly variable hydrology, however there are a few bulletproof forbs as well.

Sedges are uniquely qualified to withstand the rigors of storm water BMPs due to their tolerance of anaerobic soil conditions and their ability to restrict moisture loss during droughts. This tolerance often makes them the dominant cover in wetlands that dry out in the summer, a condition very similar to what is found in a bio-retention basin. Species that I have observed to be particularly durable for storm water BMPs include Yellow Fox Sedge (*Carex annectans* var *xanthocarpa*), Riverbank Tussock Sedge (*Carex emoryi*), Frank’s Sedge (*Carex frankii*), and Fox Sedge (*Carex vulpinoidea*). If drought resistance is more of concern than flooding, try Meadow Sedge (*Carex granularis*) or Plains Oval Sedge (*Carex brevior*).

Several grasses also earn the bulletproof rating in storm water BMPs. Although often thought of as a dry prairie grass, Prairie Dropseed (*Sporobolus heterolepis*) has proven to be quite tolerant of shallow inundation. Our seed production rows of this species suffered no mortality after sitting in a few inches of water for over 10 days during the flooding of July 2003. Established clumps of this species tend to develop a raised crown or hummock, increasing its resistance to shallow inundation. Tufted Hair Grass (*Deschampsia caespitosa*) is a native grass that is frequently utilized as an ornamental grass. Few people are aware that it is native to seep wetlands and wet prairies, making it very adaptable to storm water practices. The toughest grass of all is Switchgrass (*Panicum virgatum*). It is able to tolerate significant inundation for long periods of time and yet will grow in the driest sands. If you have a sandy free-draining soil mix where flooding is not a significant concern, Little Bluestem (*Schizachyrium scoparium*) will be a drought-resistant plant for your site.

Fortunately, there are a few forbs that have proven quite tolerant of the erratic hydrology. If your primary concern is significant long duration inundation, Blue Flag Iris (*Iris virginica* var *shrevei*) and Swamp Rose Mallow (*Hibiscus palustris*) are outstanding species to accompany the above sedges. Other forbs that have proven resistant to both wet and dry include New England Aster (*Aster novae-angliae*), Wild Senna (*Cassia hebecarpa*), Prairie Blazing Star (*Liatris pycnostachya*), Dense Blazing Star (*Liatris spicata*), Foxglove Beardtongue (*Penstemon digitalis*), Sweet Black-Eyed Susan (*Rudbeckia subtomentosa*), Riddell’s Goldenrod (*Solidago riddellii*), and Wrinkled Goldenrod (*Solidago rugosa*).

If you have had experience with species that have survived or failed to survive extreme weather in storm water BMPs, I would like to hear from you, so that we may work together to continue to refine our recommendations for establishment of successful plant communities in these practices.