

SARE

Farmers Forum Highlight

The Farmers Forum is an annual event that gives farmers, ranchers, and others the chance to share information about sustainable agriculture practices with a national audience. The talks focus on research, demonstration, and education projects that promote farming and ranching that is good for the environment, profitable, and good for the community.

The 2010 Farmers Forum will be held on Nov. 4-6 at the Boone County Fairgrounds in Columbia, MO, and will feature farmers, ranchers, youth, educators, researchers, and others who have received North Central Region-Sustainable Agriculture Research and Education (NCR-SARE) grants. It is supported by the NCR-SARE program. For information, or to register, call *Small Farm Today* magazine at 1-800-633-2535 or see the website, www.smallfarmtoday.com.

NCR-SARE is a USDA-funded program that supports and promotes sustainable farming and ranching by offering competitive grants and educational opportunities for farmers and ranchers, youth, researchers, educators, institutions, organizations, and others exploring sustainable agriculture.

One of many educational efforts NCR-SARE helps support is the Farmers Forum at the National Small Farm Trade Show and Conference in Columbia, MO. The 2009 Farmers Forum featured speakers who received NCR-SARE Farmer/Rancher Grants and Youth and Youth Educator Grants. Additional speakers included extension educators and farmers who received Missouri Sustainable Agriculture Demonstration Award grants through a joint program of the Missouri Department of Agriculture and University of Missouri Extension.

This highlight is a summary of reports and presentations by the 2009 Farmers Forum speakers. The FNC, YNC, or YENC numbers listed with most project titles are NCR-SARE project numbers. They can

be used to look up full project reports. To read the full reports, go to the national SARE website at www.sare.org and click on the "Project Reports" tab.



<http://www.sare.org/ncrsare>



Cindy Pittz and Andrew Pittz sell aronia berry products at the Omaha, NE farmers market.

Photo by Pittz

FNC05-561 Missouri Valley, IA – Vaughn, Cindy, and Andrew Pittz

Aronia Berry: A Sustainable Organic Crop

Objective: To research the feasibility of the aronia berry (also known as chokeberry) as a value-added, profitable, alternative crop that can be produced in the North Central Region by small family farms, and to develop the opportunity for small family farms to use the aronia berry as a sustainable organic alternative crop.

Results: Sawmill Hollow Organic Farms, our family-owned agribusiness, began in 1995. We have always practiced sustainable farming on our farm. We plant and raise aronia berries using organic farming methods, and are a certified organic farm. To meet our SARE project goals, in 2006 and 2007 we planted an additional 8,500 aronia berry plants, adding to our four acres of aronia berry already planted. We continued to research and develop five aronia berry products: Aronia Jelly, Aronia Cayenne Sauce, Aronia BBQ Sauce, Aronia Syrup, and Aronia Salsa.

From this grant we learned there is a great deal of interest and opportunity for developing alternative value-added crops that can be produced through organic farming methods. Organic aronia berries offer this opportunity.

SARE grant support gave Sawmill Hollow Organic Farms the incentive to work harder in continuing our goal

of developing this industry for family farms. In addition to SARE's grant support, we have also benefited greatly from SARE literature and the overall connectivity that SARE provides farms and communities engaged in sustainable agriculture. We met our goal to increase aronia berry production to meet the manufacturing demands for products that already had met success with manufacturers. We did this by increasing the number of plantings at Sawmill Hollow Organic Farms, and by helping increase the number of new commercial growers. We've enjoyed implementing a project that has been well received for its environmental, economic, and social success. In fact, we have had berry picking fundraisers for various community groups, such as the Boy Scouts and Friends of the Library. We've held an aronia berry

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Use of Multispecies Grazing to Reclaim Abandoned Strip Mines

One of the key things we learned with this project is that goats and sheep and firewood harvesting can drastically lower the costs of reclaiming strip mine spoil. The traditional way of reclaiming this land is bulldozing, because strip mined land is frequently covered with spoil piles and pits to the point that it is unmowable even if you could get anything to grow on it.

With this grant, in early spring 2000 we added a test paddock to our rotational grazing. It was one of 12 paddocks; animals were moved to a new paddock every two to three days.

The paddock now has been grazed regularly during the growing season, and stock overwinter there. Sweet clover, red clover, white clover, orchard grass, and lespedeza all were established throughout the paddock by feeding the seeds to the sheep and goats and letting them “plant” via their droppings. They do a better job than people planting seed!

We found using a strip system of grazing over the whole

paddock to reduce underbrush, then cutting firewood from a strip about 20 feet wide, waiting two years for stumps to loosen before leveling the long washboard-like spoil fingers left by the drag line, and feeding big bales on the newly leveled strip, cost us less than 10 dozen hours total.

I’ve sold the goats because they share parasites with the sheep, but I know goats make money. Over five years we spent \$1,000 for five nannies and two billies. During the course of the grant we sold 23 meat goats for \$1,508. When we depopulated we sold 28 nannies of various ages for another \$2,690. Our total additional cost for keeping the goats was two round bales of hay a year for four winters.

Currently our pasture is lush. Instead of dozing it flat we saved all the oaks, and the sheep continue to graze the mine area. We’ve started to graze them on another pasture to reclaim it, as well. In spring 2010 I plan to test the organic matter to see the difference made.

Pasture-Raised Heritage Breed Turkeys

Objective: To hatch and raise my own turkeys out of my existing birds, to market my birds to various ethnic groups that come to our farm to buy livestock and poultry, and to cook one of my birds and do a taste test and survey about how the bird tasted compared to store-bought turkey.

Results: Raising heritage turkeys outdoors on pasture reduces stress and is a healthier environment for them. They’re better adapted to outdoor life. Before receiving this grant, I had two different varieties of heritage breed turkeys, but had not tried to raise any on my own. When my original turkey hens started laying eggs, I put them in an incubator. I also put eggs under broody chicken hens and, toward the end of the laying season, let two turkey hens set on a clutch of eggs.

None of the incubated eggs or those under the chickens hatched. Two eggs under the turkey hens hatched, but neither poult lived past day one. I’ve since learned that to increase hatchability of

eggs, I need to increase the feed protein level from the 16 percent I was feeding to 20 percent. I need to make sure eggs cool to 50 degrees before putting them into an incubator, and to keep setting turkey hens where the hatchlings can’t wander off and get chilled.

Since none of my eggs hatched, the only young birds I had were the 16 Royal Palm turkeys I bought with the grant money. I’ve kept back a Royal Palm tom and four Royal Palm hens to use as breeders.

I processed a pasture-raised heritage breed tom, which my mother served at two Missouri Extension Council dinners. I surveyed those attending. They said they thought it tasted better than a store-bought



Will King checks a Buff tom turkey at an American Livestock Breeds Conservancy turkey workshop held in March 2009. Danny Williamson, of Good Sheppard Turkey Ranch, trained participants on how to evaluate birds for breeding stock.

turkey. Most said they’d be willing to pay a little more for a local, sustainably raised bird.

There is demand for this type of product. I am going to try

this project again, and will be printing a sales brochure, and planting disease-resistance dwarf fruit trees in my turkey pasture.

Cattle, Grass, and Streams: Can They Work Together as a Sustainable Ecosystem?

Objective: To use a small stream that runs through the northeast quarter of a 160-acre marginal farm to show proper grazing management allows cattle, grass, and streams to co-exist in a successful ecosystem. The farm rotationally grazes a beef cow/calf operation of 40 stock cows.

Results: In 1967, in keeping with the belief that the way to conserve a creek was to fence the stream, plant trees, and keep cattle out, four acres of Sugarloaf Creek were fenced and pine, cedar, spruce, and white ash planted. Several decades later the fenced stream was shallow, with banks prone to erosion.

A stream area above the fenced area where, since 1989, cattle grazed in a rotation of

about three days per month during grazing season, was much more stable, with a deeper, narrower streambed. This suggested letting cattle graze along a stream for a limited time could be rehabilitative with managed intensive grazing, opening the area to more diverse plants, and improving the waterway. To study the issue further, a middle section between the 1967 fenced area and the managed

grazing area was changed from a narrow, fenced corridor to a larger riparian paddock. It rested all year except when cattle heavily impacted it once in early summer.

Over time, a study of plant species in the three stream sections showed Section A, grazed in regular rotation during grazing season, held 50 different species. Section B, grazed no more than once each year, but highly impacted at the time, had 45 different species, with a number of indigenous plants returning.

Section C, not grazed since 1967, held 24 different species.

Farmers, scientists, environmentalists, high

school students, and county professionals have visited the area. Concerned there would be considerable animosity regarding cattle grazing in riparian areas, I was pleased that instead, participants and presenters held great dialogues.

Not all streams respond the same to well-managed grazing; managing narrow riparian areas along streams is only a partial solution. We must think in terms of watersheds. And remember in some instances, with proper management, cattle, grass, and streams can exist together as a sustainable ecosystem.



Cattle graze along Sugarloaf Creek as part of Ralph Lentz's rotational grazing system. Grazing stream banks for short periods of time actually increases stream quality and plant diversity.

Future Farming Families

Objective: To teach young people hands-on, socially responsible agricultural systems, including free-range poultry, pastured pork, rabbits, and worm production, and community gardening.

Results: My family – which includes husband John and nine children – runs L & R Farms in Pembroke Township in Illinois. Our 20-acre operation strives to grow nutritious foods to feed our family, and educate the public about sustainable agriculture. We have used sustainable organic methods of livestock and vegetable production for home consumption and as a way of life. We began retail marketing in 1999 on-farm and at the Kankakee County Farmers Market.

Our livestock production includes grass fed/rotationally grazed cattle and goats, pasture pork, and range-fed

poultry, turkey, geese, duck, and rabbits. The pesticide/herbicide-free vegetable production includes a rotation of melons, squash, peas, beans, corn, tomatoes, peppers, cucumbers, okra, greens, potatoes, and pumpkins. We also grow and cut grass hay.

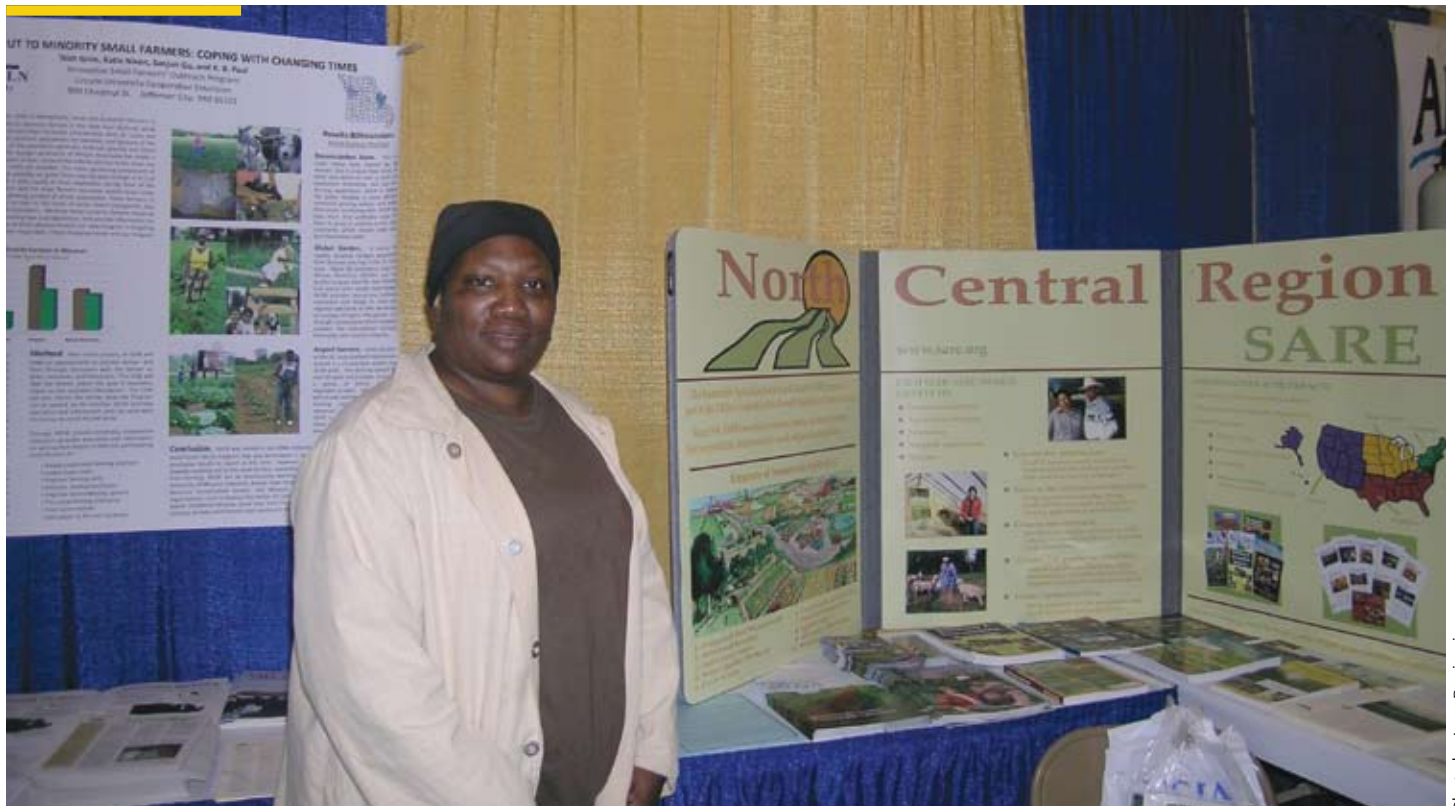
We believe it's key that older farmers share their knowledge with younger ones. We used our SARE funding to provide members of 4-H and Realistic Opportunities for Youth (ROY) a safe place to learn hands-on, socially responsible agriculture. They learned details of our livestock operations.

ROY is an initiative in which youngsters who participate

in the Youth Garden are taught by older youth about gardening. Those who serve as youth leaders often become 4-H members. Youth leaders learn sustainable agricultural systems, whether at L & R Farms or while visiting neighboring farms. Several youth leaders created gardens for senior citizens and the disabled. They also had an option to participate in the community garden and then sell the produce they planted, weeded, and harvested at the local farmers markets. Within ROY they experienced seed saving, learned to prepare the foods they were growing in the Youth Garden, and exchanged recipes. They also took part in community service activities – delivering food, mowing lawns, and raking leaves for seniors and the disabled. Youth who

participated not only were viewed as positive members of our community, they also learned to care about someone, or even something, other than themselves.

Long-term, this project seeks to make small-scale agriculture affordable again in a region once dominated by family farms, including a number owned by African-Americans. The project and a collaborative effort from Pembroke Farming Family, a Project Partner of Heifer International, continues to provide some participants marketing opportunities at the Hopkins Park/Pembroke Farmers Market, Kankakee County Farmers Market, and the City of Chicago Farmers Markets. These opportunities reward limited-resource farmers' efforts.



Ida Thurman participated in the 2009 Farmers Forum to explain how her family promotes socially responsible food production through youth programs on the farm, at community gardens, and at farmers markets.

The Use of Movable High Tunnels in the Organic Production of Strawberries, Potatoes, and Raspberries

Objective: To determine if it's feasible for a market farmer to use the high tunnel system to increase profitability of his crops by reducing losses from diseases, pests, and weather concerns.

Results: I own 75 acres of land, 25 of which are tillable. We grow small fruits and vegetables using organic practices. My crops often are damaged by diseases and pests. For example, the tarnished plant bug often decreases the marketable quality of my strawberries by more than 50 percent, while the Colorado potato beetle and early and late blight have caused many problems. Fall raspberries could be a profitable crop, but in my region frost typically shuts down production before most of the crop ripens.

I set out to grow my crops in high tunnels to try to alleviate these challenges. High tunnels are portable, hoop-type greenhouses that have roll-up sides to allow for natural air movement. I planted crops in the high tunnels in 2002 and 2003, and also grew control plots without tunnels nearby to compare results.

It took about 30 man hours to install the tunnels, which measured 26 by 96 feet. It's critical to anchor them securely to prevent wind damage.

We found that the tunnels significantly reduced the workload by extending the growing season and giving us more time to do needed work. We can plant earlier and grow later. Since the crops were protected from weather, I was able to better control weeds,



Photo by Dan Mielke

and diseases were eliminated. The tunnels made it easier to contend with pests, too. Because crops ripened earlier, I was able to get higher prices, with virtually no competition at the farmers market where I sell my produce, and I also was able to sell later into the season. I tripled my customer base.

The quality of my produce also was improved – cleaner, sweeter strawberries than those grown in control plots. Raspberries in the tunnels produced until Nov. 2 – about four weeks longer than outside the tunnels – and were of excellent quality and size right up until the day they froze. Tomatoes had no disease problems, and cucumbers and peppers also grew very well in the tunnel.

Profits from the tomatoes alone – about \$6,000 – were enough to pay off the tunnels.

There were some downsides, though. High winds threaten

Growing produce in high tunnels can extend the harvest through late fall, adding four or more weeks to the season for crops like beans.

to damage the tunnels, and one must take care to raise the sides during warm weather to avoid overheating the plants.

All in all, high tunnels are a farmer's dream, allowing a producer to control weather conditions.

FNC06-628 Kansas City, KS – Christine Allen

Small Poultry Education Project

Objective: To disseminate knowledge about small-scale poultry farming in an urban area.

Results: I purchased and raised chickens on my small Kansas City, KS, acreage. I also raised squash, tomatoes, and other produce.

I bought and sold more than 250 chickens, making money by selling both birds and eggs to neighbors and friends and at two roadside events. I also used rain barrels and chicken manure to make manure tea for my vegetable garden.

I also taught a class called Healing Egg, in which I shared with community residents the health advantages of growing produce locally, showing the food I had grown, and also providing egg and chicken recipes.

Economic impact was limited because of a lack of manpower and other factors, but the class helped spread awareness about healthy food to a limited-income audience – an important target audience for this kind of knowledge.

Accelerating the Acceptance of Alternative Foundation in Honeybee Frames

Objective: To explore and evaluate different approaches to frame technology used by beekeepers in an attempt to reduce costs and labor to make the practice more economically viable.

Results: Conventional beekeepers use movable wood frames to manage their bees. Pioneered in 1860, the techniques are little changed. Unfortunately, these frames are expensive, require special tooling, are labor-intensive to assemble, and require frequent replacement because they are so susceptible to damage from a variety of sources.

Recently developed plastic frames solve some of these problems, but bees have been reluctant to accept them. This project sought to resolve those concerns.

My hives are located on a dozen farms in Cape Girardeau County. I market honey through farmers markets and a couple of retail grocery stores.

We evaluated several types of plastic foundations for the honeybee hive, comparing

them to the conventional approach, which uses a wax foundation, and evaluated management practices needed to accelerate bees' acceptance of the plastic foundation.

Our research showed it's almost impossible to get bees to establish hives on plastic foundations, but it is possible, with intensive management practices, to get already established hives to adapt to them. Adding more wax to the plastic foundation proved to be highly beneficial.

Many beekeepers may find the additional management challenges of getting bees to use plastic

frames are not worth the eventual savings in costs, especially since most beekeepers don't depend on it for their livelihood. However, the benefits of plastic

foundation include its reusable nature, which saves time and energy, not to mention the resources of wood and fuel to make and ship the replacement parts of the wood frames.



Modern apiculture, in an attempt to manage the honeybee for greater productivity and improved health, has adapted square boxes (hives) with parallel slats across the top which are called "frames."

Photo by Grant Gillard

Brambles and Sassafras Agroforestry

Objective: To develop an agroforestry system with several blackberry and raspberry varieties to serve as a source of annual income, and to grow sassafras trees to reduce sunscald damage to fruit, and to serve as a source of supplementary income.

Results: I tilled several 5-by-200 foot rows for 50 plants each of three blackberry varieties, and another 50 plants each of three raspberry varieties. Each plot was mounded to improve drainage, and brambles were planted down the center of the rows. Each row was mulched, trellised, pruned, and mowed to improve weed control

and irrigation efficiency. Approximately one-half acre was planted.

Brambles were well-established. I installed irrigation and applied minimal pesticides. Only the Illini Hardy blackberry produced consistently over the two years of the project. I decided production wasn't worth the time and expense it was taking

from me. The market in my small town wasn't sufficient, and people weren't willing to pay the right price for the type of berry they were getting. I sold 23 quarts and made \$69; the 50 plants I purchased cost \$100, so that left me without a profit.

I made no profit on the sassafras. I learned sassafras trees do not transplant well, and they did not grow well. The project was extended one year to gather data on berry harvests and allow for sassafras planting.

I manage and sell trees on my Foxtail Farm, which is

37 acres, about half of which is forested. I work with the green-certified nonprofit Tree Farm, which certifies that trees harvested come from properly managed land. I now am working to regenerate oak on my property. I view my forestry project as profitable, and as an investment. I do not make an annual profit from it, but every 10 years I have a timber sale, and profit from that. I select-harvest certain trees, and leave the others for more growth, to be harvested later.

Equine Forestry: Promotion of a Low-Impact Forest Harvesting Method

Objective: To produce a public television program with Twin Cities Public Television's Minnesota Channel to educate the public about equine forestry, to bring young people into the profession, and to provide viewers a glimpse into sustainable forest management, ideas for forest recreation, and woodworking projects.

Results: The mission of Cedar River Horse Logging is to preserve a dying art and the ecology of our forests. Horse logging is a low-impact tree harvesting method that promotes sustainability, decreases soil erosion and compaction, and promotes healthy growth of remaining trees. The demand for the service is growing, and there is a need to recruit and train new horse loggers. This project provided a tool to educate land owners on forest stewardship and using sustainable practices.

The SARE grant resulted in a half-hour professional

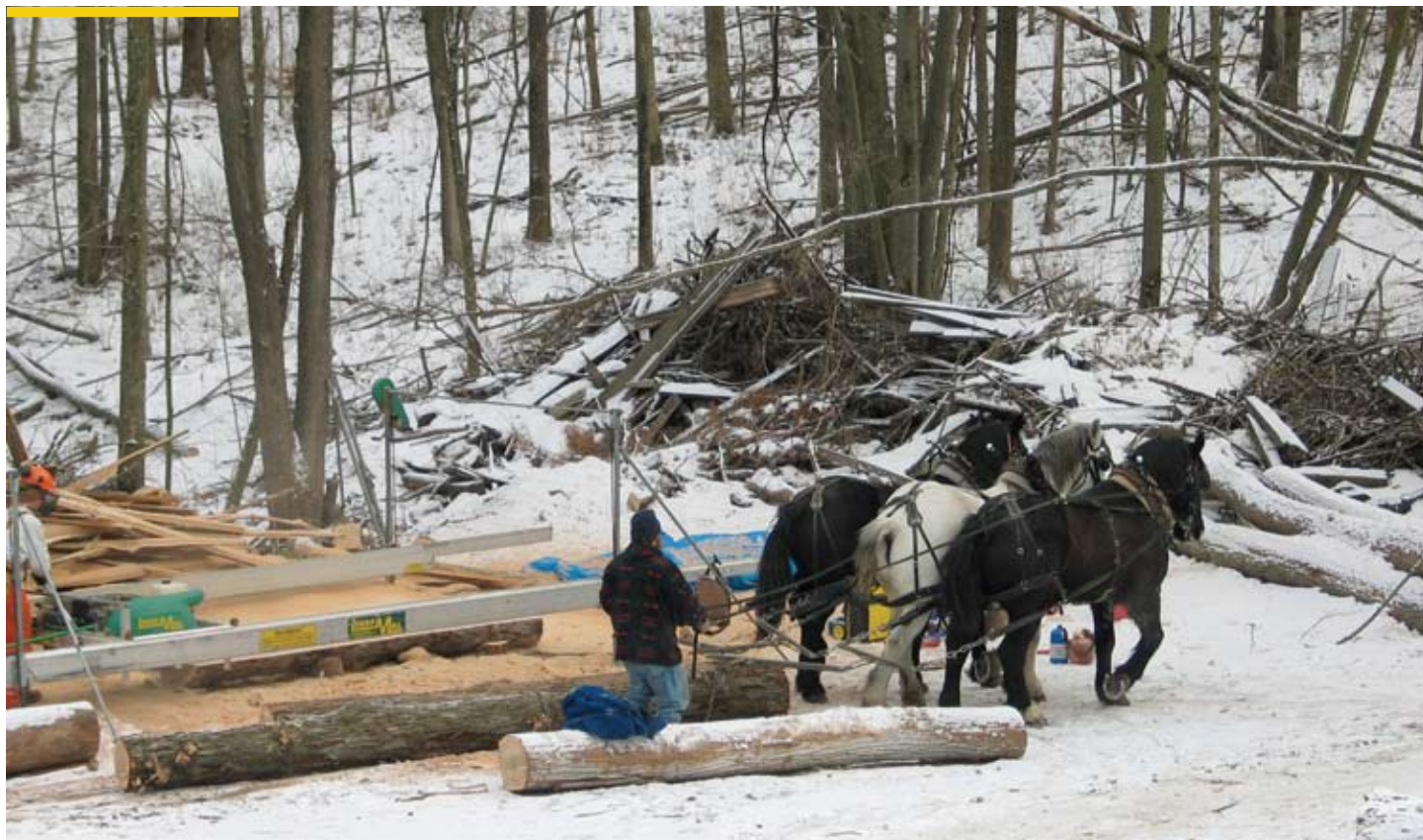
documentary that first aired Jan. 12, 2008, and was followed by a number of calls from people who wanted their land worked with horses. I see my role as a businessman changing from a producer to a manager and teacher. I think educating the public about equine forestry is the key to its long-term success, and I hope to bring more young people into the field.

In spring 2010 we finished our 13th episode on horse logging for RFD TV. I am seeking funding for a second season.



Photos by Ronnie Hartman

Tim Carroll uses horses to reduce the impact of logging on the environment. He uses television to educate landowners and the next generation of equine foresters about low-impact tree harvesting and forest stewardship.



Assessing the Sustainability of Growing Non-traditional Fruit Tree Crops in the Upper Midwest: A Collaborative Agroforestry Approach

Objective: 1) To find diverse fruits suitable for Midwest organic production that can be easily grown, have minimal labor, establishment, and management costs, are nutrient rich, appealing, and accessible to consumers. 2) To use design of the orchard to stimulate use of sustainable agriculture methods that demonstrate ways to conserve moisture, build soil fertility, manage for wildlife, and reduce weed competition. 3) To provide growers outreach and educational resources on the value and potential profitability of growing these fruits.

Results: In 2008 we began transitioning land to an organic mixed- fruit orchard designed for sustainability. We are working to develop appropriate outreach materials and provide educational opportunities for growers to collaborate for producing Aronia, Russian quince, European black currant, white and red currant, Saskatoon, seaberry, and American elderberry. This is part of a longer-term regional project to establish sustainable production practices, expand regional fruit grower networks, examine risk, and test consumer fruit acceptance.

Our project's first year focused on site preparation, orchard design, plant cultivar research, and outreach. In 2010 we'll install our research plots, begin monitoring results, and provide outreach and education. Our biggest challenge is that little knowledge and research exists on best ways to design and grow our fruits in combination with each other.



Above: A prescribed burn was conducted on the one-acre orchard test plot to remove invasive species. Right: Rob McClure removes multiflora rose from the test orchard perimeter to prepare the site for non-traditional fruit crops.



Photo by Alana Kosholiak, Aldo Leopold Foundation

Photo by Erin Schneider

River Hills Purebred Poultry Marketing Alliance Research Project

Objective: Local farmers supplying eggs to the River Hills Poultry Project Alliance (RHPA) project have been maintaining laying flocks and producing eggs for years, but the market for those eggs has been limited by the lack of a delivery system to connect producers and consumers. The project seeks to develop a marketing approach for both eggs and live chicks to expand opportunities for the alliance's producer members, who specialize in heirloom poultry breeds.

Results: Four families operating small poultry operations in east central Missouri specialize in heirloom poultry breeds such as Orpingtons and Delawares, which used to be common on family farms but now are considered rare and endangered. These birds are hardy and well-adapted to the traditional, natural

production methods these small farmers prefer.

Initially, the alliance conducted surveys on breed preferences, existing ventures, marketing methods and outlets, and seed stock sources and pricing. The surveys showed a preference for classic, heritage breeds; a desire for better seed stock; and a strong interest in buying from farmers

rather than commercial hatcheries. One factor the surveys didn't initially reflect is that many of the farmers supplying table eggs use hybrid layers primarily, while farmers maintaining flocks for both table eggs and baby chicks are using heirloom breeds. This information represents the reality of certain trends that currently exist among small producers, each having specific goals and management systems.

The alliance's local table egg marketing efforts, headed up by Mark and Michelle Wagstaff, have moved beyond the initial grant support and were self-sustaining in 2009, with a steady supply of 300 dozen

eggs every week provided to customers in the St. Louis, MO, area. Deliveries for the 2010 season have increased to over 500 dozen per week. While many Community Supported Agriculture ventures require customers to pick up their goods, the alliance provides weekly deliveries, which has led to increased orders from RHPA.

The increased success of the table egg market has enabled the alliance to solve one of its initial challenges – the high cost of shipping egg cartons. Now that the alliance is buying in bulk, its supplier is waiving shipping costs.

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Can Straw Mulch and a High Tunnel Be Used to Better Grow Ginger in the Midwest?

Objective: To determine whether ginger production can be improved on an urban Kansas City acreage through use of straw mulch, a high tunnel, and other practices that would allow producers to forgo the usual 10-year crop rotation system.

Results: With my wife, Chaxamone Lor, I grew specialty vegetables and herbs for years in Fresno, CA, but we have moved to Kansas City, KS, where we continue to grow produce on a 3.95-acre urban site. We serve a diverse customer base including immigrants from Africa, the Middle East, South America, the Caribbean, the Pacific Islands, and Asia, as well as locals interested in healthy eating. Our produce is sold at the City Market in Kansas City, MO.

We want to meet growing demand by altering production practices to extend the growing season.

Ginger does not grow well in the Midwest because of the short growing season. We set out to see whether straw mulch and a high tunnel could be used to extend the season by increasing early spring temperatures. I also wanted to grow ginger without the commonly used 10-year crop rotation, which prevents the development of nematodes and rot before the ginger matures.

Because ginger grows slowly, has a limited root system, and is subject to nematode damage, I sterilized the ginger seed pieces with a bleach solution, dried them, and planted them in plastic bags filled with peat moss to conserve moisture. To achieve sprouting, I placed the bags in a 75 to 80 degree environment.

After sprouting and hardening, the rhizomes were transplanted into raised beds made of cinder blocks and

filled with peat soil and covered with straw. There, they grew to maturity and were harvested.

I found that plants grown on the outer edges of the raised beds were susceptible to excessive moisture and fluctuating temperatures, resulting in smaller roots.

However, even in the outer bed, results were within expectations, with every 0.1 pound of rhizomes planted producing a half pound to 2 pounds during the second year of production.

In the inner bed, results were much better: Every 0.1 pound of rhizomes

produced 1.5 to 5 pounds in Year 2.

Nematodes were not a problem.

One challenge we ran into: Other local farmers adopted our production methods, but as supply increased, prices plummeted, making it difficult to meet expenses.

Still, our project showed that these methods could help local specialty farmers meet increasing demand for their produce.



Photos by Pov Huns

Chaxamone Lor prepares ginger roots for sprouting. New plants sprout from the rhizomes and can be grown inside a high tunnel or outdoors.



Pov Huns compared growing ginger inside a high tunnel and outdoors, and found he could grow larger roots inside, where plants are protected from weather fluctuations. These ginger roots were harvested from an outdoor growing bed.

Aronia berry

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festival for several years to spread the word about this healthful fruit, organic farming, and local artisans. In 2008 the event drew approximately 600 people in two days, and last year's festival included nearly 1,400 persons. So mark September 19 and 20 on your 2010 calendars and plan a trip to Harrison County and experience the scenic Loess Hills.

River Hills

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Interest in locally produced poultry and eggs is even higher than the RHPA expected. Urban consumers have been especially interested.

A second portion of the project – the shipping of live chicks – is already underway in earnest in 2010, with an initial order for 25 Delaware chicks sent to a buyer in Tennessee. Individual RHPA members have started websites to encourage sales (www.backtothefarmMO.com). Local chick sales have been steady, with customers willing to pick up orders themselves, enjoying a farm visit in the process. This type of “hands-on” approach brings buyers and producers together on a personal level, something that is missing from the majority of chick orders today.

Plans for 2010 and 2011 also are to develop a local hatchery for heritage breeds.

Increasing Safety and Sustainability and Reducing the Use of Pesticides and Other Farm Chemicals Among Hmong Farmers

Objective: To encourage Hmong farmers to use fewer chemicals in their operations by teaching them alternatives.

Results: Ly Vang, executive director for the Association for the Advancement of Hmong Women in Minnesota, hired Kevin Cavanaugh, integrated pest management specialist, as the project consultant, and Maiker Vang as farm coordinator and translator for the farmers.

The consultant created four treatments to be demonstrated on the farms of the two Hmong women participating in the project. The purpose of the treatments was to show different ways of controlling insect pests using cultural

methods and a safe, low impact pesticide. The treatments:

- control – no pesticides applied
- dipel DF (bacterial - based insecticide) applied as needed when Lepidoptera insect larvae reached threshold levels
- row covers placed over rows
- trap crop (two rows of collard greens placed adjacent to cabbage row)

Four-row plots were marked at each farm with each farmer

responsible for planting the cabbage plants. Cabbage plots for each farmer were established between late June and early July.

The consultant and farm coordinator made weekly visits to the farmers beginning in mid-June. They observed cabbage growth and insect activity and shared their observations with the producers and explained the cultural methods used. The row-cover and trap-crop techniques were new to the Hmong.

The demonstration plots were harvested in late August at one farm and in mid-September at the other. At one farm, the trap crop treatment produced the largest average

head size – 5.2 pounds, while the row-cover treatment produced the largest average head size – 6.5 pounds, at the other. The cost of the row cover was 11 cents per foot. Cabbage sold at market for about \$1 per head, so the cost of the row cover was easily covered by the sale of the cabbage.

Despite a late start, growers were pleased with the new cultural practices. Both farmers saw the value and ease of setting up row covers to protect cabbage from insect pests. This information will be shared with other Hmong farmers so they can adopt the changes, too. Chaineng Thao recently replaced Maiker Vang on the project.



Hmong farmers in Minnesota found they could produce excellent cabbage crops using non-toxic pest management methods such as row covers and trap crops.

Photos by Ly Vang

Native Plant Propagation Session Offered by the Native Plants Program Cooperative Extension

Objective: To introduce small farmers and producers to basic native plant propagation methods.

Results: During this session Native Plant Extension Specialist Nadia Navarrete-Tindall demonstrated how to propagate native plants from seed or vegetatively, and discussed factors affecting root and shoot formation, and native plant identification. Some species shown were blue lobelia (*Lobelia siphilitica*), Joe-pye weed (*Eupatorium purpureum*), bee balms (*Monarda* spp.), cup plant (*Silphium perfoliatum*), goldenrod (*Solidago* spp.), native asters (*Aster* spp.), butterfly weed (*Asclepias tuberosa*), swamp-milkweed (*A. incarnata*), American bittersweet (*Celastrus*

scandens), deciduous holly (*Ilex decidua*), wild canna (*Thalia dealbata*), bloodroot (*Sanguinaria canadensis*), pussytoes (*Antennaria* spp.), and native cool-season grasses. Vegetative propagation techniques include stem and root cuttings, layering, and division.

The Native Plants Program goals, cited on Lincoln University's website, are, "1) to promote the use of native plants for conservation to enhance biodiversity in rural and urban settings, and 2) to increase awareness about their potential as specialty crops to generate income for underserved audiences



Photo by Randy Tindall

Swamp milkweed attracts bees, monarch butterflies, and other pollinators. It flowers in summer and fall and can be propagated by seed, division, stem, or root cutting.

including small farmers, producers, landowners, and others." To reach these goals the Native Plants Program offers field days,

training, and seminars. For more information visit the website: www.lincolnu.edu/pages/3081.asp.

FNC04-512 Albany, OH – Patricia Tillis

Use of Acid Reclaimed Mine Land for Commercial Blueberry Production

Objective: To see if a commercial crop, blueberries, could be grown in poor and acidic mine reclamation soil that has been considered too fragile either to use as pasture or to grow crops. By only renovating narrow strips for the blueberries and leaving wide sod strips between rows, we hoped to preserve the fragile soil from erosion, since there is only a thin layer of topsoil over the mine wastes. By planting blueberries, we hoped to take advantage of the natural acidity of the soil.

Results: We have an unusual situation with subsoil so much more acidic than topsoil. While blueberries are shallow rooted, their tap roots do reach into the subsoil. Our goal was to put 4 to 6 inches of organic top dressing of manure, sawdust, and other compost on the soil, all of which already had been allowed to compost for at least three to six months prior to application.

Periodic soil tests were part of our process. We wanted to add needed organic content while preserving acidity.

We originally thought we'd pump water from one of our ponds into a truck tank, and truck water up the hill to the blueberry bed. A severe, prolonged drought convinced us we needed a better plan. We added an irrigation system

with an emitter on each side of each plant.

We planted 300 blueberry bushes into holes in which we could see the dark amended topsoil and the orange subsoil where blue clay mixed with orange sandstone mine tailings. We dug up many hunks of coal and chunks of flint. We broke up clay clumps by hand to mix with the topsoil in the planting hole, and mixed topsoil and acid planting mix in the wheelbarrow for each plant.

We found we had to install supports and bird netting to harvest any blueberries – otherwise the birds took them. The blueberries are growing well and we've had two good crops since putting the nets

up. We expect this year to be even better. Our success with blueberries has led other farmers in the area to plant them, which will affect what we can charge per quart. We expect our blueberries will produce about \$4,000 a year for another 25 years.

Drought created issues besides lack of water – for instance, we concluded our "slow-release sulfur" hadn't released into the soil because of the severe drought in summer 2005, which probably also contributed to the slow breakdown of manure and sawdust.

The struggle to get pH adjusted surprised us. We

continued on page 24

Study to Reduce Parasitic Infestations of Yellow Perch in Flow-Through Outdoor Growout Systems

Objective: To produce high quality fish outdoors by reducing or eliminating parasitic infestations. There are few if any proven economical means to raise fish in outdoor ponds without encountering parasite infestations. Typical control mechanisms include biological, chemical, and physical control. All interfere with production.

Results: This study's premise was that a slightly mobile parasite isn't able to infect a fish in a moving body of water. Given knowledge of indoor recirculating aquaculture systems (RAS), it seemed logical an outdoor RAS could discourage parasite infestations, even if the pond water feeding pond-side tanks was infested with parasites.

To test this theory, four pond-side tanks were set up, and one net pen was placed in the pond to serve as a control. Water was pumped continuously through the tanks and returned to the pond. Fish were fed using belt feeders. The study ran June through August 2009; it was terminated when drought caused low water levels

that reduced water quality to the point it put too much stress on the fish. Options for an oxygen backup system were considered; a high/low level oxygen sensor with standby oxygen source should be part of the water quality scheme.

The study in the RAS tanks included 3,000 yellow perch and none were found to have acquired any parasites from June through August. The study demonstrated yellow perch can be raised in a flow-through production setting without becoming infected with parasites present in the water.

A secondary study on parasitic infestations was conducted during the 2009 study, with 250 yellow perch fingerlings captured from



Photo by Bill West

Controlling parasites is a big challenge for producers who raise fish outdoors. Bill West set up a water re-circulating system using four pond-side tanks and found that moving water could prevent parasite infestations in yellow perch.

the same pond and the same water that fed the tanks of the primary study. Of the 250 fish tested, only one did not have parasites. Infestations per fish ran from two to over 20.

The secondary test showed the pond contains parasite infestations, pond fish acquired the parasites in a short time,

yet even with the parasitic load present, fish in the moving water didn't become infected.

This project is one phase of a larger concept of sustainable aquaculture to allow more intense production in a smaller footprint.

Development and Testing of a Mycorrhizal Inoculum for Ericaceous Ornamental and Small Fruit Crops

Objective: Develop a commercially usable approach to inoculate certain economically and ornamentally important acid-loving plants with fungi that provide several advantages to their host plants. These advantages include increased survival rates, propagation efficiency to disease and stress resistance, and easier maintenance.

Results: Ericaceous – or acid-loving – plants such as rhododendrons, azaleas, blueberries, and cranberries are important economically in some parts of the United States for their ornamental and fruiting characteristics. But they are difficult to grow because they are fastidious in their

drainage needs and nutrition requirements, and often are susceptible to disease.

Studies show that fungi known as ericoid mycorrhizae, which thrive in the same environments as acid-loving plants, can help host plants survive when they form a symbiotic relationship with their roots.

They increase propagation efficiency and survival rates in harsh environments, increase growth rates, provide disease and stress resistance, increase intake of beneficial nutrients, protect against heavy metal toxicity, and reduce the need for fertilizer and pesticide application. Currently, no commercially available inoculants for ericoid mycorrhizae exist because they are difficult to isolate and grow too slowly in culture to be commercially useful.

Growing and Marketing for a Winter CSA in Central Missouri

Objective: To develop a community supported agriculture business growing and marketing cool-season greens and vegetables from October through April in central Missouri, experimenting with unheated greenhouse and coldframe designs.

Results: Central Missouri has a variety of commercial growers providing fresh, organically grown local produce for wholesale and retail buyers during the typical growing season of April through October. However, there are few options for area consumers to buy such produce during the off-season of November through March, so virtually all fresh greens and vegetables must be trucked in.

At Wintergreen Farm, our small family operation on about five acres west of Ashland in Boone County, MO, we established a winter community supported agriculture (CSA) venture on about two acres. We tested four styles of unheated greenhouses and coldframes: 1) standard hoophouses, 2) hoophouses made from cattle panels, 3) low tunnels over raised

garden beds, and 4) standard wooden coldframe boxes. We grew more than 30 crops through the winter, including several varieties of greens, root crops, herbs, and more.

We had eight families for the 2008-09 season, and 16 families signed up for 2009-10. Each family paid \$15 for a large box of produce, which was available weekly from October through December and every other week in January and February. We struggled this past season with a cold, cloudy, wet, fall and winter that slowed production.

Overall, though, many of the crops were surprisingly cold hardy, surviving even through two weeks in January when high temperatures didn't get out of the single digits. Results from the first two seasons have encouraged us to continue with these efforts.

No difference in seedling



Photo by Jennifer Grabner

Jennifer Grabner used unheated hoophouses, coldframes, and low tunnels, including this homemade cattle panel hoophouse, to grow more than 30 winter crops.

germination, growth, productivity, or survival was noted among the different greenhouse and coldframe

designs. The only differences were in building and maintenance costs and ease of operation.

This project comprises three phases.

1. Verify ericoid mycorrhizal associations with host plants in vitro as a basis for plant trials.
2. Develop a reproducible growth medium and test several materials that could be commercially usable.
3. Implement and test the inoculum under commercial conditions at the Poruban Nursery in Ohio and at other nurseries and small fruit grower operations.

The first two were funded by this grant; the third awaits future funding.

For the first phase, researchers established an in vitro relationship between

the host plant *Vaccinium macrocarpon*, a type of cranberry, and *Clavaria acuta* as the mycorrhizal inoculum. They sprouted *Vaccinium* seedlings, then moved them to a petri dish containing agar inoculated with the *Clavaria*.

They found that the *Clavaria* was beneficial to the host plant, as its growth was vigorous, covering roots with a thick mat that eventually formed rhizomorphs, which are root-like structures that indicate vigor and support fruiting.

In the second phase, 17 bulk media were tested to determine their suitability to support *Clavaria* growth. Media included both natural and synthetic materials, such as floral foam, ericaceous field soil, black willow twig, cotton clothesline, and more.

Most of the tested media supported *Clavaria* growth, except the scratcher pad, masonry sand, and peat moss.

Materials containing high starch and phenolic compounds generally promoted more vigorous growth of the fungi.

Although further research is needed to prove *Clavaria*'s commercial feasibility as an inoculant, the potential commercial impacts could include more uniform and more vigorous young ericaceous plants, increased yields of useful characteristics later in production life, fewer disease problems, less mortality in propagation, and reduced waste of soluble, leachable chemical fertilizers in production.

Growing and Marketing Elderberries

Objective: We are trying to improve the native selection of elderberries at Elderberry Life Farm in Hartsburg, MO, where we've been growing elderberries for three years. In fact, at 23 acres, we have the largest elderberry farm in the United States.

Results: We choose selections of elderberries that grow in the Midwest and put them into trials to see which grow best in our area. In the spring we start with 8,000 elderberry plants in a greenhouse where we keep the humidity up. It takes six to eight weeks for plants to root and send up shoots. Once started, we move them to a 50-acre field that is drip-irrigated.

We lay a plastic mulch layer, then transplant the elderberries mechanically. We can plant about 1,000 an hour, which is about an acre an hour. We plant them 4 feet apart on 12-foot centers.

We put six different native grasses between each row of elderberries, and use the grass clippings as mulch. Every fifth row we plant a different variety of elderberries for diversity, and every 10th row we plant a habitat row of pecans, wild plums, black raspberries, blackberries, or hazelnuts. In the end, we have a permaculture system

that is made up of all regional native plants. We expect to get up to 12,000 pounds to the acre on the varieties wildwood and Bob Gordon (the University of Missouri's new selections), after the fifth year of establishment.

Around Aug. 15 the first varieties of elderberries are ready to pick, which we do by hand. We then have continuous harvest through the season. We process the elderberries for jellies and juice. We retail the juice for \$12 per 11-ounce bottle. Mostly we wholesale – we get \$100 wholesale per case. One health food store we work with will sell about \$20,000 worth of our elderberry juice this year. Currently we're trying to get more growers to grow elderberries, form a juice collective to process the juice as a group, market it together under one brand name, and sell it wholesale.

We cut the elderberries to the ground after harvest to keep them contained enough



Photo by Joan Benjamin

Terry Durham (left) sells elderberry cuttings to Kevin Ryan of Horsefeather Farm, Davis City, IA, at the 2009 National Small Farm Trade Show and Conference.

and organized so eventually we will be able to develop and use a mechanical harvester. For

more information, see www.riverhillsharvest.com.

Sustainable Backyard Egg Production from a 9-Year-Old's Perspective

Objective: To explore the sustainability of raising laying hens in a backyard operation.

Results: For several years we have raised laying hens in a moveable A-frame at our Michigan home. We wanted to improve on the housing to make it habitable for four seasons and easier to move. We wanted to demonstrate that

even a 9-year-old – Ellen – could manage the enterprise.

We obtained 10 Isa Brown chicks in June, first housing them in a converted children's pool. We placed them in a corner of our garage and used a heat lamp to keep them

warm. Ellen was responsible for checking on the chicks almost hourly.

Eventually, we moved the chicks to an A-framed, movable coop. It was good for the chicks to feed on lawn insects, worms, and clover, and it was good for the environment to have the manure dispersed throughout the lawn. The hens began laying eggs in the fall. Ellen was

able to collect eggs easily for sale to friends and neighbors.

We've shared our experience with other youth through classroom presentations and have written school papers describing our work. Our conclusion: A 9-year-old can manage a sustainable backyard egg operation, with some help from parents and siblings.

Developing a Saskatoon Berry Market in the Upper Midwest

Objective: To diversify an existing farm operation and increase income with limited labor and chemical use by adding a pick-your-own berry patch featuring mainly Saskatoons.

Results: I own 266 acres in central Minnesota where I raise cows and alfalfa and rent pasture and hay ground.

My sister and I decided to try growing Saskatoon (*Amelanchier alnifolia*) to produce a crop that would increase our income but require less labor than cattle. The Saskatoons replaced an aging box elder windbreak and eventually will become both windbreak and income generator.

Saskatoons look similar to blueberries and can be used the

same way – for fresh eating or in pies or jams.

We tested our soil, adding lime and rotted manure. In May 2004 we planted 648 plants of assorted varieties and sizes. Washouts, erosion, and weeds were challenges early on. Later (fall 2004), we added 1,200 seedlings ordered from Canada. We seeded grass between rows to control erosion.

By the following summer (spring 2005) a few plants had berries, though it takes about five years for them to fully mature and fruit heavily.

Deer damage was significant, so we fenced in the shrubs. To combat grasshoppers, we placed some turkeys in the area, and they definitely made a difference.

While it's still too soon to determine profitability, we do expect this venture to be successful. U-pick farms are quite popular in our area, and these plants have an average life of 60 to 80 years. We've already had a lot of interest in the area; in fact, my sister and I are known as "The Saskatoon Ladies."

Last year we had an open house with over 150 people, and we sold about \$600 worth of berries. There were about \$1,000 worth of sales in 2009,

but it was really dry so only the mature plants produced. This represented about one-fourth of an acre of plants that produced about 500 pounds of berries. Drought stress had limited plant growth and production. We're considering adding a drip irrigation system.

Altogether we have planted 5.7 acres of Saskatoons including the windbreak planting. We're also planting Evans or Bali cherries.

Initial labor and material costs to establish such a planting are significant. We estimated establishment costs of about \$6,700 per acre, including tillage, plants, labor, mulch, grass seeding, and more.



Turkeys provide excellent control of grasshoppers in Pat Altrichter's Saskatoon planting.

The Expansion of the South Dakota Goosemobile Project to Include Beef, Pork, and Lamb

Objective: To attempt to market pastured beef, lamb, and pork along with free-range poultry using what was originally developed as a mobile meat market called the Goosemobile.

Results: For 14 years we sold poultry only through the Goosemobile, using a freezer delivery truck where only one customer at a time could stand in the entry door to be waited on. The SARE grant allowed us to add beef, lamb, and pork to the product list in 1998, and buffalo, goat, and ostrich in 1999. For the SARE project we used a 26-foot cargo trailer pulled by a pickup and filled with eight freezers, which allowed numerous customers to view product and shop at the same time.

Three producers who farmed sustainably were recruited to provide product. Each was responsible for processing their animals or birds, vacuum packing them, and weighing and pricing each package. Each producer set his own prices, usually 40 to 50 percent above supermarket prices for free-range, pastured meats.

The project ran from Sept. 1, 1998 to Dec. 31, 1999. During this time the mobile meat market toured South Dakota twice the first three weeks of December, marketing for the holidays. In 1998 there were 62 stops in the larger cities and towns; in 1999 there were 185 stops in every village, town, and city on the route.

Gross revenue in 1999 was \$18,695.44; in 1998 it was \$17,828.99. In 1999 buffalo equaled beef in sales, while goat and ostrich appealed to high-curiosity shoppers. All three have been discontinued because they were not popular long term.

We found an increase of 16 percent in sales of poultry

and red meats through the Goosemobile, and a 117 percent increase at the local farmers market, where we sold May 1 through Oct. 31. We attribute that to customer contact – when making 185 stops over three weeks, there isn't nearly as much time for that as there is during a five-hour farmers market.

We market our meats as 100 percent natural, free range, pastured, and low fat. Only the beef is certified organic. We save feathers from the geese and make pillows.

Through the years we sent a newsletter to former customers; in 1998 we tried a more



Photo by Tom Neuberger

Ruth Neuberger sells pasture-raised meat from a mobile meat market she and husband, Tom, developed and named the South Dakota Goosemobile.

elaborate, four-page newsletter produced by a marketing firm. In 1999 we went back to our single sheet newsletter, and saw an \$866 increase in sales at half the expense.

We found there are two factors necessary for profit

for family farmers operating a mobile meat market. First, they must sell a “niche” product that can command a premium price. Second, they must provide labor themselves until sales volume can support hiring workers.

Natural Fiber Socks

Objective: To promote the production and use of wool, mohair, and Angora rabbit fiber to produce natural fiber socks. This is a sustainable agricultural operation because it turns natural fiber, a renewable resource, into usable products.

Results: I have a 12-acre farm in southeast Missouri on which I raise sheep, Angora goats, and Angora rabbits, practicing sustainable production by allowing the livestock to rotationally graze.

We needed an outlet for the animals' natural fiber of wool, angora, and mohair to produce more revenue for the farm and make the animals more cost efficient. I have been a hand spinner for 25 years and have sold my natural fiber to other spinners for almost that long.

However, there is only so much fiber that one can sell, so we began to look for a product that would use the fiber and generate income. Our solution: natural fiber socks.

We obtained a commercial sock machine needed to process our fiber into a commercial product – socks labeled as 100 percent wool, 15 percent Angora and 85 percent wool, and 25 percent mohair and 75 percent wool. They sell for \$10, \$18 and \$12 a pair, respectively. The profit on

the Angora/wool socks is the greatest, averaging 75 percent markup if I do the washing of the wool before sending it to the mill and also if I am able to deliver the fiber to the mill owner at one of the fiber events I attend. I have many repeat customers who look for me at the fiber events I attend every year.

Response has been very good. Farmers, fishermen, hunters, and hikers who need very warm socks have been a good customer base. I attend craft and fiber festivals to promote my products and was interviewed by Successful Farming Radio.

Evaluation of Raspberries Grown in High Tunnels for a Northern Climate

Objective: To produce raspberries earlier in the year and to experiment with fall-bearing raspberries using a high tunnel to extend the fruit's growing season in Duluth, MN.

Results: Our farm consists of 12 acres of sustainably grown vegetables and fruits, free-range chickens and 20 acres of Christmas trees. We'd grown tomatoes in high tunnels for 15 years when we received a 2004 SARE grant for a high tunnel to try extending the growing season for raspberries. While high tunnels have been used for annual crops, this was the first time they were used for a perennial plant in Minnesota.

Raspberries are a high-value product in Duluth, where the short growing season makes visitors to farmers markets hungry for every bit of summer sweetness they can find. We planted five types of raspberries. Of those, summit and autumn bliss did best, the latter because

it had the most sunlight, being at the edge of the high tunnel. We tested soil, used a trickle irrigation system and an injector to get water soluble fertilizers in during the season – we wanted high phosphorus during the fruiting season.

Between Sept. 10 and Oct. 10 we harvested 75 pints of raspberries, sold at \$4 per pint. Our high tunnel-grown raspberries income was \$300 and our raspberry-raising expenses were \$914.50, for a loss of \$614.50. Even though raspberries are a minimum labor crop, they don't seem to make profit for us. We laid down landscape fabric to help with weed control, but it didn't work as planned. Plants got too hot and started dying. When



Photo by Lois Hoffbauer

The Hoffbauers tried to extend the raspberry season in Minnesota with a high tunnel, but it wasn't cost effective. High tunnel-grown tomatoes proved to be a much more profitable crop.

the sides were up on the high tunnel, wind lifted the fabric, ripping plants out. We also had trouble with spider mites.

In 2009 we harvested 2,140 pounds of high tunnel-grown tomatoes between July 18 and Oct. 10, earning a net income of \$10,459. We find tomatoes more cost effective. While

they take a little more work – pruning, spraying, picking – they do well. We've found if you plant tomatoes in a high tunnel or outside, they yield at the same time. You do have to get indoor plants planted earlier. We're working to produce bigger tomatoes earlier, and to have a disease-resistant crop.

Continued Study of Controlling Leafy Spurge Utilizing Angora Goats

Objective: To control leafy spurge in pastures by intensively grazing Angora goats on spurge patches in 70 acres of grassland, instead of using chemicals. Since cattle don't eat leafy spurge, infestations overcome even native grasses, reducing pasture productivity. Chemical spraying interferes with livestock grazing and the sustainable practices I want to use on my farm. Introducing Angora goats also provides an alternative livestock enterprise for breeding stock, a meat source, and mohair production for the home spinning market.

Results: This 240-acre dairy farm uses intensively managed grazing, with reduced or no chemical inputs. Adding goats provided another dimension to the grazing herd, complementing pasture plant diversity. Electrified netting kept goats in the desired area, and predators out. A used livestock trailer provided shelter and a way to transport the

animals to leafy spurge patches. The goats provided good control of spurge once they were trained to eat it. I did that by fencing an area with netting to keep the goats where the spurge was, and not moving them until they ate all of the spurge. The first time it took three days, the second time two days; after that the goats devoured the spurge as soon as they could get to it.

After one year of this multiyear study, comparing goat-grazed patches to a ditch spurge patch sprayed by the county for control, goat-grazed patches showed less evidence of stem growth and no seed production.

The following year showed a 30 percent decrease in spurge population, and the year after that, a decline of 37 percent.

I used the goats for four to five years. They didn't roam the 70-acre pasture like cattle do, but stayed closer to home. That meant they didn't get all the spurge patches, which was a problem. I needed more



Photo by Ken Schneider

Angora goats eagerly ate leafy spurge, a noxious weed, growing along with Canada thistle (shown in photo) in Marvin Lange's cattle pasture.

extensive fencing to graze them as needed. Now I use spurge bugs. I have tried several different kinds over six to seven years. The ones I've seen results from are the defoliating bugs. I still am experimenting with different spurge bugs, looking for a kind that works on the plant and roots more, not just the leaves.

Taproot Sustainable Farming Experience for Children

Objective: To provide sustainable agriculture camps where children learn that food is produced as part of a system, of which they are an integral part, and the advantages of buying and consuming sustainably produced food. Children also learn the environmental advantages of sustainable farming, the keystones of conventional farming, the power of consumer choice and spending, and tools to participate in sustainable agriculture practices.

Results: Taproot Nature Experience is in a unique position to educate children and families in eastern Iowa about sustainable agriculture because of its nature-based educational programming, its sustainable farm, and relationships with local farms.

Taproot used three reinforcing methods to teach children about sustainability: 1) visits to different kinds of farms practicing sustainable methods, 2) hands-on experience with these methods, and 3) a week-long discussion about choices, specifically food choices, and how those affect the system.

In 2008 Taproot offered children a day-camp experience that included visits to local

sustainable farms. Hosts of those visits were unpaid. Feeling participating farmers should be paid for their time, Taproot did so in 2009 with money from an NCR-SARE youth educator grant.

Eighty-eight children enrolled in the eight weeks of 2009 camps, representing 47 families. Many families said food and systems thinking were the focal point of evening conversation with their children during camp week. Children's camp experiences stimulated lively discussions at home about family food choice, meal preparation, and food budget. Families reported the emphasis on local sustainable farming affected both their approach to purchasing food

and their food choices.

Many families reported they are more likely to purchase food from a specific farm after the week. Some visited some of the farms to purchase goods during the week their child was in camp.

Each week of the summer camps, families received e-mails and photographs from camp, along with conversation starters, and

added information the family could explore.

Farmers involved said they formed new relationships with families because of the Taproot tours, and reported increased sales due to these relationships. Several farmers reported a new sense of pride and accomplishment in teaching children about sustainable food production.



Photos by Zac Wedemeyer

Continuing Egg Production a More Natural Way

Objective: To modify a rotational grazing system for laying hens to improve flock health and egg quality and reduce the environmental impact on the pasture.

Results: I had an egg-production business that included 45 laying hens, producing about three dozen eggs a day, all of which I sold to customers. I decided to update my existing chicken coop so that I could provide healthier living conditions for the flock and improve the quality of eggs produced.

We tripled the size of our outside rotational pens so that the chickens would have more grazing time in each pen. Previously, with the smaller pens, the chickens would eat grass more quickly than it could regrow.

With the new pens, which are about 20 by 20 feet, the chickens rotate every seven to 10 days; their diet includes fresh water, green grass, shelled corn and grit. I saw a noticeable change in the egg quality after we introduced this new grazing system: yolks were darker and more solid, and the whites weren't as runny.

I increased my flock by adding 50 leghorn chicks and building another coop. I also designed a chicken carrier to transport the eggs to market. Currently, we have about 80 chickens and 50 more chicks to add to the flock.

We now get about four or five dozen eggs a day, all of which we sell.

Michael Anderson built new pens to give his laying hens access to fresh grass. The extra space and improved conditions allowed him to build up his flock and increase his profits.



Taproot Nature Experience day camp provides hands-on experiences to help children learn about sustainable agriculture.



Photos by Diane Anderson



Photos by Zac Wedemeyer

Little Horses/Big World Sustainable Agriculture

Objective: To explore and implement a plan to use sustainable agriculture on a multigenerational family farm to increase profits, while providing agritourism tours to provide recreation and education for communities, schools, and individuals.

Results: Our family has a 170-acre farm – 100 for crops and 70 for grazing. The land also includes miles of deer trails, creeks and river that wind through stands of native trees, wildflowers, and other plants. We decided to use this land and the miniature horses we raise to create a new agritourism business that also would help educate participants.

The result was Tiny Trails. We added picnic tables and benches to the land, labeled trees and wildflowers, and installed informational signs along the trails. Because trash often blows in from nearby

highways, we built a large wire cage in which to deposit the trash and added a sign to educate people about how litter affects the environment.

Young and old can walk the trails with a miniature horse. We have groups from schools and families come to enjoy the horses and trails. We can provide party packages, such as theme parties, to draw groups to the trails. We did a very successful MiniFest event, working with local 4-H'ers and advertising via local media and with flyers. Participants could walk the trails with the horses and have free rides in carts



Photo by Cathy Martin

Cara Martin gives a presentation about her agritourism project. Cara and her family educate the public about sustainable farming and living through trail walks with miniature horses.

pulled by miniature horses. We also filled a stock tank with corn for children to play. Local businesses brought mums and pumpkins to the site to sell. A

local special education group sold concessions. We offered games for kids to play.

Not Just Chicken

Objective: To save rare breeds of geese by starting a small flock of American Buff Geese, keeping the best ones for breeding and butchering the rest to sell in the fall.

Results: I wanted to raise some different kinds of poultry to help encourage people to think beyond chicken and turkey as poultry options in their diets. If people don't raise and market rare poultry, these breeds won't survive.

We purchased 16-day-old American Buff Goose goslings, which are medium-weight (16- to 18-pound) birds that are relatively tame. These geese are listed as "Critical" by the American Livestock Breeds Conservancy, which means there are fewer than 500 breeding birds in the United States.

Four goslings died the first week, leaving us with 12. We

started with Kent brand multiflock nonmedicated feed, which cost \$14 for 50 pounds, and then switched to cracked corn at eight weeks. Initially, we raised them free range, but after some strayed from home, we penned them. Our pen included solar-power lights to help keep predators away.

Our total feed costs were \$128. We saved four birds for a breeding flock and butchered the others in November 2009 for \$7 each and had some smoked at \$5 apiece. We gave out samples as part of our marketing efforts, which will focus on friends and neighbors. In 2010 we plan to put the birds in our berry fields to test



Photo by Cindy Garber

Marley Sukenik feeds American Buff geese she raised for an NCR-SARE Youth Grant project. She hopes to develop interest and a market for this endangered breed of poultry.

their usefulness for weeding, and perhaps try some different penning options – fencing or hedges – but will let the birds

out of their pen daily. We also plan to raise our own goslings, add some ducks, and increase our customer base.

Comparing The Market Viability of Two Methods of Shiitake Mushroom Production (Seasonal vs. Year-Round Production on Logs)



Photo by Earnie Bohner

Earnie and Martha Bohner had energy conservation in mind when they designed a fruiting building for indoor production of shiitake mushrooms. The temperature is kept at 60 to 70 degrees with a radiant energy floor.

Objective: To explore the feasibility of expanding an existing shiitake mushroom operation to offer a year-round supply to customers.

Results: We began our farming operation, Persimmon Hill Farm, in 1982 with the planting of two acres of highbush blueberries. Later we added more blueberries, blackberries, gooseberries, apples, and shiitake mushrooms. We are

primarily a you-pick farm, but we also sell products such as jams, berry-flavored barbecue sauces, butters, biscuit mixes, and other items wholesale to some retailers and do some mail-order sales through www.persimmonhill.com.

We produce log-grown shiitake mushrooms indoors. About 3,000 logs are inoculated each year; logs can be used for three to four years.

Logs are taken indoors in baskets that contain 60 logs each, soaked in tanks of water in our fruiting building and then placed in racks where they fruit. Then, they're removed and placed in the "laying yard" until their next fruiting. The water tanks are in the floor of building

The fruiting building is about 14 feet square and has a hoist that reduces labor while soaking the logs. The fruiting racks have trolleys that allow for easy access for loading and harvest.

In addition to selling mushrooms to retail customers, we have a weekly wholesale route for upscale restaurants and grocery stores in the Springfield and Branson region during our primary harvests in the spring and fall.

The fruiting building has allowed us to expand our production to make our shiitakes available to restaurants year-round. By doing so, we're build-

ing our business by promising restaurants a steady supply that they can rely on to feature in their menus.

Our new, larger facility was constructed using well-proven energy conservation techniques. It also allowed for more labor-efficient production.

We are producing more usable mushrooms with this new facility, but just as important, we're better able to control the production pace and quality. Growing mushrooms indoors also reduces waste because it reduces weather-related damage.

Our production costs per pound dropped significantly. We also noted mushroom quality was improved through the new fruiting process. When using seasonal production, we could produce during six months of the year; now we can produce year-round. While initial capital expense for the building was significant, our increased profits have recouped those costs.

Using Commercially Available Mycorrhizae Inoculant, Compost, or Mycorrhizae Inoculant and Compost when Transplanting Small Berry Bushes

Objective: To determine whether adding commercially available mycorrhizae inoculant, compost, or both at the time of planting small berry bushes will affect their growth and survival.

Results: Previous research has shown mycorrhizal fungi improve plant uptake of water and nutrients through its roots and increase plant vigor and

survivability. Research has also shown that the effect of the mycorrhizae can sometimes be species specific. The purpose of this project is to explore the

effect of these fungi on woody berry bushes. This research is currently ongoing.

Woody cuttings were obtained from elderberry and Aronia bushes. They were placed in small pots with perlite under grow lights until leaves and roots developed.

They will then be transplanted outside, using the different experimental treatments.

Future plans may include researching the effect of mycorrhizae with the blue honeysuckle.

Innovative Field-to-Market Processes for Small Produce Farms

Objective: To design and build a washing system, including a washing machine, that reduces the labor needed to harvest, prep, package, and transport various kinds of fresh produce.

Results: Cooley Family Farm is a small family-owned Direct Market Produce Farm. We use organic methods and are working toward organic certification. Our crops are vegetables and fruits. We use row covers, temporary low tunnels, and high tunnels to extend our growing season. Our SARE project began with our desire to create processes and equipment that allows for harvesting, cleaning, cooling, transporting, and displaying produce from the same container. We wanted to know if it was possible to pick into, transport, wash, cool, and sell produce from the same crates. We needed standardized crates that save space and time in transporting for field-to-market use, a washer that freed up hands and allowed for multi-tasking, and better use of space in cooling/storage.

Information from hand trials to simulate washer action helped us plan and build the washer. The plans for my vegetable washer are included with my online project report on the national SARE website: www.sare.org. Click on the Project Reports tab at the top of the home page to find it.

The process we developed allows us to save as much as 90 percent of the time we'd earlier spent washing potatoes, up to 50 percent of the time for beans, and 25 to 50 percent of time for squash, cucumbers, and peppers.

While wash time is reduced with root crops, picking time may increase. The greatest time savings come if it's really muddy – our washer saves 25 to 75 percent of the time

we'd spent hand washing. Anyone planning on using this wash process needs to understand it is intended for removal of excess field dirt only, and is not the final wash. All produce must be washed properly by customers before being consumed.

We found for us, the best crates are almost mesh-like plastic, with lots of holes on all sides and the bottom. A universal top of hardware cloth cut to the length of the crate and about 4 inches wider than the crate, held down by elastic straps, is used on crates while in the washer.

These crates allowed us to improve transportation, increase storage, speed loading and unloading time, better use of space, and they can be sanitized and used repeatedly. We were able to reduce time and labor needed to get produce from our fields to our customers. Picking into crates, then washing field dirt from the produce while still in the crates, saves many steps.

Seeing how much difference the crates made on the farm side, we invested in an enclosed market trailer, then equipped it with shelves to hold crates. With crates of produce on



A motorized vegetable washer designed and built by Kevin Cooley saves water and washing time and frees up the person running the washer to do other tasks.

shelves in the trailer, we were able to handle a much larger volume of sales at market than in previous years. Most days we sold more with less labor.

We received a one-year extension on our project to evaluate a full season of crops. The best advice I can give

anyone putting a proposal together is plan carefully, think out each step and what you'll need to accomplish it, and make sure it's available.

Photos by Kevin Cooley

Planting and Growing Giant Miscanthus as a Bioenergy Crop in Missouri

Objective: To determine the commercial viability of giant miscanthus as a bioenergy crop.

Results: Interest in developing energy from biomass continues to grow. Giant miscanthus (*Miscanthus x giganteus*) is a vigorous perennial grass that can grow as tall as 14 feet. It has tremendous potential for bioenergy because it recycles nutrients, has a significant yield, has little or no need for chemical weed control or fertilizer, and will produce for many years.

I decided to develop field-scale plots of giant miscanthus and gather data to identify the suitability of Missouri soils for the grass and evaluate the production potential for our region.

In 2007 I began by hand-

planting 5,000 plants, covering 15,000 square feet on my farm. Later, I modified a bermudagrass sprigger to plant rhizomes. Giant miscanthus thrives in hot, wet conditions.

Our two harvests so far were 6.7 tons in 2008 and 11.7 tons in 2009, more than the harvest from traditional switchgrass (*Panicum virgatum*) grown in the area. We processed one crop of round bales into biomass pellets, which were used at a local utility to create electricity.

Planting giant miscanthus is very labor intensive, and I believe most farmers who grow it will plant it in small fields (less than 10 acres). If

purchased from a local grower, the rhizomes will cost about \$5,500 per acre to establish.

I believe giant miscanthus is most likely to be of interest to young, beginning farmers; displaced tobacco farmers; and truck gardeners. Small-city farmers might also be interested.

Future success will depend on building more biorefineries that can process giant miscanthus. These plants can provide jobs in rural America. Missouri has one biorefinery, the Show Me Energy Cooperative, which licenses technologies to other producer groups so they can emulate our model. With

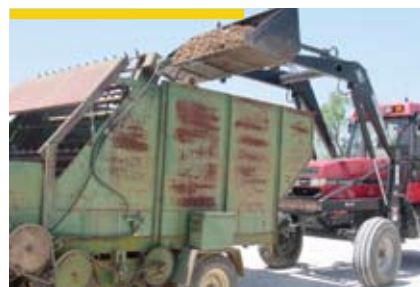


Photo by Steve Flick

In 2008, Steve Flick planted giant miscanthus rhizomes with a modified bermudagrass sprigger. Flick continues to test planting methods as he explores the bioenergy potential of this perennial crop.

today's tight capital markets, I see these plans being developed on a small scale – fewer than 150,000 tons per year. Processing biomass is not easy, but the demand for renewable fuel is growing, especially for European export.

Eliminating Invasive Buckthorn with Goats, an Ecological and Habitat Restoration Study

Objective: To determine how quickly and completely a herd of Spanish meat goats can clear land of invasive buckthorn trees, and to gain knowledge to set a fair price for renting them out to do so. This uses forage now being wasted and causing environmental harm. It leaves a small carbon "hoofprint" and no chemical residue, while providing a goat meat source where demand outweighs supply.

Results: In 2009 I built eight 30 by 60 foot pens, four for each study area. In the first study area there was target grazing of an uncut stand of buckthorn and other understory brush. I quickly realized I'd planned to put too many goats in the pens. Separating out a few goats, transporting them to the study pens, and expecting them to graze away from the comfort of the herd were logistical problems. In late summer when I had to wean my intact bucklings and separate them from the females, four

bucklings and their Dad became my test animals. Pen vegetation was documented before, during, and after grazing with photography and stem count of standing plants.

One mature buck and four bucklings defoliated a pen in three to four days. I was surprised brush didn't recover before the growing season ended. I look forward to seeing the spring growth impact.

I've staked a new study area of four pens adjacent to the four pens I already grazed. I feel it will give a

better comparison of two management styles. In 2010, all non-native trees/brush in these new pens will be cut before the buckthorn leaves, and allowed to re-grow before introducing goats. The most comfortable time for chainsaw crews to cut brush is fall through spring when the heat, humidity, and bugs are at their lowest. However, cutting right after the first leaves appear may increase stress on the plant after it uses its root reserves to produce the first leaves and before those leaves can replenish the nutrients to the roots. If a project is started during the grazing season it would make sense to let the goats clear the way for the chainsaw crews. Precutting goat clean up should save some human time, effort, and therefore money, because

human hours cost more than goat hours. Pens grazed in 2009 will be grazed again at weekly intervals as soon as there is enough leaf to justify bringing goats back.

Photographic documentation and stem counts will be done in both sets of pens before cutting, after cutting, after regrowth, before grazing, and after grazing. Goats will be introduced to both study areas at weekly intervals throughout the grazing season.

Although it isn't part of the original study, I'm documenting all target grazing I'm doing with the doe herd, and including this information in the final product. The doe herd – about 20 adults and 38 kids – can defoliate about 10,000 square feet of heavy brush or weedy pasture each day.

Culinary and Ornamental Herbs: Adding to a Grain and Livestock Family Farming Operation

Objective: To expand a culinary and ornamental herb business to help support a family farming operation.

Results: Our farm – in our family for six generations – currently supports two families but has struggled to stay afloat with its conventional feedlot and small-grain operation components. In 2000, we incorporated a culinary and ornamental herb business to help make ends meet, initially selling our herbs to local food service outlets. Business was inconsistent and unpredictable, however, so we decided to expand so we could sell potted plants at a local farmers market. Our expansion aims were to increase net income, make smaller areas of marginal ground more productive, and provide our community quality products not currently available.

We installed a used greenhouse (120 feet long by 25 feet wide) and built in-ground beds. We use composted manure from our feedlot, mixing it with a peat mix for our planting medium.



Photo by Ken Schneider

"Herb Lady", Jody Rauch displays an herb planter she designed as part of a successful effort to increase income from a grain and livestock farm by adding a culinary herb enterprise.

Our produce includes sage, rosemary, French thyme, garlic and onion chives. We installed automatic drip irrigation to keep up with the watering. We marketed our business at local craft shows and a flea market. An early boost to our venture was an opportunity to provide

plants for an annual herb sale after the event's previous supplier went out of business.

We also sell planters, bare root and cut herbs as well.

We found there is an interest in our area in a reliable source of locally grown, high-quality herbs. We even do some limited

shipping outside the state.

Income from this venture has steadily increased each year. If success continues, we hope this venture will enable us, and our children, to stay on the farm.

Blueberry

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continue to monitor the soil. Our other big surprise was that hours of labor and hauling supplies were greater than expected, even with the purchase of labor-saving devices such as an end-loader. Our bushes in general seem healthy and are growing well. We add muriatic acid every time we irrigate to counter the alkalinity of our irrigation

water. Getting the pH adjusted has been a struggle. Soil and water tests are so important – we thought we had acidic soil, and in actuality, the alkalinity of our water was counteracting our efforts.

To find out more about NCR-SARE Grants, please contact:

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