



Action in Agroforestry

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Michael Gold and Katie Moritz, editors



Photos by Katie Moritz | Center for Agroforestry Intern
A donkey, a natural guardian against predators, protects a bunch of baby goats on Busby Farm.

TOP: Charlotte Clifford-Rathert at Busby Farm in Jefferson City.
BOTTOM: A herd of goats grazes on a hill at Busby Farm.

Local scientist studies goat silvopasture

By Katie Moritz
Center for Agroforestry Intern

The best way to protect woodlands from invasive plant species turns out to have four legs, an insatiable appetite and a very low environmental impact, according to a local scientist's findings.

Since fall 2011, Charlotte Clifford-Rathert, DVM, an assistant professor at Lincoln University in Jefferson City, has been studying the use of goats to restore native vegetation in woodlands at the school's 280-acre Busby Farm, Missouri's largest organic research farm. She has found this system is beneficial for the goats and the land.

"This is a perfect place for goats," Clifford-Rathert said. "Instead of mechanically [or chemically] clearing you can use goats for less of an impact on the environment. I'm really anxious for the next two years to show, 'See? it really does work.'"

To conduct the three-year study, Clifford-Rathert partitioned off six seven-acre paddocks of the farm's woodlands; three are occupied by goats. The goats munch on invasive species such as multiflora rose and Japanese honeysuckle, leaving the forest floor weed-free and able to regrow native plants. Clifford-Rathert and her team of two graduate students move goats from acre to acre every four to seven days and study the effects

the goats have on the woodlands.

Researchers observe the land and goats closely, monitoring weight gain, intestinal parasites in the goats and soil fertility and compaction. The grazing has cleaned up the forest floor, seriously diminishing invasive plants, and the goats have far less parasites than if they had been grazing traditionally, Clifford-Rathert said.

Learning about the effects of woodland grazing has several benefits, she said. Farmers can make money on a wood crop by making their woodlands usable. Clifford-Rathert said farmers could get a good wood crop every 10 to 15 years, with an annual meat crop in between, when utilizing this agroforestry practice.

"It's frustrating to me that people have woodlands but aren't using them," she said.

Cleaning up woodlands also diminishes the risk for forest fires, Clifford-Rathert said.

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Simulation of row-crop watersheds in claypans

By **G.M.M.M.A. Senaviratne, R.P. Udawatta, C. Baffaut, and S.H. Anderson**

2013. *Agriculture Policy Environmental eXtender simulation of three adjacent row-crop watersheds in the claypan region. J. Environ. Qual. 42: 726–736.*

The Agricultural Policy Environmental Extender (APEX) model is used to evaluate best management practices on pollutant loading in whole farms or small watersheds. The objectives of this study were to conduct a sensitivity analysis to determine the effect of model parameters on APEX output and use the parameterized, calibrated, and validated model to evaluate long-term benefits of grass

waterways. The APEX model was used to model three (East, Center, and West) adjacent field-size watersheds with claypan soils under a no-till corn (*Zea mays* L.)/soybean [*Glycine max* (L.) Merr.] rotation. Twenty-seven parameters were sensitive for crop yield, runoff, sediment, nitrogen (dissolved and total), and phosphorous (dissolved and total) simulations. The model was calibrated using measured event-based data from the Center watershed from 1993 to 1997 and validated with data from the West and East watersheds. Simulated crop yields were within $\pm 13\%$ of the measured yield. The model performance for event-based runoff was excellent, with calibration and validation $r^2 > 0.9$ and Nash–

Sutcliffe coefficients (NSC) > 0.8 , respectively. Sediment and total nitrogen calibration results were satisfactory for larger rainfall events (> 50 mm), with $r^2 > 0.5$ and NSC > 0.4 , but validation results remained poor, with NSC between 0.18 and 0.3. Total phosphorous was well calibrated and validated, with $r^2 > 0.8$ and NSC > 0.7 , respectively. The presence of grass waterways reduced annual total phosphorus loadings by 13 to 25%. The replicated study indicates that APEX provides a convenient and efficient tool to evaluate long-term benefits of conservation practices.

This article appeared in JEQ of May-June issue, 2013.

Senaviratne defends dissertation on claypan soils

By **Dr. Ranjith Udawatta**

Anomaa Senaviratne defended her dissertation research entitled “APEX and fuzzy model assessment of environmental benefits of agroforestry buffers for claypan soils” on May 3, 2013. Dissertation committee members were Drs. Ranjith Udawatta, Stephen Anderson, Claire Baffaut, and Allen Thompson. She will begin a Post-doc position on June 3, 2013 with Dr. Baffaut on APEX simulation for P Index, funded by the National CIG Program. She will also work with Dr. Udawatta on prediction of environmental benefits of conservation practices with APEX modeling on agricultural watersheds in North Missouri.

Mid-American Agroforestry Working Group gets new website

The Mid-American Agroforestry Working Group has a new website that is a portal to information and resources to support agroforestry. It can be found at midamericanagroforestry.net.

Silvopasture: Continued from page 1

She said the U.S. Department of Agriculture was interested in her research because it could provide solutions to forest fire problems.

“If that stuff is all gone, there’s no fuel to the fire,” she said.

In addition to benefitting farmers and providing a fix for forest fires, woodland grazing restores the woods to their natural state. Clifford-Rathert said she’s become very excited about the work she’s doing at Busby Farm.

“It’s my passion; it’s really become what I get up in the morning to do,” she said. “I see the potential, one year later, two years later, three years later. I can’t wait for it.”

Upcoming events

- May 30** Alternative Agriculture Field Day
Alan T. Busby Farm
Contact Chris Boeckmann by phone at (573)619-2914 or by email at boeckmann@lincolnu.edu for more information.
- May 31 to June 1** 34th annual Missouri Tree Farm Conference
Kirksville, Mo.
Contact the Forest and Woodland Association of Missouri at (818)645-5399, email fwam.trees@gmail.com or go to forestandwoodland.org for more information.
- June 3** Sustainable Management for Livestock Production - Ann Wells, DVM
Webinar at 7 p.m.
To join the webinar log in at univmissouri.adobeconnect.com/debikelly
- June 9 to 14** First International Symposium on Elderberry
Columbia, Mo.
Visit muconf.missouri.edu/elderberrysymposium for more information and to register for the conference.
- June 13** The Short and Long Term Benefits of Cover Crops - Newell Kitchen, Soil Scientist, USDA-ARS
Webinar at 2 p.m.
To join the webinar log in at univmissouri.adobeconnect.com/debikelly
- June 19 to 21** 13th North American Agroforestry Conference
Charlottetown, Prince Edward Island, Canada
Visit 2013naac.com for more information.
- June 20** Bradford Research Farm Quail and Native Plant Field Day
Columbia, Mo.
Call (573)884-7945 for more information.



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