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# Science Update

## **Bacteria May Provide Biofuel, Cheap Nitrogen Fertilizer**

Some soil-dwelling bacteria may prove useful for making an inexpensive biofuel or improving the production of synthetic fertilizer. These microorganisms use enzymes—containing iron or iron and vanadium—to change atmospheric nitrogen into a form plants can use. Some of the hydrogen released during this conversion is not used by the plants, and scientists say the extra hydrogen could be collected and used as a biofuel. In addition, bacteria that use iron in the conversion process may yield clues about whether iron has potential as a catalyst in manufacturing ammonium-nitrogen fertilizers. Currently, producing these fertilizers requires very high temperature and pressure and, thus, lots of fossil fuel. An alternative process could lower the fuel requirements. *Paul Bishop, USDA-ARS Soybean and Nitrogen Conservation Laboratory, Raleigh, North Carolina, phone (919) 515-3770.*

## **Speediest Cover Crop?**

Tropic Sun, a USDA-developed variety of sunn hemp for the South, grows to its full 6-foot height in 10 weeks, according to tests by ARS scientists. Other cover crops, such as hairy vetch and crimson clover, take 7 months. In the South, sunn hemp, *Crotalaria juncea*, can be planted right after corn harvest to protect soil from fall and winter storms. And since it's a legume, it can make enough natural nitrogen fertilizer for the next corn crop. Sunn hemp can also be grown as a high-protein forage for late summer, when other pastures slow down. USDA's Natural Resources Conservation Service

selected Tropic Sun from sunn hemp lines used for centuries as a green manure crop elsewhere, mainly Southeast Asia. People in India make cloth from the fiber. ARS researchers in Weslaco, Texas, are investigating whether sunn hemp fiber can be turned into paper or has potential as a supplement for peat moss used to grow nursery plants. *D. Wayne Reeves, USDA-ARS Soil Dynamics Research Laboratory, Auburn, Alabama, phone (334) 844-4741.*

## **A Couple of Drinks a Day Can Lower Vitamin B**

One or two alcoholic drinks a day can interfere with vitamin B levels, according to an ARS study of 41 men and women. Their blood levels of vitamin B<sub>12</sub> dropped when alcohol made up 5 percent of their daily calories. Over the long term, compromising B<sub>12</sub> status could impair memory. Scientists also evaluated the volunteers' levels of folate. This B vitamin helps transform an artery-damaging amino acid, homocysteine, into a harmless substance. That's important to health, because high homocysteine is linked with increased risk of heart disease and stroke. Average blood folate levels didn't drop when the volunteers were consuming the equivalent of two drinks a day. But during their alcohol-free period, folate levels rose and homocysteine levels fell. These findings shed new light on an old question: What causes low B vitamin status in alcoholics? Some health professionals have said the cause is poor nutrition; others, that alcohol degrades the B vitamins. Both factors appear to contribute. *Judith Hall-frisch, USDA-ARS Beltsville Human Nutrition Research Center, Beltsville, Maryland, phone (301) 504-8396.*

## **Seed's Coat of Many Microbes Wards Off Rot**

Shielding corn seeds with a mix of helpful fungi and bacteria weakens or kills fungal pathogens that attack young corn sprouts. ARS scientists came up with this way of using a number of different microbial species to protect corn seeds from rot diseases caused by *Pythium* and *Fusarium* fungi. The diseases can cut yields 10 to 30 percent. Earlier research approaches focused on finding one microbial agent to fight one pathogen. But a combination of helpful bacteria and fungi—isolated from roots and soil—could guard against multiple pathogens that may be present. Some good-guy microorganisms compete with fungal pathogens for nutrients. Others make antibiotics that kill or repel the fungi. Still other microbes are parasites that invade and consume the fungi. Field tests in Maryland, Minnesota, Delaware, and Virginia were conducted by ARS scientists collaborating with the University of Delaware, Virginia Polytechnic Institute and State University, and a commercial firm. In one field test in which plots harbored both *Pythium* and *Fusarium*, only about half the seeds sprouted and grew to mature plants. But 80 percent of seeds coated with beneficial fungi and bacteria grew to full-grown plants. Seed protected with coatings of fungicides did no better. The ARS lab is seeking commercial collaborators to develop the technology. *Robert Lumsden, USDA-ARS Biocontrol of Plant Diseases Laboratory, Beltsville, Maryland, phone (301) 504-5678.*