

# **PUBLICATIONS**

## **2006**

## SOILS FOR ALFALFA ON THE EAST TEXAS COASTAL PLAIN

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**Background.** Site selection is critical to successful production of alfalfa. Characteristics of a good site for alfalfa include adequate soil drainage, low subsoil acidity, high fertility, and good soil aeration. The importance of good soil drainage and aeration cannot be overemphasized. Alfalfa cannot tolerate wet soil conditions for extended periods, particularly near the surface. However, we have successfully grown alfalfa on a Thenas fine sandy loam that had a perched water table at 20 inches below the surface in the spring. Knowledge of the type of soil available on the farm or ranch is important for successful alfalfa production on acid soils. Distinguishing characteristics among soils mainly occur in the B (argillic-zone of accumulation) horizon.

**Research Findings.** Our research on soil series shows that alfalfa produces well on Paleudult and Paleudalf soils. These are old, well-developed soils that have excellent drainage and aeration. Subsoil colors are reddish orange to yellow with very little gray color in the top 4 ft. Gray subsoils can be indicative of prolonged periods of excess water. Depth of surface sand varies, but can exceed 4 ft. Soils with deep, sandy A horizons will hold less plant available water. Because these soils contain lower amounts of iron and aluminum compounds, less Al will be solubilized when these soils have a pH below 5.5. By contrast, lower alfalfa yields were attained on the Hapludult and Hapludalf soils. These soils have a shallower depth of surface sand and minimum horizon development. They have more clay, iron and aluminum compounds, are a darker red color in the subsoil horizons, and therefore will solubilize more Al as soil pH drops below 5.5. In a review of the USDA Natural Resources Conservation Service Soil Survey Manuals for Anderson, Cherokee, Gregg, Rusk, and Smith Counties in Texas, we selected soils that we considered suitable for alfalfa production. Keep in mind that with any of these soils, good drainage and aeration are important, **and**, on soils that are acidic, the subsoil pH must be evaluated to 4-ft deep. Regardless if all other characteristics of the site are optimal for alfalfa, but subsoil pH is much below 5.5, reconsider using this site for alfalfa unless irrigation is available to keep the limed surface depth moist, because subsoil acidity will limit alfalfa rooting depth.

Soils with properties suitable for alfalfa production in the five-county region include those named: Bowie, Darco, Elrose, Fuquay, Gallime, Libbert, Larue, Oakwood and Ruston. Soils which may or may not be suitable, depending upon slope and other factors include: Boswell, Eustis, Pickton and Wolfpen. Soils common to East Texas with properties NOT suitable for alfalfa production include: Arenosa, Bub, Bibb, Cuthbert, Gladewater, Hannahatchee, Iuka, Kirvin, Kullit, Kaufman, Lakeland, Latch, Magnolia, Mantachie, Nacogdoches, Nahatche,

Redsprings, Sacul, Thenas, Trinity and Urbo. Some of the more sandy soils listed as 'unsuitable' may support alfalfa if a judicious liming program has been followed and the site is well drained.

Anderson County soils considered suitable for alfalfa account for 32% of the area. These soils include Darco, Fuquay, Larue, Elrose, and Bowie. Gregg County soils considered suitable for alfalfa production include Bowie and Lilbert, which comprise 23% of the area. Smith County soils considered suitable for alfalfa include Wolfpen, Pickton, Oakwood, Lilbert, Bowie, Elrose, and Gallime. These soils account for 36% of the county acreage. More than 30 % of Cherokee County soils are considered suitable for alfalfa production. Suitable soils include selected Lakeland, Bowie, Eustis, and Ruston soils. Nearly 46% of Rusk County soils are suitable for alfalfa production, the highest percentage of any of the five counties Haby evaluated. Rusk County soils suitable for alfalfa include Lilbert, Tenaha, Sawtown, Kirvin, Bowie, Darco, Betis, Latex, and Ulto. Alfalfa-suitable soil acreage may be lower than this percentage because slopes greater than about 3% may not be suitable due to the possibility of erosion when a clean-tilled seedbed is prepared. Successful East Texas alfalfa production isn't limited to the counties surveyed.

**Application.** The guidelines used for these five counties can be used to identify soils suitable for alfalfa in other counties. Success with alfalfa depends upon careful attention to site selection, proper liming of acid soils, pest control and fertilization – including boron. Establishment costs – from \$230 to \$350 per acre – can also be an inhibiting factor. On the other hand, compared to hybrid bermudagrass, some production costs are reduced. Nitrogen fertilizer is not needed for alfalfa because Rhizobium bacteria inoculated on the roots of alfalfa convert nitrogen in the air to the form needed for plant growth. Detailed guidelines for site identification and establishment of alfalfa can be found on the Internet at <http://soils.tamu.edu>. Alfalfa production budgets in the form of Excel spreadsheets may be downloaded at <http://ruralbusiness.tamu.edu/forage/>.