# Fact Sheet

USDA NRCS
Natural Resources Conservation Service

**Plant Materials Center**
**14119 Broad Street**
**Brooksville, FL 34601**
**(352) 796-9600**

## Gully Stabilization in North Florida

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Intense rains combined with erosive soils and sloping topography make the Florida panhandle very susceptible to gully erosion and down stream sedimentation. Most gullies are without vegetation which contribute to serious erosion. In early 1994, a 5-year study was begun evaluating different plant materials and their potential in stabilizing four gullies.

Plants adaptable to gullies must be able to establish quickly on seasonally droughty infertile soils, withstand the discharge flow velocity, overcome rapid sediment buildup, and possess non-invasive tendencies. Overall performance of the plant materials used in this study was closely tied to the volume and velocity of runoff water associated with each gully. Gullies with peak discharges from a 10-year, 24-hour storm of 90 cfs (cubic feet / second) or less were successfully stabilized by plant materials. The one gully in the study that had a discharge from a 10-year, 24-hour storm exceeding 180 cfs had velocities too high for plants to become firmly established. It was concluded, that gullies with large flows and high velocities should be stabilized with structures in addition to vegetative measures.

The following species were used in the study: 'Sunshine' Vetivergrass (*Vetiveria zizanioides*), 'Northpa' and 'Southpa' bitter panicum (*Panicum amarum*), 'Sharp' marshhay cordgrass (*Spartina patens*), brunswickgrass (*Paspalum nicorae*), giant reed (*Arundo donax*), 'Alamo' and 'Defuniak Source' switchgrass (*Panicum virgatum*), 'Halifax', 'Citrus' and FLPMC accession no. 421992 maidencane (*Panicum hemitomon*), 'Redalta' limpograss (*Hermarthria altissima*) and sericea lespedeza (*Lespedeza cuneata*). (See performance rating table for species planted on each site.)

**Vetivergrass** was found to be useful in stabilizing upper banks of the gullies. This long-lived hardy bunchgrass can withstand severe droughts and wet periods. The dense fibrous root system clings tenaciously to the soil, and plants that have been washed down from slopes often remain alive and growing. If the plant becomes established in the streambed it can confine runoff water and cause channels to be cut into the streambed. Vetivergrass is a non-native plant however, 'Sunshine' used in this study does not produce viable seed and shows no potential for becoming invasive. Vetivergrass will not spread or colonize an area and once a plant dies and is washed down-slope, there is none to replace it. Therefore, this species should be considered as an early succession plant that stabilizes the soil for colonization by other species.

**Bitter panicum** and **marshhay cordgrass** showed tremendous potential for use in gully plantings. These plants are capable of colonizing on dry or wet soils. Their rhizomatous growth habit gives great stability to the soil, and the plants function well as sediment filters. They are native to Florida, and invasive potential is not a serious concern. Bitter panicum was planted in the largest of the four gullies, which is approximately four miles long, up to 50 feet deep and 200 feet wide in places. Due to heavy rains the first two years, three fence structures and most of the plant materials were washed away or buried by silt. At the end of the evaluation period only a few plants remained along the banks, with small remnants of bitter panicum and vetivergrass remaining in the main channel.

Bitter panicum did not perform well on this site, but it has been observed successfully stabilizing other eroding sites in North Florida where the water velocity and volume was lower.

**Brunswickgrass** is closely related to bahiagrass. It has a similar growth habit but is not as aggressive as bahiagrass. It was found to have fair potential for stabilizing the soil in the gully bed. It appeared to be rather short-lived, being easily crowded out by other species. Because of this, it is not generally considered an invasive plant, though it is not native to Florida.

**Giant reed**, because of its tremendous height and rhizomatous growth habit, can withstand severe flooding and sediment deposition. It prefers moister soils, which limits its usefulness for bank stabilization. It has potential as a sediment trap, however it is not native and has the potential of being invasive.

**Switchgrass** is a bunchgrass native to the Great Plains and most of the eastern US. The cultivar 'Alamo', originated in Texas but grows well in Florida, established initially but did not persist. 'Defuniak Source' (from a wetland in North Florida) apparently did not receive enough moisture on these sites to survive. This species does not appear to be useful for gully plantings under the conditions found in this study.

**Maidencane** is a low growing rhizomatous plant that is adapted to wet fertile sites, but is known to exist in sandhill habitats in Florida. The accessions used in this study exhibited less than favorable results, making them poor candidates for gully stabilization. Other ecotypes might produce different results.

**Limpograss** is similar to maidencane in growth habit also requiring wet fertile conditions for growth. It did not perform well in this study.

**Sericea lespedeza** is a perennial herb with a tall spindly growth habit. Although this was one of the most persistent species studied, its use for gully stabilization is questionable. It is thought to have wildlife food value and may be included in gully plantings for that purpose.

**Visual performance rating of plant materials to stabilize gullies after five years.**

| Species | Okalossa Co. Antioch Gully (20 cfs) | Walton Co. Obermeyer Gully (90 cfs) | Escambia Co. Ronald Rigby Gully (180 cfs) | Santa Rosa Co. Sandy Hollow Gully (> 180 cfs ) |
|---|---|---|---|---|
| Vetivergrass | Excellent | Excellent | Average | Poor |
| Bitter panicum | N / A | N / A | N / A | Poor |
| Marshhay cordgrass | Excellent | N / A | N / A | N / A |
| Brunswickgrass | N / A | Average | N / A | N / A |
| Giant reed | Good | N / A | N / A | Poor |
| Switchgrass<br>'Alamo'<br>'Defuniak' | <br>Poor<br>Poor | <br>Poor<br>Poor | <br>N / A<br>N / A | <br>Poor<br>Poor |
| Maidencane | Fair | N / A | Poor | N / A |
| Limpograss | N / A | N / A | Poor | N / A |
| Sericea lespedeza | Average | Average | Average | Poor |