

Restoring Grasslands in the Chihuahuan Desert: The Burlap Wattle Technique

The Borderlands Research Institute for Natural Resource Management, Sul Ross State University

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Retaining moisture is one of the keys to healthy rangeland, especially in arid regions such as the Chihuahuan Desert of West Texas.

Keeping moisture on-site makes it available for vegetation growth, spring and creek flow, and ground water recharge. When moisture leaves an area as excessive runoff, it causes a decline in the health of the rangeland. As a site becomes degraded, the system's ability to retain moisture decreases, leading to further degradation. Increased runoff and erosion can also hurt adjacent sites; therefore, it's important to maximize infiltration and retain as much moisture as possible.

One way to keep water on the range is with a wattle, a generic term for a small man-made water obstruction. In many arid regions of the world, wattles have been used to increase soil moisture for agricultural purposes. The Bedouins of Egypt and Native Americans both used small stone structures to capture water and sediment to grow crops. Using this technology, engineers on construction sites now use loose rocks and organic materials as wattles. The organic wattles are commercially available and usually are constructed from coir or rice straw wrapped in photodegradable polypropylene netting.

Unfortunately, this style of wattle is expensive. It's made from imported or rare materials, with high transportation costs. Additionally, the photodegradable netting may stay on site indefinitely because it doesn't fully degrade. Installation is also a concern – it requires digging a trench and staking down because the wattles are stiff and do not conform well to the soil surface, which allows water to flow freely underneath and leads to erosion. Because of these problems, this style of commercial



Staked wattle treatment immediately after installation, July 2006, and one year later, August 2007.



Dozed wattle treatment immediately after installation, July 2006, and one year later, August 2007.



wattle has not been used for rangeland restoration.

Because many habitats in west Texas are highly erodible, we initiated an experiment to evaluate moisture retention using wattles. Our research had three main objectives: 1) determine if biodegradable wattles could be efficiently constructed from local materials, 2) determine if wattles combined with reseeding could be successfully used to revegetate rangeland, and 3) determine if different wattle installation techniques yielded different results.

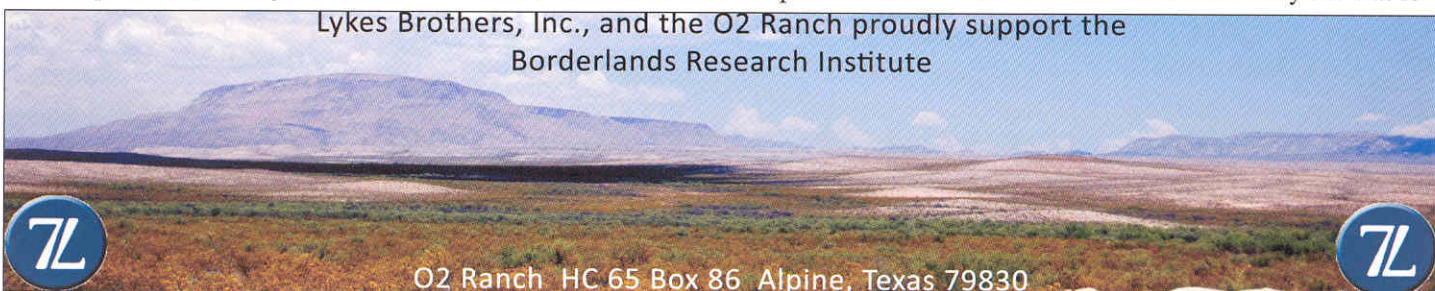
Our first objective was to create a wattle that would be more practical as a range restoration tool. We constructed our wattles with burlap tubes filled with cotton burs. These materials are readily available in Texas from the wool and cotton industries and are 100-percent biode-

gradable. The natural composting process of the cotton burs at the gin yard neutralized any weed seeds.

Another advantage of our wattles is the burlap and cotton burs hold the water until saturation and then allows excess to seep through. The burlap also allows the wattle to flatten out and conform to the soil surface, preventing undercutting. Based on our estimates, the burlap-gin trash wattles cost 66-percent less than commercial wattles and freight was less than 10-percent of that charged for commercial wattles.

To meet objectives two and three we chose a severely degraded site adjacent to the riparian habitats near the headwaters of Terlingua Creek. Because of the site's proximity to the creek headwaters, it could potentially impact thousands of acres downstream. The study site was lo-

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cated on the historic O2 Ranch, owned by Lykes Bros. Inc., in Brewster and Presidio counties. Grazing has occurred along the riparian channels of the O2 since the 1500s causing localized degradation.

Under the supervision of Ranch Manager Homer Mills, the O2 Ranch has made great strides in restoring many of the grassland and riparian habitats on the 275,000-acre ranch. Soils on the study site were sodic – high in sodium content — which makes it difficult to restore native vegetation. Other restoration techniques that have been used in west Texas to increase water infiltration, such as ripping and contouring, were not suitable for our site because of these characteristics.

We installed wattles along contour lines every 110 feet, using two different installation techniques. The “staked” treatment involved driving three to four pine stakes on the downslope side of each 20-foot wattle. The “dozed” treatment required us to dig an eight-inch trench using a D2 dozer and then lay the wattle directly in the trench. For comparisons purposes,

we also monitored a control area with no wattles adjacent to these treatments to ensure that our results were not from natural change. For the staked, dozed, and controls we seeded and harrowed a mixture of native grasses in an eight-foot strip on the upslope side of the wattle lines.

The wattles were successful in holding soil and moisture long enough to allow the seeds to germinate within two feet, but not farther upslope. The cotton burs acted as moisture-retaining mulch and created an excellent microclimate conducive to vegetation establishment. The soil moisture was substantially higher in the two treated areas than in the control area. Soil moisture for the dozed, trenched, and control area averaged 10.1, 9.5, and 7.8 percent, respectively.

All of the seeded species (blue grama, green sprangletop, alkali sacaton, sideoats grama, fourwing saltbush, and cane bluestem) became established in the two treated areas. Many other desirable species, including tobosa, bush muhly, deer muhly, and plains bristlegrass, also germinated. No perennial grasses were estab-

lished in the control.

Vegetative cover was estimated at 84 percent (28 percent perennial grasses) along the dozed wattles, 67 percent (22 percent perennial grasses) along the staked wattles, and 30 percent (zero percent perennial grasses) along line transects in the control. The control looked much the same as it did at the beginning of the study. The majority (77 percent) of the forbs in the control was Russian thistle and the only grass we documented was annual sixweeks grama (three percent).

Both the staked and dozed treatments of the wattle technique had successful vegetation establishment within one year, with the dozed treatment having the highest soil moisture and vegetation establishment. Although we have monitored this study for only a year, it shows promise as an affordable restoration technique for west Texas rangelands. We plan to continue to monitor the plots to determine how fast the wattles will fully degrade and how long it will take for vegetation bands to become self sustaining. 🐾



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