North Central Region SARE

Farmers Forum Highlight

The North Central Region-Sustainable Agriculture Research and Education (NCR-SARE) Farmers Forum is an annual event that gives farmers, ranchers, educators, students, researchers, and others the chance to share information about sustainable agriculture practices with a regional audience. The talks focus on research, demonstration, and education projects that promote farming and ranching that emphasizes environmental stewardship, profitability, and quality of life for farmers, ranchers, and their communities. The 2012 Farmers Forum will be held on Nov. 1-3 at the Boone County Fairgrounds in Columbia, Missouri, and will feature NCR-SARE grant recipients. 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 United States Department of Agriculture–National Institute of Food and Agriculture (USDA-NIFA) program that supports and promotes sustainable farming and ranching by offering competitive grants and educational opportunities for farmers and ranchers, researchers, educators, students, institutions, organizations, and others exploring sustainable agriculture.

One of many educational efforts NCR-SARE helps support is an annual Farmers Forum. The 2011 Farmers Forum featured speakers who received NCR-SARE Farmer Rancher Grants and Youth and Youth Educator Grants.

This highlight is a summary of reports and presentations by the 2011 Farmers Forum speakers. The FNC, YNC, and YENC numbers listed with project titles are NCR-SARE project numbers. They can be used to look up full project reports. They stand for Farmer Rancher Grants (FNC), Youth Grants (YNC), and Youth Educator Grants (YENC). To read the full reports, go to the national SARE website at ***www.sare.org*** and click on the "Project Reports" tab, then click on "Search the Database." Enter the project number in the "Search String" box.

SARE Sustainable Agriculture Research & Education

http://www.northcentralsare.org

Photo by Cherrie Nolden

Fencing is a challenge for Julie Engel who raises rabbits using a modern Coney Garth (rabbit yard) system, but the benefits include no cages, so rabbits graze freely, and need no purchased feed.

FNC10-824 **Madison, WI – Julie Engel**

The Coney Garth: Effective Management of Rabbit Breeding Does on Pasture

Objective: Rabbit meat is healthful — high in protein but low in fat, cholesterol, and sodium. I want to graze, breed, and manage meat rabbits in a cage-free, hare-pen-free colony setting where they thrive entirely on grass and vegetable scraps.

Results: My rabbits rely solely on the pasture for their nutrition in the summer, and on hay, vegetable scraps, and sunflower seeds in the winter. Rabbits actually are very efficient grazers, shearing grass at about two inches and chewing the stem to the end.

Feeding rabbits a grass-based diet reduces feed costs. I first tried raising them on fresh pasture, using the hare-pen method, which is a pen set up in a pasture that allows them to graze grass. I found that unsatisfactory because the does are still caged, feed must still be purchased, and the pen doesn't allow the rabbits to graze effectively. After two years I came up with a new system, using pasture land already in rotation with other animals, providing an opportunity for owners of these lands to diversify. My Coney Garth (i.e., rabbit yard) system uses a mobile, intensely managed pasture allocation where rabbits thrive entirely on grass and vegetable scraps.

I experimented with several fencing systems to try to keep rabbits from escaping, discovering after much trial and error that a physical-barrier fence worked better than an electrified one. I had zero percent escape loss during the months of October, November, and December, the only months the fence was in operation. However, this fence is heavy and time consuming to work with. I will look to make improvements.

I did not achieve my goal of 400 fryers slaughtered in 2011, in part because of dealing with escapees. I am hoping the new fence will improve production.

One downside: Rabbits dig holes in the pasture, perhaps escaping or causing danger to other animals in the pasture.

FNC08-731 Black Creek, WI – William West

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

Objective: To raise yellow perch successfully outdoors, and to reduce or eliminate parasitic infestations.

Results: There are few, if any, economical ways to raise fish in outdoor ponds without encountering infestations. My project focuses on reducing and/or eliminating parasitic infestation in yellow perch as a method to increase the value of the crop.

Pond infestations of yellow grub and black spot are problematic to a wide variety of fish, including all sunfish, perch, bass, hybrid striped bass, and catfish. Typical control methods include chemical, biological, and physical control, but all interfere with production.

Since free-swimming parasites are only slightly mobile, we can possibly use water current to prevent infection. Given knowledge of indoor recirculation aquaculture systems (RAS), I installed an outdoor RAS to discourage parasite infestations.

Test parameters were temperature, water flow, water quality and oxygen, fish growth, and parasitic infestations. Temperature became a problem; we were unable to maintain optimum water quality due to temperatures above 80 degrees. We were unable to maintain feed consumption, which resulted in lower growth. Of the 3,000 fish in the survey, and approximately 360 fish necropsies, observed parasitic infection was zero.

In the second year, we tested other parameters such as changing flow and location of intake water, and we increased fish capacity per tank to more reflect real farm conditions.

This project study opens the door for similar research focused on other economically important species such as sunfish and hybrid striped bass.

To learn more, email William West at blueirisenv@gmail.com.

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

Aronia Berry: A Sustainable Organic Crop

Objective: To sustainably and economically grow the aronia berry (also known as the chokeberry) in the North Central Region on a small family farm, and to develop the opportunity for other similar farms to do the same.

Results: At Sawmill Hollow Family Farm, our family-owned agribusiness, 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; aronia berry is an example.

The aronia berry is native to eastern parts of North America. It is considered a super fruit, as this darkly pigmented berry's properties include flavonoids, antioxidants, and tannins.

We found that the aronia berry cultivars Viking and Nero are best. There should be at least one foot of spacing between plants, and using mulch helped keep in moisture for the plants. We found that mechanical harvesting would be faster than harvesting by hand.

We grow aronia berry using organic production practices (like cover crops), which we think is better environmentally. An affordable perennial cover means less cover crop planting the next year. We recommend an 80%/20% bluegrass/ryegrass mix.

On the economics side of this project, aronia berries are a value-added crop. There are many products, including wine, that can be produced from the aronia berry. There is growth potential for farm-to-market sales.

Learn more at sawmillhollow.com/.

Photo by Joan Benjamin

The Pittz family shares information about growing aronia berries and using them for value-added products at their annual North American Aronia Berry Festival at Sawmill Hollow Family Farm. The event features tours, seminars, and tastings and is scheduled for September 15 and 16 in 2012.

FNC08-745 Fremont, NE – Cathy Hanus

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

Objective: To help small farmers improve the survivability and plant development of transplants with commercially available products, particularly to see if adding commercially available mycorrhiza inoculants and/or commercially available compost affect the early plant growth of small berry bushes.

Results: We are trying to diversify our operation with four acres of specialty berries such as aronia and elderberry. Our goal was to see if adding mycorrhiza and/or commercially available compost would affect the early plant growth of our small berry bushes. Mycorrhiza are fungi that form associations with the plant root and help with nutrient uptake and plant growth.

Aronia and elderberry rooted cuttings were planted in four groups: control, commercially available compost added, commercially available mycorrhiza added, and both commercially available compost and mycorrhiza added.

We hypothesized that the group with both the commercially available compost and mycorrhiza would produce the most significant early growth but we were wrong. The compost-only group appeared to develop mycorrhizae at two weeks with the aronia, and at four with the elderberry. The aronia in the group that had both applied also had mycorrhizae at two weeks. At four weeks, both plants in the compost-only group had very bushy feeder-like roots compared to both plants in the control group, which were scrawny. The mycorrhiza-only treatment was close behind but still less full. The treatment with both had a completely different type of growth characterized by a very long root with little fullness. All the plants appeared to have mycorrhizal development by eight weeks.

We likely will continue this experiment to look at the plants over the next year to see if the early start of the composted plants makes a difference in plant growth over a longer period of time.

Photo by Cathy Hanus

Cathy Hanus enlisted the help of her husband, Michael; daughter, Patricia; and son, Sebastian (shown) to determine if commercially-available mycorrhizae and/or commercially-available compost would affect the early growth of small berry bushes. The research included rooting cuttings, planting, and lab work.

FNC06-628 Kansas City, KS – Christine Allen

Small Poultry Farm Education Project

Objective: To share knowledge of raising chickens and growing a garden in an urban area.

Photo by Joan Benjamin

Christine Allen (left) explains how she uses poultry art and birds like Roller Pigeons to engage students in her Healing Egg classes. Allen teaches urban poultry farming and promotes healthy eating.

Results: The Chicamore Urban Poultry Project teaches people about raising chickens for eggs and meat; raising other birds that are good in urban areas, like pigeons; and growing a vegetable garden.

I have purchased and raised over 250 chickens on my small Kansas City, KS, acreage. I raise the birds then sell them and eggs to neighbors and friends, and also at two roadside market events. I also feed and employ the homeless people in my neighborhood.

I grow squash, tomatoes, and other vegetables in my garden, and one time made salsa with my vegetables. I bring food from my garden and hold "Healing Egg" classes at the library so children and parents can learn about eggs and chickens, and taste my vegetables. I share egg recipes and art dealing with poultry to help inspire the class participants.

I use rain barrels and chicken manure to make "manure tea" for my vegetable garden.

Economic impact was limited, but the class helped spread awareness about healthy food to a low-income audience.

Bio Char Kiln Fabrication and Operation

Objective: Bio char, a solid material obtained from the carbonization of biomass, can be a useful soil amendment, as it enhances soil fertility and water retention and has potential as a carbon sink. It could have excellent potential for organic farms devoted to small, intensely cultivated plots of vegetables, herbs, or fruits. To date, there's little information available on how a farmer could produce meaningful amounts of bio char with a repeatable process and at an economical cost. Our project aims to answer some of those questions.

Photo by John Topic

Downed wood and prunings are loaded into a kiln and set on fire to start the charring process. The result will be about 200 pounds of bio char.

Results: My wife, Peg, and I own 57 acres of woods in northeast Iowa, 20 of which are mature trees, mostly oak, hickory, and walnut. The remaining acreage is a 20-year-old stand of coniferous trees and oak; the entire tract is in Forest Reserve. The mature portion has been managed for salable timber, but there are numerous girdled weed trees and a considerable amount of fallen branches. We are using wood from this acreage for bio char production.

Photo by John Topic

John Topic's portable bio char kiln has combination air inlets/chimneys to control the rate and location of the fire inside.

We had small, metal kilns built. The design is simple. Two metal rings 4-feet in diameter and 2-feet high are stacked, and a flat, round lid is used as a cap. Eight combination air inlets/chimneys are used to control rate and location of the fire inside the kiln during charring. A small kiln can complete the charring process in one day, cool down on the second, and be ready for loading the third.

During 2011, two different types of kilns were fabricated and used to generate bio char. The char has been used under different conditions to evaluate its performance: direct application to soil, mixing char with composted manure and tilling the mixture into the soil, and incorporating the char into a compost heap.

Early estimates indicate that we are able to produce about 200 pounds of bio char per incident, for a total of about two tons a month. That's enough to amend a plot 75 feet by 75 feet at a rate of 20 tons/acre.

Last fall I mixed composted manure with char and tilled it into a plot of clay soil. This spring that section of garden was amazingly friable. Untreated soil was sticky and waterlogged, and soil with only composted manure was also sticky, but soil with char only was more friable and less sticky. The mixture of char and manure was like potting soil, requiring only a twist of the wrist to loosen the surface.

I plan to continue to incorporate a portion of char into compost piles, begin to use char as a bedding material for composting worms, and to apply a mixture of composted manure and char to soils.

FNC08-742 Brodhead, WI – Tony Ends

Comparing Prairie Grass and Small Grain Straw for Mulching Vegetable Crops

Objective: To compare a biodegradable mulch alternative to the rolled plastic mulch made from polyethylene film.

Results: We started producing vegetables for direct market sale in 1994 on Scotch Hill Farm. We grow more than 100 varieties of vegetables, including sweet corn, on 10 to 12 acres per year. On another 29 acres, we grow oats, wheat, hay, rye, and now switchgrass.

Controlling labor costs through reliable, cost-effective methods of suppressing weeds is vitally important. Rolled plastic mulch from polyethylene film has increasingly helped vegetable crop farmers control weeds since the 1950s. However, extracting and disposing of plastic mulch after the growing season poses challenges for most growers.

In addition, much of it ends up in landfills, which are filling up and closing. Consumers worry about black plastic mulch leaching chemicals into soil during and after production.

We've used both black plastic and straw mulch to reduce labor expenses for weeding and cut cultivation time. Our SARE producer grant for comparison of oat, wheat, and switchgrass straw mulch took place in 2009 and 2010. We compared the performance of prairie grass straw to oat and wheat straw as organic mulch alternatives to black plastic for fresh market production of a variety of vegetable crops.

We also compared our own experience establishing 3- to 5-acre fields of oats, wheat, and prairie grass and their integration into our primary production and rotation of vegetable crops.

Photo by Tony Ends

Farm apprentice Trish DeCoster of Evanston, IL, mulches bedding plants at Scotch Hill Farm, which has been growing and direct-marketing fresh vegetables for 17 years in southern Wisconsin and northern Illinois.

All three mulch types were equally effective in delaying the emergence of weeds. Switchgrass seemed to host no plant disease, though some plant disease was detected in both the oat and wheat straw.

Learn more at www.scotchhillfarm.com.

Photo by Dela Ends

Scotch Hill Farm in Brodhead, WI, compared oat and wheat straw and switchgrass as mulch in many varieties of transplanted and direct-seeded vegetable crops, including these snow peas.

YNC10-052 Illinois Youth – Lydia Gioja

How Can I Fit Pigs into My Family Farm?

Objective: To raise pigs as a fund-raiser for college, learn how to use an electric fence, and determine whether pigs could follow ruminants in rotational grazing without damaging the pasture.

Results: I live on a small farm that practices rotational grazing with our small herd of livestock, which includes Alpine and Saanen goats, Katahdin ewes, and Dexter steer cattle.

I was interested in trying to raise pigs and heard a presentation at the Small Farm Show on pigs. I researched the equipment I needed and prepared a budget. I looked at electric fencing and posts, feeding troughs, nose ringing pliers and rings (to prevent rooting), and buying the pigs themselves. We bought two crossbred feeder piglets in spring 2011. They weighed 43 pounds.

I kept them in the barn for about a month to prevent sunburn and to monitor them while switching feed. Then I put them into a large dog run until we set up the pasture for them. While they were in the dog run, before we rung their noses, they spilled their water onto the dirt and started rooting. Within two hours they became the blackest pigs I have ever seen! The next day we put rings in each nose, and put them out on the pasture. They never rooted like that again. As they moved outside, I gave them a large kiddie pool to help them cool off in the summer, which they loved but destroyed as they got bigger. The pigs were very healthy. Each day I fed them a swine ration, and whatever skim milk, whey, or veggie scraps we had in the kitchen.

Photo by Gioja family

Lydia Gioja holds her new piglet and begins her hands-on education in raising pasture hogs.

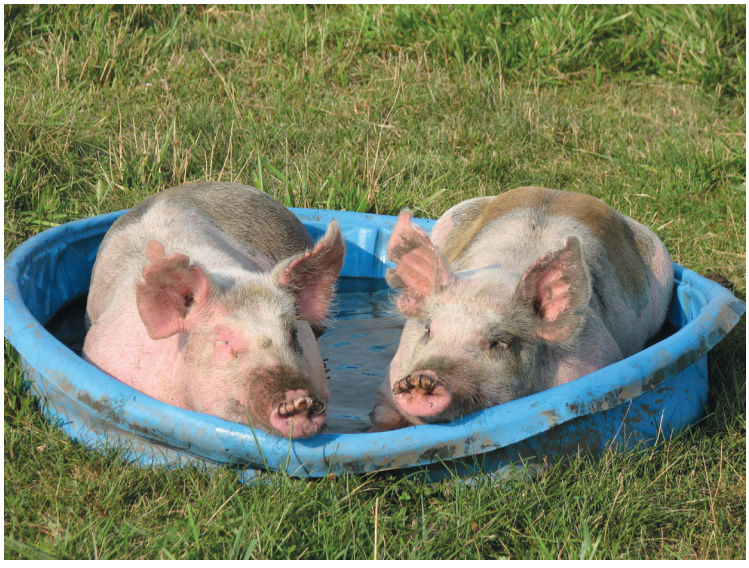

Photo by Lydia Gioja

A kiddie pool is a handy, lightweight, but temporary solution to keep feeder pigs cool.

At 6 months old, they went to the meat locker, weighing about 283 and 269 pounds. Their hanging weights were 204 pounds and 194 pounds. I sold three halves for $2 per pound and kept the fourth for my family. The meat I sold brought in $860.

We ended up with bacon on the table for breakfast, sausage for lunch, and ham for supper. I also made a good sum of money for my college fund, learned how to raise pigs, make a budget, and set up electric fencing. The fencing was totally effective — after the first day they never challenged the fence again. I found that young pigs with rings in their noses won't damage a pasture.

I would improve the project by getting a reel with a crank to wind up the electric rope. Another big improvement would be a pool with stiff sides that is still light enough for me to carry from one paddock to the next.

FNC09-756 Roseville, OH – Tim Kimpel

Study and Develop Tillage Practices and Timing for Incorporation of Cover Crop Plant Material

Objective: Having found significant crop response to aerating soil a few days after initial shallow incorporation of various plant residues, this study is to fine tune the management techniques and quantify the expected nutritional, biological, and yield response to various cover crops, incorporation techniques, and timeliness of tillage for aeration and weed control.

Results: Kimpel Farms is a diversified certified-organic farm of approximately 500 acres. We grow corn, soybeans, spelt, oats, hay, and forage, and raise grass-finished cattle, pastured hens, pastured broilers, and swine. We direct market our farm products at a small natural/organic grocery store our family owns, and sell products to other grocery stores and restaurants.

I worked with my friend Ray Rawson from Farwell, MI on duplicating trials. He is a biological/conventional farmer who is very aware of soil biology and works to enhance the health and soil environment for beneficial soil microorganisms.

We seek to save input costs as plant nutrition becomes more expensive, and to provide information valuable to much of agriculture. We had noticed before the study that sometimes we'd get a nice plant and yield response to tillage that mixes various residue and plant material into the top few inches of soil along with plenty of air, and that this response seemed enhanced if another aeration-type shallow tillage occurs a few days later.

Our thinking is that when residue and plant material is shallow-incorporated with plenty of air in soils with plenty of beneficial biology/soil microorganisms, those beneficial microorganisms almost immediately begin to convert the material into plant-available nutrition. We think another aeration treatment a few days later adds oxygen that causes a burst of biologic growth, speeding and enhancing biologic conversion of nutrition.

This study shows how tillage type used in incorporating cover crops and timing secondary incorporation/aeration tillage might impact both nutrient release and quantity of nutrients released. We measured at harvest for each variable and replication, and did soil testing for each.

A few examples of our findings include: at Rawson Farms, soybean yield was 90 bushels per acre in areas where residue/plant material was incorporated earlier, compared to 55 bushels per acre where reside was not incorporated earlier. Where somewhat aged beef manure was applied before planting over earlier incorporated ground, there were some weeds and yield was 157 bushels per acre.

At Kimpel Farms, soybeans planted in the area of earlier incorporation had an almost perfect plant stand and yielded 49.7 bushels per acre. In areas not incorporated earlier, beans came up three to five days later, plant stand was reduced at least 30 percent, plants yielded 24.5 bushels per acre and died earlier.

Corn at Kimpel Farms grown on areas not incorporated early yielded 105 bushels per acre. On areas incorporated early, corn yielded 137.3 bushels per acre, a 31 percent increase. Rows cultivated early after emergence over areas of earlier incorporation yielded 140 bushels per acre.

Photos by Tim Kimpel

Soybeans in the same test plot are shown early and later in the year. Tim Kimpel tested the hypothesis that timely additional aeration after earlier incorporation of green plant materials (cover crops) increases yields. The area with the taller, thicker beans was sub-tilled (shallow tilled for aeration) three weeks before planting. The shorter, thinner beans are just across the line where the area was sub-tilled the day before planting. The taller beans made 50 bushels per acre and the shorter beans made 25 bushels per acre. The only variable was the timing of sub-tilling.

Developing a Wildflower Nursery for the Restoration Market Using Forest Biomass By-Products as the Garden Foundation

Objective: To establish a local ecotype stock of selected plants of savannas and woodlands in southwest Wisconsin, and to test the success of nursery production beds that mimic wild-simulated growing conditions.

Results: Oak woodlands and savannas have suffered significant declines in southwest Wisconsin due, in part, to invasion by aggressive nonnative plants and shade-tolerant trees that have supplanted the oaks. Landowners and resource managers have started to restore the native woodlands and savannas, resulting in a growing need for native local seed.

Turtle Hill Wilds began in 2009. We slowly built our nursery stock from local sources of wild-collected seeds that we propagated and grew ourselves. By 2010, we were offering 45 different species of native wildflowers for sale. A weak aspect of our business was loss once plants were potted; we lost on average two pots per flat. We also were concerned over the collecting pressure on remnant habitat in the region. The SARE grant was used to address these issues.

To address collection pressure on wild populations, I used the following criteria to select seed sources: 1) a population size of at least 50 plants, 2) a native population or planted established population (e.g., not planted within the last 10 years) and 3) a population with enough seed to allow taking 2,000 seeds without taking more than one-third of the available seeds.

Locating populations of local ecotype seed material for woodlands and savannas proved challenging. Parcels of state and private land with appropriately sized populations were scarce, and many were already sites for other nurseries. The roadsides of rural roads provided the best results.

I've concluded that committing to selling local ecotype seed will require using populations of size that are unknown to other collectors, collecting from smaller populations, and adding genetic diversity by collecting from numerous small but separate populations.

To deal with nursery loss associated with pots, we developed and tested a three-stage process for growing woodland and savanna plants that circumvents using pots. Seeds are germinated in our greenhouse, moved to raised garden beds for one to two years, and subsequently transplanted into permanent forest production beds. We tested seedling survival in garden beds composed of 60 percent mulch and 40 percent soil compared to seedlings held in pots in traditional potting soil, and the success rate after transplant into forest production beds.

During both years of my experiment, growing seedlings in nursery beds far exceeded performance of growing seedlings in pots. In 2010 and 2011, all seedlings directly planted into the nursery mulch/soil beds had high rates of survival, while the potted plants averaged 30 percent die-off. By using the nursery mulch/soil beds, we saw a reduction in our water usage, our reliance on expensive plant mediums, and produced hardy plants both for sale and for out-planting into our forest production beds. In the upcoming years, all individual 1-year-old plants transplanted into the forest production beds will be monitored for survival and growth. Within five years many of the plantings will mature to the point of sustainable harvest, either of live material or seed.

This strategy diversifies the character and quality of our lands, enhancing our ongoing restoration efforts, and develops a sustainable seed nursery that can grow.

Learn more at *www.turtlehill.wordpress.com/*.

Photo by Cindy Ramseyer

Raised beds proved better than pots for growing native wildflower seedlings such as Compass Plant and Blazing Star at Turtle Hill Wilds wildflower nursery.

YENC10-037 Kansas City, MO – Sarah Holmes

A Five-Part Plan to Bring to Life a More Sustainable School Garden

Objective: The goals are to expose first-grade students to hands-on environmental education through a school garden, to enhance the curriculum by connecting it to the natural world, to provide students with the opportunity to grow and eat fresh produce, to diversify campus ecology, and to make school grounds look more attractive and inviting.

Results: This project revolves around five concepts: composting, beneficial insects, extending the season, cover crops, and irrigation/water. Significant progress has been made on several of the concepts.

Composting was implemented after we researched several different types of worm bins, choosing one from Gardeners Supply. We've been feeding our worms for several months now; they consume apple cores and banana peels from a collection bin. Several times a week students mist the bin and check for worm activity. At first, many students thought the worms were gross, but now that they understand their usefulness, that attitude has changed.

Our outdoor compost bin is a wooden frame bin that assembles in a Lincoln Log fashion. It was very easy for the students to put the bin together. We emptied our first load of compost this spring and started filling it for next year. Students participated in watering the compost, aerating it, and turning it.

As for beneficial insects, students are investigating native plants that have the qualities of attracting beneficial insects. We have prepared a bed along the side of our garden and amended the soil. We will plant the natives that the students chose and count the insects on the plants.

Photo by Sarah Holmes

Teaching first graders about gardening and worms.

FNC09-772 North Ridgeville, OH – Timothy Malinich

Elderberry Trials for Northern Ohio Growers: Demonstrations and Evaluations to Encourage Diversification

Objective: To conduct regional trials of different elderberry cultivars to determine which fare best, and to use the information to help local producers.

Results: Local producers can diversify their crop mix to take advantage of local food initiatives in the region, including niche markets that exist for less-common fruits and vegetables. Elderberries are one possible option for growers. Currently, most elderberries are collected from wild shrubs, but planned, established plantings can yield 15 pounds of fruit per plant, or a potential annual yield of 12,000 pounds per acre.

We planted one-half acre of land at our Hearthstone Berry Farm with elderberries in spring 2010, using several plants of each of several cultivars, including *Sambucus canadensis 'York', S. canadensis 'Adams', S. canadensis 'Nova', S. canadensis 'Johns', S. canadensis, S. nigra 'Samdal', S. canadensis 'Haschberg', S. nigra 'Haschberg'*. Each year we'll be grading the plants for height, spread, growth habit and overall condition. We'll record time of harvest and total harvest weight for each plant, and commercial growers will be invited to provide their own assessment of the plants, including fruit quality.

We expect the first harvest of fruit to occur this summer.

Learn more at *hearthstonefarm.net*.

Photo by Tim Malinich

Elderberries are an emerging niche crop with significant variability between plants in yield and performance. Tim Malinich is conducting trials to determine which cultivars work best for northern Ohio.

YENC10-023 West Branch, IA – Mark Quee

Green Manure vs. Brown Manure in an Organic Vegetable System

Objective: To compare two fertility management treatments in an organic vegetable production system to determine whether animal manure is necessary to maintain soil fertility in an organic vegetable system or whether cover crops are sufficient. We also wanted to give students an opportunity to work with real data and to create meaningful statistics and documents describing processes and results.

Results: Scattergood Friends School has a long history of raising organic vegetables and grass-finished, rotationally grazed beef and lamb to feed staff and students while also incorporating food production into classroom curriculum. We decided to conduct the experiment on land recently transitioned from organic pasture to vegetable production, reasoning that the soil would be relatively uniform, with no previous influence from vegetable production. Our plan was to measure soil fertility two ways — soil tests and plant productivity.

In spring 2011, we conducted soil tests to get baseline fertility, rototilled all the plots, planted in mid-April, and cultivated until mid-June when crop samples were harvested and weighed.

Photo by Mark Quee

Students at Scattergood Friends School set up eight test plots as part of a long-term experiment studying the differences in fertility maintenance using animal manure products and plant-based cover-cropping.

Baseline yields (prior to treatments being imposed) were:

- Broccoli's average head size was identical (6.83 inches), though the green side had a higher percentage of successful crop.
- The zucchini grown on the green side was more productive, with 11.2 marketable fruits per plant, compared to 8.4 on the brown side.
- Beets grown on the brown side outproduced those grown on the green side, averaging 14.5 pounds per 10 linear feet, compared to 12.5 on the green side.

We established our fertility management treatments in 2011 (Brown, Green, and Control) by grazing three Katahdin rams on the Brown side from July 27 to August 5. On August 5, we rototilled the crop and livestock residue and drilled in a cover crop mix of oats and field peas in all areas except the Control plot. On September 1, we introduced turkeys to the Brown side, where they rotationally grazed until November 1. We chose crops with different fertility needs: a leafy green (broccoli), zucchini (fruiting plant), and beets (root crop).

The first year was spent primarily establishing baseline data to which to compare future results.

We will continue this experiment in 2012, rotating the cash crops to maintain good management practices.

Cow Taxi: Using Noncontiguous Pastures for Dairy Grazing

Objective: To find a method to move our animals in a non-stressful way from various outlying pastures to the milking parlor on our home farm.

Results: Land suitable for farming is increasingly found in noncontiguous parcels surrounding urban areas that are experiencing sprawl. While this pattern works for some agricultural applications, it is a barrier to livestock farming that requires a relatively expensive infrastructure. Our Lubbers Family Farm, 10 minutes west of Grand Rapids, faced such a challenge when we wanted to expand our dairy herd, using land that was available but not abutting our current operation. We decided to adapt a used stock trailer as a "cow taxi" to move cows among various pastures and to and from the milking parlor.

The first summer — 2010 — we bought gates and built loading ramps at both the home place and the North 30 where most of the grazing acreage was. We began trial runs of moving a select number of cows on an existing small stock trailer and began collecting and tracking milk-production data and cow-health data to establish a baseline to be compared to later data.

We also completed construction of a creamery on our farm and began to make cheese that summer.

In 2011, we bought a trailer and adapted it to transport the cows. We used an open trailer because the cows like to see where they're going, and we taxied our 28 cows in two trips.

Our findings:

- Milk production increased 30 percent from 2010 to 2011, while the fat content decreased slightly and the protein increased.
- Generally speaking, the herd's overall health improved, though there was an increase in the incidence of mastitis.
- We spread our capital costs — truck, trailer, and docks and gates — over a 10-year period. The financial cost of transporting the cows was less than the cost of feeding hay in a quasi-confined environment. The number of gallons of milk produced in 2011 was significantly higher than in 2010.

The cows adapted well to the taxiing. The taxi works well for once-a-day milking but probably wouldn't work as well for twice-a-day or more frequent milking. The process is generally less energy intensive than providing hay or green chopping, but it probably would not work well with large herds.

We will continue to taxi our cows, perhaps expanding to neighboring farms that have abandoned pastures.

Learn more at *www.cowslipcreamery.com*.

Photos by Jeffie Lubbers

Jersey cows await transportation from the home place to pasture two miles north.

Cows like to see where they are going, so an open stock trailer proved the best option for low-stress transportation of the Lubbers' dairy herd from home place to outlying pasture.

Sustainable Agriculture Education and Practicum for Kansas Small Farmers Using Permaculture Principles of Ecological Systems Design and Management

Objective: To raise awareness of the importance of a sustainable, resilient food system by providing an educational venue where small-scale farmers and urban gardeners in the Kansas Valley Region can learn about permaculture systems.

Results: Permaculture emphasizes patterns of landscape, function, and species assemblies. Elements are chosen to match the characteristics of the farm, and combinations of plants are used considering needs, outputs and properties, and how they interact with the system.

The educational goal for our project was to provide farm training sites for the practice of permaculture principles. We taught farmstead planning, systems design, the creation of sustainable soils, and biologically diverse food systems. These food systems are designed to stack — orient and position in space and time — vegetable, perennial fruit, and nut tree species. This mimics nature's natural progression of species composition and increases diversity over many decades.

To effectively support our educational program, we created three demonstration and intern training farm sites. The first, Prairie Lovesong Farm, demonstrated an initial phase of planting, and the second, Vajra Farm, demonstrated ongoing support for a partially established system. The third, Chestnut Charlie's, demonstrated a mature system — a mature fruit and nut tree orchard system. Chestnut Charlie's tree plantation is a silviculture system that consists of chestnut trees and other trees, including pecans, Black and Carpathian walnuts.

At Vajra Farm, we completed a forest garden design layout and planted most of our nut trees and all of our planned fruit tree species. Major elements were planted between 2009 and 2011, including fruit and nut trees, shrubs, and berry vines. The planted hardwood trees include Burr Oak, Black Locust, Chinquapin Oak, Chinese Chestnut, Carpathian Walnut, Hazelnut, Paw Paw, pecan varieties, Persimmon, Shellbark Hickory, and Witch Hazel. Fruit trees included apple, Asian Pear, cherry, European Pear, peach, and grape vines. As of January 2012, all trees planted during the grant period have survived except for one apple tree. Nitrogen fixing shrubs planted were Siberian Pea Shrub, Autumn Olive, Goumi, Bush Clover, and other perennials.

At Prairie Lovesong Farm we completed a master plan to develop a forest garden nut and fruit tree crop system, and the construction of three large water harvesting swales. By the end of 2010 we had planted a cover crop and the pecan trees on the lower swale berms. In spring 2011, we planted over 100 fruit and nut tree species and varieties. These included apple, cherry, Paw Paw, peach, nectarine, apricot, pear, Persimmon, plum, and Quince.

Hardwood and nut tree species include Almond, Black Locust, Chinese Chestnut, and Shellbark Hickory. Shrub species include Autumn Olive, Aronia , Cornelian Cherry, Elderberry, Goumi, Hazelnut, and Kousa Dogwood. Of the named species, we experienced about a 75 percent survival with losses due to deer browsing and drought.

Permaculture design field sessions and whole-day practicums were held at these sites.

We've successfully completed four certified permaculture design courses (PDC) with 49 participants. Courses planned for this year include a 15-week PDC, a two-day permaculture workshop, and a nine-day intensive PDC.

We have awarded 21 PDC graduates with certifications from the Kansas Permaculture Institute. On evaluations, students have rated the courses as "exceeding expectations" or "excellent" in the categories of Quality of Training Facilities and Content and Instruction.

Vajra Farm has had an apprenticeship program since 2001 for teaching organic methods for vegetable and herb production. In 2009 we began including internships for permaculture design and practice.

Learn more at *www.kawpermaculture.org*.

Photo by Greg Moring

Steve Moring (center) explains permaculture principles and polyculture no-till design at Vajra Farm during an urban garden and farm tour.

Photo by Steve Moring

This no-till raised-bed polyculture garden is designed to maxmize bed space and minimize pathways. It features a keyhole maze design made up of several keyhole shaped beds put together. Crops include: broccoli, green onions, lettuce, red cabbage, Napa cabbage, and potatoes.

Extending the Season and Increasing Quality of Produce with Low Tunnels Year-round

Objective: To explore using low tunnels as an economical way to extend the growing season.

Results: Locally produced food is growing in popularity as consumers' interest in knowing where and under what conditions their food is grown is increasing. In the Midwest, though, most producers stop growing after the first frost and don't have produce for up to six months a year. Also, there's a two to three month period in the summer when it's too hot to produce lettuce. High tunnels or heated greenhouses are too expensive, so we are exploring the potential of low tunnels to extend the growing season.

Millsap Farms is a 20-acre diversified farm near Springfield, MO. We raise 5 acres of vegetables, bedding plants and vegetable starts, along with some livestock. We sell our produce through farmers' markets, grocery stores, our farm stand and the local community supported agriculture program.

We are exploring the potential of temporary low hoops with light coverings, sometimes referred to as quick hoops, as a way to extend the growing season, meet consumers' desire for local food year-round and increase producers' profits. The hoops are bent out of 10-foot galvanized electrical conduit into 6-foot diameter half circles, stuck into the ground 6 to 12 inches on each side and then covered with either a floating row cover or plastic.

We initially installed about 1,600 linear feet of hoops, covering a 6-foot wide bed of vegetables, for about $1,000 in materials and $300 in labor. This covered 9,600 square feet of growing space for less than 15 cents per square foot. At the end of November, after several frosts in the upper teens, we were harvesting bok choy, beets, carrots, arugula, lettuce, spinach, green onions, kale, mizuna, and two types of turnips.

The potential of this approach appears tremendous, but further experiments are needed. There is only minimal information on the best way to build, maintain and cover these temporary structures. Among the details needing further research is the best kind of row cover, one that lets in enough light during the darkest time of the year but doesn't promote overheating on occasional warm, sunny winter days.

We will be expanding our research to additional beds, and testing different types of row covers to answer these and other questions.

Learn more at *millsapfarms.wordpress.com/*.

Photos by Curtis Millsap

Low hoops covered with lightweight row cover provide a low-cost, low-risk method of season extension. In winter, they protect crops from frost; in summer they provide protection from intense heat.

Galvanized electrical conduit bent into half circles form the frames for the low tunnels.

Impact of Rotational Grazing on Species Composition in Square-Foot Plots During a 21-day Rotational Grazing Cycle

Objective: To learn more about grazing and the species composition of plant communities in three square-foot plots in our pasture.

Photo by Abby Rider

Spring 2012: Graham Rider increases pasture diversity for his cattle by using rotational grazing and planting rye and legumes such as alfalfa and clover.

Results: I have been involved on our family's certified-organic farm, Thistle Byre Farm, since it began nearly six years ago. I enjoy working with my small purebred Belted Galloway and Scottish Highland Cross cows. We grass feed our animals, as it is environmentally friendly and healthy for our customers.

For my project, I wanted to explore the species composition of plant communities in three square-foot plots in our pasture. A plant community is the sown and unsown plant species that make up my pastures. I wanted to see if grazing alone would increase the variety of forbs, grasses, and legumes in the pasture. I used 21 cattle for my project.

At the end of my project, the three plots had increased in diversity slightly. Forbs increased as the season progressed, as I expected. There was no noticeable change in legume levels. The grasses — mainly fescue — stayed strong with a small decline. I expected the grasses to decrease. In addition, I expected an increase of overall pasture diversity. I did not expect that the cows would not respect the fencing, nor did I expect that my brother's hogs would uproot one of my plots.

I have future plans that include buying five more cows and building better fences. In addition, I would like to stockpile hay to extend the grazing season and seed legumes and herbal pasture mix.

Learn more at *www.thistlebyrefarm.com*.

Photo by Joan Benjamin

Spring 2011: Graham Rider (left) and his brother Peter show off a package of frozen bratwurst — one of Thistle Byre Farm's most popular products.

YNC08-008 Indiana Youth – Andrew Rider

Efficiency of Jerusalem Artichokes as Part of a Diversified Pasture Plan for Free-Range Hogs

Objective: To find out the efficiency of Jerusalem artichokes, also called sunchokes, as part of a diversified pasture plan for my free-range hogs.

Results: I work with my family on our 75-acre organic farm in rural Carroll County. Several years ago, I bought a hog from Purdue University that couldn't be returned to the herd after a vet school petting zoo. The hog, Charlotte, is a Yorkshire/Chester White cross. She had 14 live piglets in her first litter. Farmer's market customers and our Community Supported Agriculture customers seem to enjoy our pork products.

I became interested in Jerusalem artichokes after receiving some tubers. I know they have been used in Europe and that Purdue studied them as an alternative crop. I wanted to see if I could speed my hogs' growth and get them to market faster using the sunchokes.

I was not able to draw any valid experimental conclusions for my project. I divided my hogs into two groups — one group was supposed to have the artichokes and one was not — but my hogs did not stay divided. I also don't think Jerusalem artichokes are the best choice for pasture diversity in our area because they have a 90-day growth period. Their long maturity makes them less useful. I need forage with a shorter growing season.

In the future, I plan to add even more forage diversity to my free range hog pasture.

Learn more at *www.thistlebyrefarm.com*.

Photos by Abby Rider

Andrew Rider raises Berkshire hogs on pasture. He would like to include hickory nuts in the hogs' diet by opening up access to a wooded area.

Jerusalem artichokes, also known as sunchokes, frying in butter in the skillet.

FNC10-806 Waukee, IA – Randy Kasparbauer

Growing Biomass Crops in Iowa

Objective: To grow giant miscanthus (*Miscanthus giganteus*) on a plot and analyze costs, impact on soil and natural habitat for wildlife, and potential profits.

Results: The perennial grass giant miscanthus has great potential as a biomass crop in Iowa, but farmers are reluctant to grow it because it's new to them, and they're not convinced they can make a profit because of the labor-intensive planting and harvesting required.

Giant miscanthus can produce up to 10 tons of biomass per acre per year. It is noninvasive and propagates from roots that continue to grow over time. We are growing a small plot in moderately good soil to both evaluate it and show local farmers how it can be established, harvested, and propagated.

In 2011, our first year growing the plot, the miscanthus did very well. Plans this year are to dig up some rhizomes for later propagation. By the time the project is completed in 2013, we expect to have completed a soil study, an analysis to determine whether miscanthus can help preserve natural resources, and an analysis to determine profitability.

All harvested biomass will be evaluated by a forage testing laboratory in Iowa.

We're working with the IKM-Manning Community High School's agronomy program to give young people a chance to learn about this work, since these future farmers will be important in growing renewable biomass.

Miscanthus certainly isn't a perfect solution for biomass production, but rather one piece of a biomass solution that will include corn stover, trees, and other crops. It is well-suited for buffer strips next to waterways and public areas, replacing switchgrass in land coming out of the Crop Reserve Program, or as an alternative crop for land on which farmers no longer can produce grain because of soil degradation.

Learn more at *growingmiscanthus.blogspot.com/*.

Mulching With Wool: Opportunities to Increase Production and Plant Viability Against Pest Damage

Objective: To move unsalable wool from the agricultural waste stream and provide a new market for growers by using wool as a mulching agent to enhance plant health and increase production of Solanaceae on organic farms.

Results: Turner Farm is a certified-organic farm with about 6 to 8 acres under cultivation. It grows a variety of seasonal vegetables, corn, pumpkins, and flowers, with output distributed to a 50-member CSA. Turner Farm also raises lambs, which involves shearing 40 ewes and three rams, resulting in accumulation of 260 pounds of raw, unsalable wool each year. A small portion of this wool is used for felting classes, but most is stored. We decided to try mulching our crops with it. One pelt covers about 4 square feet of garden at about 4 inches thick.

We experimented with using the wool to mulch eggplants. Initially, we believed the lanolin in the wool might deter the flea beetle, a problematic pest on the farm, by interfering with its breathing. Although beetles did not seem deterred, the plants that received the wool mulch were more resilient than those that received hay mulch. These eggplants also had darker leaves, greater vitality, and higher yield. The soil under the wool mulch seemed cooler than that under hay mulch.

Over the course of our experiment, we measured row production, saved leaves, and took photos to document the differences. Impressed by preliminary results, we further investigated the use of sheep wool as mulch by expanding its use to other plants. Results in 2010 were impressive. A row of sweet potatoes mulched with wool produced 536 pounds compared to just 145 pounds in the row mulched with hay. The wool row also had less deer damage, which might suggest that it serves as a natural repellent. Overall, all plants that received wool treatments had on average higher row yield, row weight, and nitrogen content.

In 2011, the average weight and average number of Revolution peppers was highest with the wool-mulch treatment. The same was true for Black Beauty eggplant. Soil-moisture content was higher with both the wool and hay treatments than in the control, or no-mulch, treatment.

Wool had the most insulating effect, with less temperature fluctuation than in hay mulch or no-mulch treatment. Nitrogen levels in the tissue samples were highest in the wool mulch treatment and lowest or deficient in the hay mulch treatment. Nitrogen levels were lower, but normal, in the control treatment.

Learn more at *www.turnerfarm.org/*.

Photos by Katie Charlton-Perkins

Unsaleable wool makes an effective mulch that could help create regional markets for what was a waste product.

Growing, Processing, and Selling Omega-9 Canola Oil

Objective: To prove the viability of canola as a crop in northern Michigan, and establish a regional market to crush the seed and use the oil.

Results: In the northern two-thirds of Michigan, cash crops such as soybeans and corn are not reliably profitable, but the region has available farmland that could be useful for a profitable cash crop in rotation with wheat and hay. Canola appears to fill that void.

In 2008 we planted 20 acres of canola. In 2009 we expanded to 40 acres and in 2010, 60 acres, earning a return of $148 per acre. In 2011 we planted about 100 acres. Our SARE grant encouraged us to expand our acreage of canola and move from hobby-farm production to more of a full-scale producer.

Earlier, I had worked with the Michigan State University Extension Service to learn to grow canola, as there were almost no farmers growing it. By 2010, about eight other farmers in northern Michigan were growing canola, but as fuel prices declined, it became unprofitable to grow it as a biofuel. So, we marketed it as food.

Traditionally, we have shipped our canola to a processor in Canada, but we sought out a way to avoid high shipping costs and increase our crop's value. In 2011 we bought our own oilseed press to extract the healthy oil from our seeds. We currently have the capacity to extract 100 gallons of oil ourselves.

All pressing and bottling are done at The Starting Block, a regional kitchen incubator. After pressing, our oil is transferred to a 55-gallon drum where we let it set for at least a week so all solids can settle out, then it is bottled in one-pint bottles, boxed, and prepared for shipment. Since we have opted to do an all-natural oil, we do not refine, deodorize, or bleach it. It is truly an all-natural, locally grown product with an earthy color and nutty fragrance, and contains all the natural nutrients available in canola oil.

Next year (2012) we plan to switch to all Clearfield (non-GMO) canola because it fits best with our market. This will also qualify us for membership in "The Non-GMO Sourcebook" (a directory of non-genetically modified food and agricultural products).

To change to non-GMO (Genetically Modified Organism) canola on our farm, we will have to change our crop rotation sequence to a one-year rotation from the current two-year rotation. This means we will be growing canola for one year then rotate to another crop for one year, then back to canola. We will do this because of the need to control volunteer canola from year to year, as well as pest control. The other benefit of this is that it actually makes us a more "sustainable" farming operation.

We also created a website, which offers our B&B Farms canola oil for sale, and we have publicized our efforts through field days.

Learn more at *canolaoilproducts.com*.

The purchase of an oil press allowed Dan and Bonnie Blackledge to scale up production of canola oil from hobby-level to 40 bottles per week.

Photo by Bonnie Blackledge

Photo by Bonnie Blackledge

B&B Farms produces cold pressed, pure canola oil from canola seed grown on the farm. Cold pressing preserves the natural color and nutty fragrance of the oil.

Bonnie Blackledge fills glass bottles with canola oil at the Starting Block, a nonprofit regional kitchen incubator and entrepreneurial center in Michigan.

Photo by Dan Blackledge

Subsurface Drainage Installation as an Integrated Fruit Tree Planting Practice

Objective: To demonstrate the effectiveness of subsurface drainage tile installation as an integrated planting practice to improve soil conditions, tree establishment, and fruit-tree productivity on sloping claypan soils with poor drainage.

Results: Wind Ridge Farm, a family-owned farm with pick-your-own blueberries, peaches, and blackberries, is characterized by a deep clay subsoil under thin silty clay loam which has very poor drainage.

Significant tree loss occurred in the winter of 2010 following record rainfall and soil waterlogging in October 2009. This project comprised the replanting of 316 trees with a three-inch drain line under each row. These lines tie into a 6-inch main line with an outlet into a grassy natural watershed. In late 2010, trees and stumps were removed; nutrients were applied and then plowed in. Continuous slope is key to good drainage and the health of new plantings.

To demonstrate the benefits from this planting system, we also planted five trees without drain tile using a conventional round hole dug by shovel. These five nondrained trees were located adjacent to two rows of drained trees and directly across the main line from another row of drained trees, allowing for multiple comparisons.

Trees were observed for survival throughout the summer. With the planting system used here we only had about 3 percent tree mortality, and most of that was due to trunk canker disease rather than root rot or wet soil. The nondrained trees also had good survival (probably due to dry weather after planting) but were clearly less vigorous.

In mid-September, data were collected for trunk circumference and scaffold length for four groups of five trees each. This timing and type of data were selected because it best represents tree health and vigor after the first growing season. Trees planted over drain tile had significantly greater trunk diameter and scaffold length when compared to nondrained trees.

Trees with drainage showed greater vigor (trunk circumference and scaffold length measured in mid-September) in year one, 2011. Benefits of the improved drainage:

- Topsoil dries faster
- Soil texture much improved
- "Live" soil containing numerous earthworms and other fauna extends 2 feet deep rather than 8 inches
- Deeper root system makes trees less susceptible to drought
- More efficient nutrient intake with larger root system
- Eliminated chemical use to control root rot

Although tiling is costly, I estimate that it can pay for itself by the fourth year in the field (second crop) based on typical yields and greatly reduced tree mortality.

Learn more at *www.windridgefarm.net/*.

Photos by Barry Shortt

Before planting a peach orchard in an area with wet clay soil, Barry Shortt and crew installed a do-it-yourself drainage system to improve tree survival and vigor.

FNCO7-663 Athens, OH – Brandon Jaeger

Growing Highly Nutritious Staple Food Crops Using Intensive and Sustainable Agricultural Systems

Objective: To implement permaculture principles to grow staple food crops, demonstrating permaculture's efficiency, stability, adaptability, and resiliency for farming and gardening.

Results: Annual staples such as beans, grains, and oilseeds are difficult for homestead-scale permaculture sites because they are fairly process intensive, but they still can provide a significant portion of a household/community diet. Our intention was to demonstrate permaculture principles and techniques for growing staple crops since many practices, such as alley-cropping, keyline plowing, and over-seeding can, and ought, to be applied to commercial-scale and annual crop production.

The Belly Bowl Farm includes three on-contour beds with water-holding swales in between, which double as footpaths. Digging on contour maximizes soil and water retention. Two beds were planted with two varieties of dry beans, using a sheet mulch technique. In the third bed, I incorporated perennials in a polyculture by planting a mix of strawberries, nitrogen-fixing perennials, native perennial grasses, and a nitrogen-fixing locust sapling. The perennials will eventually be large enough to provide the biomass and mulch for the strawberries and annual beds, as well as provide integrated pest management.

Following permaculture principles, the lowest profiled plants were planted toward the equatorial end with increasing height toward the polar end, in order to capture maximum sunlight. I planted fruiting shrubs (gooseberry and currant) and dwarf fruit trees (peach and cherry) on the northern end, with hazelnut bushes forming a northern hedge.

In the section north of the hazelnuts, I planted two semi-dwarf hardy nectarine trees, with scattered plantings of native perennial grasses and shade-tolerant fruiting shrubs (gooseberry, currant) between. This gives some early succession groundcover, food, and bird habitat while the trees are growing, and the grasses provide mulch year after year.

On the east side of the north-south path, I demonstrated alley-cropping — planting rows of perennial crops with annual crops planted between the rows — by planting a series of hazelnuts along the path to eventually form an edible hedge, then about six yards of annual crop space sandwiched on the other side, on the forested eastern edge of the field, with a bed of shade tolerant currants, gooseberry, and jostaberry bushes, with wild forest varieties of strawberry below and between.

All of these techniques are applicable and helpful in small garden, homestead, and market garden sites, and can be used to make the most of the characteristics of each plant in the system, by combining them in such a way that they complement each other.

I believe alley-cropping is one of the most adaptable permaculture techniques for commercial scale agriculture and staple crops because it takes advantage of integrated pest management, habitat generation, soil building, carbon sequestration, and fuel, while allowing for efficiency with larger equipment and repetitive operations.

I hosted four field days at my Belly Bowl Farm permaculture site, one of four demonstration sites of this project.

Learn more at a*sfc.weebly.com/*.

FNC09-774 Millfield, OH – Michelle Ajamian

Designing and Building a Polyculture Food Forest Garden

Objective: To provide Appalachian Ohio with sustainable farm income options that address the challenges of soil, topography, and irregular plots in the region. This project aims to demonstrate and test organic practices that use intensive polyculture plantings to give the greatest possible yield from small plots, while ensuring soil conservation and health.

Results: My 25-acre farm features six open acres and 19 acres of forest. A lower meadow contains two ponds and a well. The forest, logged more than 50 years ago, had two undeveloped springs and is the site of medicinal plantings of ginseng, goldenseal, cohosh, bloodroot, and wild yam that I established to restore the plant cultures of the forest. In 2007, I began practicing permaculture principles, which are based on mimicking natural systems to provide food, fuel, and fiber from the land organically and sustainably.

This region's land is characterized by thin soil, slope, and forest, resulting in small, irregular tracts that don't lend themselves to conventional farming methods. I set out to show how organic practices can bear good yields while conserving soil and water.

In 2011, I contoured the site, tested both black and white plastic as a weed block (the black worked better) and brought in loads of wood chips. Planting stock included stone fruit, berries, and nut perennials with nitrogen-fixing ground covers, asparagus, and dynamic accumulators. The plan was to lay out a 200-square-foot area in medium shade to hold the potted plants in a deep layer of wood chips. Over the summer I continued to build the site, and by late fall most nursery stock was planted and mulched for the winter.

Early this year, I plan to plant all asparagus and other plants held back the first year.

I will research yields and inputs with help from experts, including Ohio State University Extension. *Learn more at www.facebook.com/groups/deepgardendesign/*

A Cooperative Small Farm Effort to Meet Local Demand for Staple Seed Crops in the Appalachian Ohio Region

Objective: To increase growing of staple seed crops by demonstrating small-plot commercial production, providing interested farmers and landowners with opportunities to be involved and with appropriate information to support their production startup.

Results: This project builds on SARE project FNC07-663, Growing Highly Nutritious Staple Food Crops Using Intensive and Sustainable Agricultural Systems (page 19).

Due to the very hilly topography of Appalachian Ohio, our farms are difficult to sustain in competition with today's large-scale agriculture model. We started primarily with crops that were reasonable analogs to the common commodity feed crop rotation of corn, soybeans, and winter wheat because we thought that might facilitate a transition to organic/chemical-free production of food for regional consumption. Those crops were heirloom yellow dent corn, black turtle beans, and spelt.

We are finding success marketing all three crops regionally. The yellow dent corn is sold as whole corn and corn flour, and we recently began working with a tortilla factory in Toledo.

Spelt was chosen because it grows well in the region, and we are marketing spelt berries as a grain to be cooked like rice or barley and spelt flour to be used like whole wheat flour. Our market includes a local pizzeria that buys 50 to 100 pounds of our flour per week.

We're selling the beans to local households, restaurants, and food processors. Customers include a local restaurant that uses 6,000 pounds of them a year and a veggie burger company, which bought 1,200 pounds for its product.

Our project has become a model of collaboration and networking in the region. We made connections with the local nonprofit Rural Action, which will provide staff assistance in our relationships with growers and in developing branding materials. Joining the Ohio Ecological Food and Farm Association led us to a key grower who agreed to plant black turtle beans and who now is excited about expanding his production five-fold.

Another local nonprofit rents us space for testing and refining our processing system, and Ohio University is developing portable threshers and de-hullers which we have begun demonstrating in community gardens and farms. Youth are learning about food entrepreneurship, and the Athens City/County Health Department is working with us on increasing awareness and access to our products for lower-income and lower-health residents.

A robust network of market partners helped us generate funding from more than 40 household CSA members and four businesses, providing critical cash flow for our operation. And we're beginning to network with partners outside our region.

We also have learned some lessons that might be useful to others interested in establishing a staple crop production system.

- Survey your market first, especially potential wholesale buyers.
- Develop recipes and offer samples of your products to food-preparation and retail businesses, which will help you acquire wholesale accounts and develop cooperative relationships with other farmers.
- Efficiency in processing is critical to being competitive and profitable.
- Find used machinery whenever possible, and be creative in looking for grant support.

Our future goals include: continue developing a cost-effective processing facility; develop and apply innovative marketing strategies to meet nutritional staple food needs of traditionally underserved sectors of our community; and network a wider geographic area to connect resources/businesses around building regional food systems.

Learn more at *asfc.weebly.com/*.

Photos by Joan Benjamin

Brandon Jaeger exhibits three Ohio-grown staple food crops: heirloom black turtle beans, yellow dent corn, and spelt. All three crops are grown, processed, packaged, and marketed locally in cooperation with other Ohio farmers.

YNC10-057 Wisconsin Youth – Thomas Bubenzer

Sharing the Buzz: Beekeeping and the Plants That Attract Them

Objective: To learn more about raising honeybees and to teach other young people which plants attract honeybees.

Results: Honeybees are important in agriculture as crop pollinators. We received our bees in May 2011 — two boxes, nine frames per box. We installed them in two hives and observed them all summer as they found nectar and pollen. With my mentor, Chip Hankley, I learned how to test the bees to see if they have mites. You put bees in a jar with powdered sugar, then pour the powdered sugar out on a paper towel. We didn't need to treat our bees.

Because my hive was new, I didn't take any honey from it but we extracted 50 pounds of honey from an already established hive using an extractor that spins the frame. I found that plants that attract bees include black-eyed susans and goldenrod.

By early winter, the bees had left the hive, maybe because they didn't have enough honey stored or because there weren't enough worker bees. Chip is going to raise a nuc (nuclear hive) for us so I can have a hive this year.

I have shared information with lots of people. I have spoken to our local homeschoolers about my project (36 people), our local Kiwanis group (24 people), and a group of local Cub Scouts, and to 30 people at the National Small Farm Trade Show and Conference in Columbia, Missouri.

This year I plan to start another hive and talk to more groups about my work. I also plan to plant more flowers that attract bees.

Photo by Joan Benjamin

Young beekeeper, Thomas Bubenzer, quizzed the Farmers Forum audience to test their knowledge of bees, and displayed his bee suit and veil.

FNC10-843 Festus, MO – John Henry Nenninger

Integrated Pest Management for Small Hive Beetles

Objective: To find a cost efficient and easy-to-implement way for hobby beekeepers to eliminate the small hive beetle without using chemicals.

Results: The main objective is to eliminate the small hive beetle, a major pest of beehives. This should be achieved by using a "no chemical integrated pest management process" and must be cost efficient and easy to implement for a hobbyist beekeeper.

I wanted to work on a method that will stop small hive beetle larvae from reaching soil, where the larvae will pupate into adult beetles. The method will suppress the development of adult small hive beetles but won't eliminate the beetle entirely.

Through this discovery process, I tested different methods of killing the small hive beetle, including oils, gels, saline solution, and plain water.

I had a test site in front of my house on concrete where I dropped the larvae onto a pea rock salt mixture to determine how long it can take the larvae to crawl out of the mixture. I used a new test procedure where I suspended the base 2 feet in the air over a metal sheet pan that catches any of the larvae that make it through the pea rock salt mixture.

I also tested for the surface temperature necessary to kill small hive beetle larvae and adults. I bought a device that measures the surface temperature of different objects.

Early in the test it became apparent to me that I needed to find a way to capture the adult small hive beetle inside the hive. I set out to test different types of glue that I could use inside a corrugated piece of cardboard. I found one product that seems to work the best. I am continuing the testing using this glue product.

Two major components of my study did not develop — the honeybee breeds supplied to me did not produce at the level advertised, and arrangements with landowners for land management were not maintained at levels needed for the honeybee.

My tests led me to new discoveries, and in the future I'm planning to buy different bees and continue these studies.

Innovative Field-to-Market Processes for Small Produce Farms

Objective: To design and build a rinsing system to reduce the labor needed to harvest, prepare, package, and transport our farm's fresh produce.

Results: Cooley Family Farm is a small, family-owned produce farm started in 2001. We started direct marketing our crops full time in 2004. We sell our produce at farmers markets, on the farm, through a CSA called Harvest Basket, and through our online store.

Our production process is based on reusable crates used to harvest, rinse, dry, cool, and transport items for market. We found a type of crate that allows us to harvest produce and then rinse it in the same crate by plunging the crates manually in and out of water. A motorized vegetable rinser that we designed and built rinses off dirt. This reduces the time and labor needed to get the produce from the field to customers. In addition, it has saved us 1.9 gallons of water per minute of rinse time.

For example, when using the crate-based system, we harvest potatoes into a crate, set the crate in the rinser, strap it down, turn on the rinser, and walk away. The rinser can run as long as needed to clean the mud from the potatoes. After rinsing, the crate is dipped into clean water as a final rinse and set aside to dry. The crate can then be transported to market. This works great for root crops. Soft crops like broccoli don't go through the motorized rinser, but the crates still work well in harvesting, storage, transportation, and sales.

Our crops include several lettuce and salad greens, beets, carrots, turnips, radishes, several types of potatoes, sweet corn, melons, numerous varieties of tomatoes, beans, peas, herbs, bunching and storage onions, summer and winter squash, pumpkins, chard, cabbage, broccoli, cauliflower, Brussels sprouts, strawberries, raspberries, rhubarb, and grapes.

Learn more at cooleyfamilyfarm.com/.

Photos by Joan Benjamin

The Cooley family experimented with many containers before coming up with a crate that fit their needs for picking, rinsing, drying, transporting, and displaying produce.

Kevin Cooley explains why building a motorized vegetable rinser took more time than he ever imagined. Even determining which crate to use was time consuming since the shape of the crate and hole size were critical to a good rinse. The savings in time, labor, and water proved well worth the effort.

At Cooley Family Farm, saving time, labor, and money are critical to success. Kevin Cooley provides details on how he built his own high tunnels to expand the growing season for the farm's 60 CSA customers.

Increasing Production by Improving Worker Comfort and Efficiency in a No-till Organic Seed Garlic Production System

Objective: To design a cart to ease labor fatigue and aide in adding mulch, and harvesting garlic.

Results: We spend 59 percent of our total labor costs and time planting, harvesting, and mulching our seed garlic and vegetable crops. Stooping, squatting, and crawling for hours as part of the production process started to take a toll on our knees and backs. Hardneck seed garlic production is particularly difficult because it must be planted by hand to meet high quality and market demands. To address the problem, we want to design and fabricate a cart to ease labor fatigue and aid in planting a living cover crop, adding mulch, and harvesting garlic.

To get started on the design, we needed to determine how to eliminate back bending and awkward positions. A known alternative is to use a motorized lay-down work cart that lets you lie face down while you work. However, these have a base price of $9,500.

Our farm does not operate at the scale that can justify that type of machine, so our solution to this problem will involve research, design, and field experience to design and fabricate a garlic cart. We are in the planning stages. A student from Purdue University is helping to construct the cart as part of an independent project.

Learn more at *www.perkinsgoodearthfarm.com/*.

Photos by Dan Perkins

Garlic beds are strip-tilled and ready for planting. This conservation tillage method allows the garlic to be planted in the fall into actively growing cover crops (oats, Austrian winter peas, and oilseed radish) that were seeded August 1 and allowed to winter kill.

After hand planting garlic in October 2011, Julie (shown) and Dan Perkins are tired of stooping over and ready for a planting cart which is being built to use in 2012.

YENC09-019 Ceresco, NE – William Powers

Healthy Farms, Healthy Kids

Objective: To inform the next generation of farmers in Nebraska about sustainable agriculture.

Results: I am the director of the Nebraska Sustainable Agriculture Society (NSAS). Founded in 1976 by a group of organic farmers, its mission is to promote agriculture and food systems that build healthy land, people, communities, and quality of life for present and future generations. Through my SARE project, I wanted to encourage kids in Nebraska to become interested in farming sustainably by offering a series of programs geared toward getting kids back to the farm.

Urban kids from Lincoln, NE learn about farm life on a Healthy Farms Healthy Kids Pasture Walk at Branched Oak Farm, a 230-acre certified-organic grass-based dairy 15 miles north of Lincoln.

Photos by William Powers

Krista Dittman (shown) and her husband, Doug enjoy showing visitors their herd of Jersey cattle and how they create farmstead cheeses at Branched Oak Farm. The city kids posing with Krista are done with picture taking and are ready to taste the butter they made on the farm.

A Youth Scholarship Essay Contest was held. All who submitted a one-page essay on what sustainable agriculture means to them received a full youth scholarship to the NSAS annual conference.

We organized several activities that brought urban kids and kids from farms together. We took pasture walks, milked cows, made butter, and learned about making cheese.

The final phase of my project was taking kids to a farmers market. The kids asked each farmer three questions: where, why, and how they farmed.

I hope to expand this project in 2012 to include a day-long sustainable agriculture day camp, youth-led sessions for kids at the annual conference, and a sustainable agriculture club at universities and colleges in Nebraska.

Learn more at *www.nebsusag.org/*.

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