

Plants Help Reduce Odors, Store Carbon

Waste management: It's about thyme

A 1,000-head cattle feedlot produces about 146 to 175 tons of wet manure every week — a problematic figure for feedlot operators and their neighbors. Despite its benefits as a natural fertilizer, manure is a source of pathogens and odor. Agricultural Research Service (ARS) scientists are developing a method to reduce manure's negative properties. All they need is a little thyme.

Thymol is the active component in thyme oil, which can be extracted from a variety of plants, such as thyme and oregano. Because of its pleasant odor and natural antiseptic properties, thymol appears in a variety of products, including mouthwash and throat lozenges.

ARS microbiologists Elaine Berry, Vince Varel and Jim Wells discovered that its qualities can also benefit feedlots. When applied to cattle feedlot soil in slow-release granules, thymol reduced concentrations of odor-causing volatile fatty acids (VFAs) and pathogens like coliform bacteria and *E. coli*. Berry, Varel and Wells work in the ARS Nutrition Research Unit, part of the agency's Roman L. Hruska U.S. Meat Animal

Research Center (MARC) in Clay Center, Neb.

The researchers observed even more prolonged effects in swine facilities, which might be due to the pits some swine operators employ to collect and store manure. The enclosed systems could retain more thymol than the cattle feedlots, increasing its effectiveness.

The scientists also tested less expensive compounds in the lab, including terpineol, linalool, plinol and geraniol. Most promoted reduction of VFAs and pathogens like *E. coli* and salmonella.

Linalool was nearly as effective as thymol in the lab, but when subjected to field studies in the feedlot, thymol outperformed it. This may have been due to dry weather conditions during the test period, the researchers speculate. They plan to conduct more tests in the spring, when feedlot conditions will more closely resemble the slurries in which the compounds were initially tested.

— by *Laura McGinnis*

Editor's Note: *Oregano plants were the botanical source for the odor- and pathogen-reducing thyme oil used in the study.*

Eastern gama grass loves the heat

The hotter it gets, the better eastern gama grass grows. That's according to ARS scientists at the Henry A. Wallace Beltsville (Md.) Agricultural Research Center. This means the plants not only could produce higher yields, but also store more carbon and, therefore, help mitigate the effects of high atmospheric carbon dioxide (CO₂) levels associated with global warming.

ARS plant physiologists Donald Krizek, Dennis Gitz and V.R. Reddy and soil scientist Jerry Ritchie have obtained the first experimental proof that eastern gama grass may outcompete other plants and store more carbon in a hotter climate.

The scientists simulated global warming conditions in outdoor climate-controlled SPAR (Soil-Plant-Atmosphere Research) chambers. They tested the plants at the current level of atmospheric CO₂ — 370 parts per million (ppm) — as well as at double that amount, the level expected around the year 2100.

Their experiments show that when temperatures were increased from 68° F during the day and 57° at night to 95° in the daytime and 84° at night,

eastern gama grass plants could triple their carbon storage. The plants' leaves were bigger and contained twice as much nitrogen (N), raising their protein content. Temperature had far more effect on plant growth than CO₂ level.

Eastern gama grass is often called "queen of the grasses" because it has so many good qualities. A hardy, warm-season grass, it not only tolerates and grows in marginal soils that are acidic, compacted and waterlogged, it actually improves them. Eastern gama grass also seems to withstand hot, dry conditions by closing the stomates on its leaves during the day to reduce water use.

At a time of year when cool-season grasses go dormant, eastern gama grass provides high-yielding forage that is as nutritious as alfalfa.

Read more about this research in the September 2005 issue of *Agricultural Research* magazine, online at www.ars.usda.gov/is/AR/archive/sep05/carbon0905.htm.

— by *Don Comis*

