

ACTION IN AGROFORESTRY

monthly newsletter of the University of Missouri Center for Agroforestry

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Michael Gold and Michelle Hall, editors

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Plant buffers may limit spread of antibiotics in animal waste

Research by scientists at the MU Center for Agroforestry suggests that buffer strips of grasses and other plants can trap and break down veterinary antibiotics in manure fertilizers.

Buffer strips have already demonstrated they can be effective in protecting water quality, controlling erosion and supporting wildlife around crop fields.

“That’s the beauty of it,” said Keith Goyne, assistant professor of environmental soil chemistry in the MU School of Natural Resources. “Vegetative buffers already are a recommended practice for reducing sediment, nutrients and herbicides in surface runoff. Our research is showing another benefit.”

The finding comes amid emerging concerns about the use of veterinary antibiotics in livestock farming. Thirty to 80 percent of any given dose of antibiotic may end up excreted as waste rather than absorbed by the animal, Goyne said. When manure is used to fertilize croplands, antibiotics in the manure-enriched soil may leave the farm via surface runoff and eventually end up in streams, lakes or rivers.

While the concentrations of the antibiotics appear to be too small to pose a direct threat to human health, scientists worry the presence of these compounds in soil and water may foster the emergence of drug-resistant bacteria. The compounds also may harm ecosystems by disrupting communities of soil microbes.



Buffer strips of grass and trees adjacent to cornfields at MU Greenley Center, Novelty, Mo.
Photo by Kristen Veum.

Earlier studies by MU scientists have shown that grass buffers in croplands can filter herbicides in surface runoff by physically trapping sediment and nurturing microorganisms that break down herbicides.

Goyne and colleagues – including assistant professor of forestry Chung-Ho Lin, professor of soil science Steve Anderson, graduate student Bei Chu, and USDA soil scientists based at MU, Robert Le-
rch and Robert Kremer – have been conducting laboratory and field tests to see if buffers could play a similar role in filtering antibiotics.

In one study, researchers collected soil samples from both croplands and grass and agroforestry buffers at three MU research farms. They exposed the samples to two common veterinary antibiotics, sulfadimethoxine and oxytetracycline. Comparisons of soil from croplands and buffers revealed soils from several types of plant buffers were effective at reducing concentrations of the antibiotics.

A more detailed report on the research was published online recently in the international journal, *Agroforestry Systems*. Chu et al. 2010. “Veterinary antibiotic sorption to agroforestry buffer, grass buffer and cropland soils.”

Article by Curt Wohleber, MU Cooperative Media Group. Research appeared in the St. Louis Post-Dispatch Feb. 15 and ScienceDaily Feb. 16, among other media.

8TH ANNUAL MISSOURI CHESTNUT ROAST TO BE HELD OCT. 16

Save the date for the next Missouri Chestnut Roast! The 8th annual specialty crops showcase will be Saturday, Oct. 16, 2010, at the MU Horticulture and Agroforestry Research Center, New Franklin.

Join the MU Center for Agroforestry as it celebrates nut harvest season; a family day out; a Missouri specialty product showcase; an agroforestry field day; and – first and foremost – a chestnut extravaganza!

The event will be held rain or shine and will be from 10 a.m. to 4 p.m.

In addition, the MU Center for Agroforestry, along with the MU Institute for Continental Climate Viticulture and Enology, will sponsor the first specialty crop educational tours and festival at Fahrmeier Farms, Lexington, Mo., Sept. 24-25. The festival will be open to the public and will be held Saturday, Sept. 25.

Stay tuned for more information as it becomes available!

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RESEARCH

Houx, J.H., R.L. McGraw, F.B. Fritschi, and N.E. Navarrete-Tindall. 2009. Effects of shade on growth and nodulation of three native legumes with potential for use in agroforestry. *Native Plants Journal*. 10:233-238.

The Midwest has many native legume species adapted to savanna environments with varying levels of shade. These plants may be ideal for use in agroforestry plantings to provide biologically fixed nitrogen, ground cover and wildlife food and habitat. Three such species Desmodium canadense, D. canadense, and D. illinoense were evaluated for their ability to grow and fix nitrogen under varying shade conditions. These three species produced equal amounts of dry matter at 45 and 100 percent light, but significantly less dry matter at 20 percent light, suggesting heavy shade does inhibit their growth. However, they had greater or equal concentrations of biologically fixed nitrogen at 20 percent light compared to 45 or 100 percent light, suggesting these species maintain the nitrogen fixation process even under dense shade. The research suggests these species may have wide applicability in shady environments where they would provide ground cover, wildlife food and habitat, and fix nitrogen to the site.

is abundant. Eastern redcedar is often considered a “trash or nuisance” tree. The bioactive phytochemicals within various redcedar tissues and by-products including cedar oil, cedar sawdust and various tissues, have been isolated and characterized. Several commercial applications in agricultural, pharmaceutical and cosmetic industries have been identified. The isolated biologically active phytochemicals will provide the opportunities to turn abundant, low-value, renewable materials from the Eastern redcedar into a lucrative, high technology industry in Missouri.

OUTREACH

Mike Gold, Dusty Walter and Johann Bruhn coordinated and presented at an Agroforestry Workshop March 5 in Kampsville, Ill. Workshop topics included shiitake mushrooms, controlling woodland invasives using goats and silvopasture, and incentives. About 45 people attended; demonstrations included log-grown shiitake production, using a wood mizer, boiling maple syrup and a timber management walk. Additional speakers included Mark Kennedy, NRCS Grassland Conservationist, Houston, Mo. Other workshop sponsors included the Calhoun County Farm Bureau, Calhoun County SWCD, McCully Heritage Project, Two Rivers RC&D, University of Illinois Extension and USDA NRCS.

KUDOS

Michele Warmund has received a \$4,995 grant for “Evaluation and Characterization of Ambers in Selected Black Walnut (*Juglans nigra* L.) Cultivars” from the Northern Nut Growers.

IMPACT

Research by **Chung-Ho Lin** shows value-added phytochemical products from Eastern redcedar (*Juniperus virginiana*) have the potential to create new industries in regions where the tree



Mike Gold speaks March 23 at the first workshop in the 2010 Chestnut Workshop Series at the MU Horticulture and Agroforestry Research Center (HARC). More than 20 landowners attended and learned about site selection, planting, grafting planning and pruning from workshop instructors Gold, Ken Hunt and Michele Warmund. While at least a few of the attendees already produce and market chestnuts, for most this was the first time to see chestnut trees or sample fresh roasted chestnuts. Following the morning classroom presentations, attendees visited the HARC chestnut orchards to view the mature research orchard and the younger research test orchards. Participants will learn about grafting at the next workshop, May 4.

COMING SOON...

May 4 UMCA Chestnut Workshop Series, workshop #2
Grafting
Horticulture and Agroforestry Research Center,
New Franklin
Contact Julie Rhoads, 573-882-3234 or
rhoadsj@missouri.edu, for more information

May 12 UMCA Faculty/Staff Bi-monthly Meeting
3 p.m., 210 ABNR



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