

what is **SUSTAINABLE** agriculture?

A SARE SAMPLER OF SUSTAINABLE PRACTICES

SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION (SARE)



Photo by Troy Bishopp

what is **SUSTAINABLE** agriculture?

Every day, farmers and ranchers around the world develop new, innovative strategies to produce and distribute food, fuel and fiber sustainably. While these strategies vary greatly, they all embrace three broad goals, or what SARE calls the 3 Pillars of Sustainability:

PROFIT over the long term

STEWARDSHIP of our nation's land, air and water

QUALITY OF LIFE for farmers, ranchers and their communities

There are almost as many ways to reach these goals as there are farms and ranches in America.

A cattle rancher might divide his rangeland into paddocks in a rotational grazing system to better manage soil and water resources while improving animal productivity. A field crop farmer might implement a rotation to break up pest cycles, improve soil fertility and cut costs, or use cover crops—non-cash crops grown for their benefit to the soil and ability to suppress weeds. A fruit and vegetable grower might try a new marketing approach such as selling directly to restaurants in a nearby city to gain a larger share of the consumer food dollar.

No one recipe works on every farm and ranch. But to give a flavor of sustainable agriculture at work, we have profiled the sustainable operations of eight of SARE's many cream-of-the-crop grantees—including producers, researchers and educators. To get a more complete picture, view 61 in-depth profiles in SARE's book *The New American Farmer, 2nd edition* at www.sare.org/newfarmer.

Best Practice Sampler

It is impossible to list all the innovative and varied practices farmers and ranchers use to improve sustainability, so consider SARE's list below a sampling, not a prescription, of best practices.

MARKETING

Farmers and ranchers can boost their financial sustainability by using a greater diversity of marketing techniques: processing on-farm; creating value-added products and a strong brand identity; conducting market research to match product to demand; selling direct to consumers at farmers markets, community-supported agriculture (CSA) enterprises, roadside stands or through the Web; and delivering to restaurants, small grocers and local institutions—to name just some techniques.



Cover photos: (from top) see p. 6; see p. 11; see p. 4; see p. 7; Courtesy Santa Cruz Farm; see p. 8; see p. 9; see p. 10. Credit: Design, Kirsten Ankers. Editing/Production, Dena Leibman. Writing/Production, Andy Zieminski. Printing, House of Printing, Inc. Printed on paper that is 100 percent post-consumer waste and process chlorine free.

COMMUNITY VITALITY

Thriving communities—rural and urban—are a key to quality of life for all. When farmers and ranchers hire help and sell in nearby communities, for example, they contribute to the local economy. In turn, they have a nearby hub for raising their families and a possible market for their products.

ECOLOGICAL INSECT AND WEED MANAGEMENT

Ecological pest management avoids single-bullet solutions that can harm beneficial insects, and instead uses a combination of many complementary strategies—for example, biological controls such as trap crops for insect pests, physical removal of weeds and insects, application of chemicals if necessary, and other methods such as selecting crops that smother or shade out weeds and creating habitat for beneficial insects.

GRAZING

Management-intensive, or rotational, grazing systems keep animals moving from pasture to pasture to provide high-quality forage and reduce feed costs. An added bonus is that—with a little attention from the farmer or rancher—grazing animals distribute manure across the field, which contributes to soil fertility and reduces the need for purchased fertilizer inputs.

CONSERVATION TILLAGE

Many soil conservation practices—contour tillage, reduced tillage and no-till, to name a few—help prevent soil loss from wind and water erosion. Conservation tillage systems also help minimize soil compaction, conserve water and store carbon to help offset greenhouse gas emissions.

COVER CROPS

Growing plants such as rye, clover or vetch after harvesting a cash crop can provide multiple benefits, including weed and insect suppression, erosion control and improved soil quality. Cover crops are now grown on millions of acres across the country.

CROP, LIVESTOCK AND LANDSCAPE DIVERSITY

Growing a greater variety of crops and livestock—especially genetically diverse open-pollinated plants and heritage breeds—can make a farm more resilient to diseases and pests, as well as extremes in weather and market conditions. Certain agroforestry techniques—inter-planting trees with crops and growing shade-loving specialty crops, for example—help conserve soil and water, provide wildlife habitat and increase beneficial insect populations.

NUTRIENT MANAGEMENT

Well-managed and properly applied on-farm nutrient sources—such as manure and leguminous cover crops—build soil, protect water quality and reduce purchased fertilizer costs.

ON-FARM ENERGY CONSERVATION AND PRODUCTION

Farmers and ranchers are using energy-saving devices, windmills and solar power, while also learning how to grow and process their own fuel. These practices not only make farm operations more profitable, clean and efficient, they help reduce dependence on foreign oil and reduce greenhouse gas emissions.

A WHOLE-FARM APPROACH

A whole-farm approach combines the practices listed above into one integrated management system that works with nature: Reducing tillage and careful application of on-farm nutrient sources, for example, build soil organic matter; energy costs are reduced when fuel is produced from waste or renewable sources; pests are controlled by plant and landscape diversity; income is boosted by more efficient use of on-farm resources—and the list goes on.

WHAT ARE YOUR IDEAS? Read on for some of SARE's cream-of-the-crop stories about successful sustainable agriculture, then consider applying for your own grant... (view all SARE project results at www.sare.org/projects)

Ana Vivar sells a bounty of vegetables at a market in Santa Fe, N.M. The produce is from Santa Cruz Farm, where Don Bustos, Vivar's father, uses ecological pest management, cover crops, on-farm energy production and other sustainable techniques (see p. 5).



Photo courtesy Santa Cruz Farm

AT A GLANCE

PROFIT: Cover crop trials led to a \$14 per acre increase in subsequent corn yields.

STEWARDSHIP: No-till, rotations and cover crops boost organic matter, maximize rainfall, and break cycles of pests and weeds.

QUALITY OF LIFE: Neighbors learning from Forgey have adopted no-till and cover crops.



Photos courtesy Dan Forgey



FREE RESOURCE!

SARE BOOKS: *Building Soils for Better Crops*, 3rd edition and *Managing Cover Crops Profitably*, 3rd edition. Download for free or purchase hard copy: www.sare.org/books.

SARE VIDEO: *Adding Cover Crops to a No-Till System*. Visit www.sare.org/forgeyvideo.

Building Soil Health, and Yields, with Cover Crops, No-Till

When Dan Forgey took over as manager of the 8,500-acre Cronin Farms in Gettysburg, S.D., in the early '90s, he set out to build soil health—and yields—sustainably. Today he uses a well-balanced medley of best practices that are getting him those better yields on less fertilizer and herbicide.

He took a major step toward improving his soil by introducing no-till and diversifying from six crops to 12. Today, he grows grains, oilseed crops and forages for his 750-head cow-calf operation. While Cronin Farms became 100 percent no-till in 1993, Forgey spent many years after experimenting with long crop rotations. Now he has a system that optimizes moisture availability and soil health, and allows him to control weeds like cheatgrass sustainably.

No-till not only makes farming more efficient—Forgey saves time and spends less on labor, equipment and fuel—it has created better yields, even in years of below-average rainfall. “It’s all about soil health,” Forgey says. “With no-till we make use of the carbon to help make organic matter.”

In 2006, Forgey took another major step. He received a SARE grant to conduct trials with cover crop mixes and identify a formula that would work with his system in his region. He is now using covers on hundreds of acres, and is showing his neighbors how to do the same.

PROFIT

More than 15 years of no-till have led to annual yields of corn, sunflowers and other crops that are at least 30 percent above what Cronin Farms experienced with tillage. “The longer we are in no-till, the more benefits we see,” Forgey says.

His recent cover crop trials showed that a mix of turnips, cowpeas and lentils planted in the fall improved corn yields 18-20 bushels per acre compared to control plots. This translated into an increased profit of \$14 per acre, after the cost of cover crop seeds.

Forgey has been buying less fertilizer because his cover crops

prevent nitrogen loss, and the legumes he uses fix nitrogen from the atmosphere. Weed suppression—another benefit of cover crops—means he is buying significantly less herbicide as well.

STEWARDSHIP

Forgey’s overall goal is to build soil health naturally and rely less on man-made inputs. “This is what the country needs,” he says. “Between cover crops and no-till we are doing things to better the soil nature’s way.”

With no-till, he has raised his land’s organic matter 1.3 percent in 10 years. Cover crops are beginning to increase the biological diversity of the soil and help keep nutrients out of local waterways.

Forgey is careful about applying synthetic nutrients. He conducts extensive soil testing and works with researchers to determine the best timing and placement of applications. This helps him minimize excessive use of fertilizers. “We put the fertilizer where it belongs,” he says.

QUALITY OF LIFE

The Gettysburg area has become a hotbed of no-till in the last 20 years, thanks to the leadership of South Dakota State University researcher Dwayne Beck and growers like Forgey who follow Beck’s recommendations. Cover crops have been slower to catch on in no-till systems, partly because not enough local growers have demonstrated which types of covers work well.

But Forgey’s SARE-funded trials, which ended in 2008, are helping to change that. He is sharing his results with fellow growers through on-farm tours, field days, by speaking at regional conferences and in the ag media. Many of his neighbors have taken notice.

Seven producers—their operations ranging in size from 3,500 to 18,000 acres—planted cover crops for the first time in 2008 after seeing Forgey’s plots. “They see and hear the benefit of cover crops in a no-till environment and it helps them understand the soil health aspect,” he says.

AT A GLANCE

PROFIT: Bustos saved his family's farm with highly diversified production and marketing. Solar power saves him \$2,000 annually.

STEWARDSHIP: Bustos employs natural strategies for conserving water, building soil health and fighting pests.

QUALITY OF LIFE: He mentors students and beginning farmers, and advocates for minority and low-income members of rural communities.



Photo by Victor Espinoza

FREE RESOURCE!

SARE BOOK: *Building a Sustainable Business: A Guide to Developing a Business Plan for Farms and Rural Businesses.* Download for free or purchase hard copy: www.sare.org/business.

SARE TOPIC ROOM: *High Tunnels and Other Season Extension Techniques.* Visit www.sare.org/season-extension.

Farm Flourishes with Season Extension, Solar and Myriad Innovations

When Don Bustos took over operation of his family's struggling Santa Cruz Farm in New Mexico in the 1980s, he set out to increase profitability while remaining true to his family's 300-year history farming the same land. With a deep sensitivity toward the ecosystem and tradition, he makes well-informed marketing and production decisions that earn him top dollar for his produce. Today, his farm's future is more secure than it has ever been.

Bustos began by diversifying his crops and tapping the local markets around Santa Fe and Albuquerque. He got organic certification and introduces a new crop whenever he sees a good marketing opportunity, leading to the 72 crops he grows today. He used a SARE grant to explore innovation in solar heating networks for his greenhouses to provide cheap, year-round, on-farm energy production—another marketing strength.

"We're always looking for new crops and new markets to be the lead on," Bustos says. "We believe it's always better to be market leading and innovative."

PROFIT

With 3.5 acres and 10,000 square feet of greenhouses and cold frames, Bustos can produce vegetables year-round, often getting them to market before the competition. For example, he estimates his 4,000 organic asparagus plants net \$16,000 over a five-week period. Blackberries, strawberries and other crops yield similar results.

The solar panels he installed in 2005 have a many-fold advantage: They allow for winter production of salad greens, cut annual greenhouse heating costs from \$2,000 to nothing and increase yields 30-40 percent beyond the standard cold frame.

Along with getting new products to market quickly, Bustos believes in maintaining diverse sales channels. He runs two community-supported agriculture (CSA) programs, helped build a permanent farmers market in Santa Fe, and engages in direct marketing to restaurants, schools and other customers.

STEWARDSHIP

Bustos uses mulches and drip irrigation to conserve water and fulfill his obligation to his acequia, a 400-year-old, community-owned irrigation system based on the premise that everybody should have fair and equal access to water. The mulches also help reduce erosion.

For more than 30 years, he has used integrated pest management strategies, such as supporting populations of beneficial insects that feed on pest species, carefully monitoring pest patterns and planting crops based on the life cycles of predatory pests.

The Santa Cruz Farm is on the edge of a desert, meaning soil health does not come easily. "Nitrogen is one of the most challenging nutrients in this area, because fertility is poor here," Bustos says. Therefore, he makes extensive use of crop rotations and cover crops, and incorporates additions of organic alfalfa hay and cottonseed.

QUALITY OF LIFE

"Little farms can make a big impact if they get their techniques down," Bustos says. Through numerous ventures, his farm's impact in the community is widespread.

Bustos helped change procurement rules for the Santa Fe school district, and now he sells it 75-100 pounds of organic salad greens each week for use in school cafeterias. He is planning to do the same in Albuquerque.

To encourage the next generation of farmers, Bustos participates in local youth programs and hosts about six interns on his farm at any one time, from college students to a couple who want to become organic farmers.

He also serves on local boards and a national initiative aimed at addressing the needs of immigrants and socially disadvantaged populations, which he considers an important part of sustaining vibrant rural communities and strong local food networks.

AT A GLANCE

PROFIT: Along with reducing fossil fuel costs, canola grown for biofuel adds more than \$200 per acre as straw and cattle feed.

STEWARDSHIP: Rainville plans to eliminate fossil fuels from his farm and encourages fellow growers to use cover crops to protect water quality.

QUALITY OF LIFE: Rainville left the dairy business to focus on sharing successful practices with fellow growers.



Photo by Bill DiLillo



Photo by Roger Rainville

FREE RESOURCE!

SARE BULLETIN:

Clean Energy Farming: Cutting Costs, Improving Efficiencies, Harnessing Renewables. Download for free or request a hard copy: www.sare.org/energy.

Leading the Way to Energy Independence

Roger Rainville is showing his fellow farmers the path toward greater independence—from fossil fuels, commercial fertilizers and the other cost-fluctuating resources that can make farming a risky business.

Rainville, who owns a 300-acre dairy farm in Alburgh, Vt., started growing canola for biofuel in 2005 after volunteering to work with University of Vermont Extension Specialist Heather Darby on a SARE-funded project researching the topic. After taking three years to get a handle on raising canola—it is uncommon in the Northeast but grown farther north in Canada—Rainville has set up an oil press and biofuel processing equipment. For the 2010 growing season he is preparing to make 1,500 gallons of biofuel, which represents about 75 percent of his total fuel consumption.

He and Darby have turned his farm into a demonstration site for cover crops and reduced tillage, practices vital to building soil health that are not used in the region as extensively as they could be.

“We’re showing ourselves that we can do things differently than we’ve been doing them,” Rainville says.

PROFIT

Rainville is examining every step of the biodiesel process—raising the canola, extracting the oil, using the byproducts, refining the fuel—in order to find strategies that are more efficient, and therefore more cost effective.

Rainville estimates that it costs \$135 per acre to raise canola. Along with the thousands he expects to save by producing his own fuel, canola comes with two additional financial benefits. He uses canola straw as bedding for his 50 dairy replacement heifers, which adds a \$200 per acre value in straw he does not have to buy. Also, he can pelletize canola meal after the oil is pressed out and sell it locally as protein-rich cattle feed, worth \$350-\$400 per ton.

Economically, canola is “very competitive with any other crop we’re growing,” he says.

Rainville has converted a tractor to run on vegetable oil because he wants to explore the feasibility of using canola oil as fuel without refining it to biodiesel. Without refining, vegetable oil would be cheaper and less labor intensive.

STEWARDSHIP

Rainville serves as chairman of the Farmer’s Watershed Alliance (FWA), a local nonprofit that helps farmers implement economically viable strategies to protect water quality. Doing something because it improves profitability and doing it because it is good for the environment “breaks down pretty evenly,” he says.

Under his and Darby’s leadership, the group launched an initiative that increased the amount of cover crops planted in two local watersheds from 100 acres in 2006 to 1,500 acres in 2008. The project includes demonstrating best management practices for reduced tillage and no-till.

With alternative fuel production, his goal is to produce 3,000 gallons of biodiesel and vegetable oil annually, which would completely eliminate the fossil fuel that he burns in his tractors.

QUALITY OF LIFE

Rainville spent more than 25 years as a dairy farmer, but he recently sold most of his herd so that he could devote himself to crop research and demonstration projects with Darby on his farm. “Farmers look at me as a real farmer doing this stuff, not just a university, so they’re excited about seeing my approach, and I know what they’re going through because I’ve done it too for so many years,” Rainville says.

In addition to his work with the FWA, Rainville holds one major field day each year to show his neighbors how they can improve their operation with cover crops, no-till and biofuel production. He also meets with school groups, nonprofits and others. He hosts 500-600 visitors each summer, and fields phone calls from farmers looking for tips on growing canola.

AT A GLANCE

PROFIT: Growing Power espouses low-cost, high-value production, able to yield \$200,000 from a single greenhouse acre.

STEWARDSHIP: Mountains of organic waste are turned into nutrient-rich compost.

QUALITY OF LIFE: Growing Power makes healthy, affordable food available to thousands of low-income consumers.



Photo courtesy Growing Power

FREE RESOURCE!

SARE BOOK: *Building Soils for Better Crops*, 3rd edition. Download for free or purchase hard copy: www.sare.org/soils.



Photo by Andrea Godshalk

Urban Nonprofit Launches a Food-Access Revolution

Will Allen can squeeze \$200,000 worth of sustainably grown produce from just 1 acre of poor-quality, inner-city land, and he is using this talent to lead a nationwide movement that is improving the lives of urban dwellers by putting wholesome foods within their reach. With minimal land, his nonprofit, Growing Power, makes fresh produce available on a regular basis to about 10,000 Milwaukeeans, many living in the city's poorest neighborhoods where supermarkets are few and far between.

"A lot of what we do is social justice and making sure everybody has access to good, healthy food," Allen says. "To me, that's at the basis of community development."

Allen co-founded Growing Power in 1993 when he began letting teenagers use some land at his inner-city Milwaukee farm to grow food for their neighbors. Now, Growing Power's 35 employees use eight small farms in Milwaukee and Chicago to show city dwellers, ag educators and others how to sustainably raise crops, fish and livestock in urban settings. Working with youth remains at the core of Growing Power's efforts.

Allen, a recipient of three SARE grants, won a \$500,000 MacArthur Foundation "genius" grant in 2008, launching him into the national spotlight as a preeminent leader in the effort to build community-based food systems.

PROFIT

The growing techniques that Allen's organization demonstrates are profitable. For example, an aquaponics system sends water from a 10,000-gallon fish tank through a natural filtration process that adds nutrients, allowing the water to be used as fertilizer for salad greens, tomatoes and other crops. Some of the filtered water is returned to the pond, where tilapia and yellow perch are raised. The low-cost system relies primarily on gravity, with only a small pump and heater to run it.

"It inspires would-be farmers that they can do this with a low

initial capital cost, versus a more commercialized system that would cost 10 times as much to raise the same amount," Allen says.

Allen estimates that Growing Power's techniques for raising crops, which rely heavily on using compost and worms to build soil health, allow the organization to gross more than \$200,000 per acre.

STEWARDSHIP

Each week, Growing Power workers collect about 100,000 pounds of organic waste from city businesses. They convert the waste into nutrient-rich compost and add vermiculture amendments. This allows Growing Power workers to create raised beds that maintain their fertility for up to five years without the need for additional inputs.

The compost, which they use at Growing Power farms and bag for distribution, is essential to converting the poor-quality dirt of urban lots into gardens and farms. "We've got to grow new soil," Allen says. "Not just little bits, but hundreds of yards of soil if we're going to grow this urban food revolution, because we can't grow in the existing soil."

QUALITY OF LIFE

Growing Power teaches farmers and community leaders how to create local food systems, thereby ensuring that fresh food gets into the hands of the people who have the least access to it, particularly low-income and minority consumers. Growing Power's store is a few blocks from Milwaukee's largest public housing development, yet 5 miles from the nearest supermarket. Their Market Basket Program, a SARE-funded project, delivers up to 25 pounds of produce each week to inner-city families at an affordable price.

Children and teenagers are one of the most important target groups in Allen's outreach efforts. "It's important that kids know what good food is," he says. Also, by engaging youth through internships and other projects, he finds it is easier to engage their parents, which further builds consensus around Growing Power's mission.

AT A GLANCE

PROFIT: Greatly improved water conservation can boost profitability as much as 90 percent.

STEWARDSHIP: Along with saving water, diversified crop/livestock operations improve soil quality and reduce erosion.

QUALITY OF LIFE: Allen's team is helping ranchers across the region employ profitable water-conservation strategies.



Photo by David L. Doerfert



Photo by Vivien Allen

FREE RESOURCE!

SARE BULLETINS: *Smart Water Use on Your Farm or Ranch and Rangeland Management Strategies.* Download for free or request a hard copy: www.sare.org/bulletins.

SARE VIDEO: *The Ogallala Aquifer of the Texas High Plains: A Race Against Time.* Visit www.sare.org/ogallala.

Conserving Water, Energy and Money on the Texas High (and Dry) Plains

Agriculture in the Texas High Plains—a \$20-billion-per-year industry—is facing a water crisis. The intensive use of water in cotton production and in corn grown for ethanol and cattle feed is causing the level of the Ogallala aquifer—the region's primary water source—to drop by more than 1 foot per year. At this rate, demand for water is expected to exceed supply within the next 10-20 years, posing a serious threat to the region's economy.

Armed with a series of SARE grants, Texas Tech University researcher Vivien Allen, her colleagues and students have spent the last 12 years developing innovative crop/livestock rotations that conserve water while maintaining or improving profitability. Rotations of drought-tolerant forages and grains break up cotton monocultures. They also present cattle ranchers with an alternative feed source to corn, a crop that, like cotton, requires a lot of water.

The pastures in Allen's system rotate like a well-oiled machine: A perennial warm-season grass called old world bluestem provides grazing for steers from January to July, when most steers go to a feedlot. The small grains, rye and wheat, grown in rotation with cotton, provide additional grazing.

PROFIT

While cotton and cattle are traditionally raised separately on the Texas High Plains, Allen has found that an integrated system demonstrates real advantages. In a 10-year test, an integrated system was more profitable than a conventional cotton system at typical yield levels—in some cases by as much as 90 percent—largely because it required pumping less water.

Adding to the relevance of their work, Allen and her colleagues showed that profitability for the integrated system increased the deeper a farmer had to drill for water. This means that an integrated system can be more economical the scarcer water becomes.

STEWARDSHIP

As water levels continue to drop in the Ogallala aquifer, cotton farmers either run out of water or they diversify. Allen's research has showed that diversification can be part of the answer: An integrated system of cotton, cattle and forage rotations reduced water consumption by about 25 percent in tests. "Pasture conserves more water than a [cotton] monoculture because the grasses do not require as much water as the cotton," she says.

But the benefits go beyond water conservation. Diversifying from a cotton monoculture leads to improved soil quality and soil carbon, less erosion and significantly lower use of nitrogen-based fertilizers. In Allen's trials, the conventional system became more profitable as yields increased, but at a huge cost: Achieving those results required using up to 40 percent more nitrogen-based fertilizers than the integrated system.

QUALITY OF LIFE

"It's impossible for us to be sustainable with irrigated agriculture in the High Plains, with us pumping out of the aquifer," says Rick Kellison, a Texas rancher who works closely with Allen. "The object is to pump less water and make more money."

State officials are beginning to agree: Thanks to their research and mounting public concern over water scarcity, Allen's team won a \$6.2 million state grant to demonstrate its water-conserving strategies across the region. Known as the Texas Alliance for Water Conservation, the group is partnering with 27 farmers and ranchers to conduct on-farm research that tests diversified systems.

With cotton acres declining because of lower profit margins and corn acres increasing due to growing interest in ethanol, Allen is also exploring the potential of sorghum as a corn replacement in grazing, silage or biofuels—a move that could again cut the region's water use.

AT A GLANCE

PROFIT: No-till saves tens of thousands in fuel costs yearly; the Carvers' value-added yarn business is booming.

STEWARDSHIP: Riparian protection has improved water quality enough that steelhead trout are returning.

QUALITY OF LIFE: Their yarn products business has created local jobs; sustainably raised beef is popular with local restaurants and grocers.



Photo by Bing Bingham

FREE RESOURCE!

SARE BOOK: *How to Direct Market Your Beef*. Download for free or purchase hard copy: www.sare.org/beef.

SARE BULLETIN: *Rangeland Management Strategies*. Download for free or request a hard copy: www.sare.org/rangeland.

SARE VIDEO: *Direct Marketing for Farmers and Ranchers*. Visit www.sare.org/carvers.



Photo by Jeanne Carver

Reviving a Historic Rangeland's Soil and Water

Soon after buying the 135-year-old Imperial Stock Ranch in Shaniko, Ore., in 1988, Dan and Jeanne Carver began implementing practices to boost profits and rejuvenate land that had become compacted and prone to major erosion. Today, surging steelhead trout populations show them that their waterways are making a comeback and, with beef production tripled, business is better than ever.

"I like the concept of conservation. I've seen the results of 100 years of doing it the wrong way," Dan Carver says. "Every time you do something with your livestock, you should be thinking about the health of the land."

To improve soil tilth, the Carvers no-till their 3,000 acres of grain. They also promote grass growth and protect riparian areas by practicing intensive grazing management on their 30,000 acres of rangeland. They raise 600 head of cattle and a flock of 240 ewes.

The Carvers' sustainable practices give them a marketing edge. They direct market much of their lamb and some of their beef to area restaurants, where it fetches premium prices. Meanwhile, supported by a SARE grant, Jeanne Carver is busy developing a strong value-added product: creating yarns, fibers and a designer clothing line from their Columbia sheep, descendants of the ranch's original flock.

PROFIT

For Dan Carver, economics and stewardship are intertwined. "You're not a cow man, you're a grass grower," he says. "The health of the grassland affects your bottom line."

The Carvers have tripled their beef production since 1990 by keeping their pastures healthy through meticulous rotational grazing. The ranch has 70 fenced pastures that are grazed no more than three weeks each year and never at the same time in consecutive years.

Dan Carver estimates he saves \$20,000 in fuel costs each year by practicing no-till. Residue from cropland is worth about \$40,000

as calf feed, and yields are higher while less is spent on commercial inputs and labor. Even with severe droughts in recent years, yields have remained good because no-till helps fields retain moisture.

Jeanne Carver's fiber business has been profitable and expanding every year since it started in 2000. Her SARE grant in 2002 was to improve marketing strategies. She sells fiber products through catalogs and local stores, and recently hired a marketer and a top fashion designer to break into more ambitious markets. One recent order was so large that it represented 10 years' worth of value the Carvers would ordinarily derive from their wool.

STEWARDSHIP

The Carvers, along with neighboring farmers and ranchers, began working with the Natural Resources Conservation Service in the late '80s to control soil erosion and restore health to the ailing Buck Hollow watershed.

Along with building fences to accommodate their rotational grazing strategies, the Carvers added watering holes to keep their cattle out of their ranch's 150 miles of streams. They have noticed the benefits these practices are having on the land: Steelhead trout, which had practically vanished from their waterways in the '70s, have come back in numbers not seen in decades.

QUALITY OF LIFE

Imperial Stock Ranch's fiber business is having a positive impact on the community: It currently employs about 20 local women as part-time knitters. "With all this excitement and buzz, we're growing jobs and revitalizing a local fiber industry here," Jeanne Carver says.

In the meat business, the Carvers give credit to the strong links they have forged with their partners—the restaurant and grocery store owners who eagerly sell their lamb and beef to consumers because it is grown locally and sustainably. "It warms the heart to hear that restaurant owners still tell our story," Dan Carver says.

AT A GLANCE

PROFIT: ASD growers earn more by raising organic crops, and using local processing and marketing channels.

STEWARDSHIP: Improved logging practices reverse chronic runoff. Organic production revitalizes soil quality.

QUALITY OF LIFE: Local growers have a viable alternative to tobacco, and local consumers get more quality food options.



Photos courtesy Appalachian Sustainable Development



FREE RESOURCE!

SARE BULLETIN: *Meeting the Diverse Needs of Limited-Resource Producers: An Educator's Guide.* Download for free or request a hard copy: www.sare.org/limited-resource.

SARE TOPIC ROOM: *Building Local and Regional Food Systems.* Visit www.sare.org/local-food.

Appalachian Farmers and Foresters Tap New Markets

In the depressed areas of Appalachian Virginia and Tennessee, one organization is giving dozens of farm families critical resources to boost incomes: techniques for raising high-value produce sustainably, and reliable access to local processing and marketing. Appalachian Harvest—the brand operated by the nonprofit Appalachian Sustainable Development (ASD)—generated more than \$500,000 in sales for local farmers in 2008. Appalachian Harvest produce is sold by local, regional and national supermarket chains representing a combined 600 stores.

Established in 1995 and supported partly by two SARE grants, ASD works to create a local economy that is robust and ecologically friendly through its two flagship “field to table” programs: Appalachian Harvest, which involves mostly former tobacco growers, and Sustainable Woods, a wood products brand that buys from local loggers. As part of these programs, ASD operates produce and wood-processing facilities locally, which helps keep additional jobs and dollars in the region.

PROFIT

Don Kiser, who holds an off-farm job, added about \$6,000 to his family's income in 2008 by raising organic bell peppers on a quarter acre and selling them through Appalachian Harvest. His costs were low because other Appalachian Harvest growers shared equipment and ASD staff provided expert advice.

“That was something very refreshing about ASD—they recognize that if it's not profitable, you can't keep it up,” says Kiser, who has expanded his acreage and selection of crops after his initial success.

By giving producers access to expertise, local processing and regional markets, ASD is helping remove major barriers to profitability. For example, ASD typically pays Sustainable Woods loggers 20-30 percent more than other wood processors would. “We evolved this strategy based on the idea that part of what we're lacking is value-added infrastructure and access to markets,” ASD Executive Director Anthony Flaccavento says.

STEWARDSHIP

Conventional logging practices—including clear cutting and selectively logging the best trees—not only have diminished the economic value of forests in the region, they have impaired streams by causing heavy runoff.

The Sustainable Woods program teaches landowners ecologically sound management practices, allowing them to maintain healthy and productive forests over the long term. The program's forestry standards address riparian buffers, clear cutting, and the preservation of forest canopies and wildlife habitat, among other issues.

Producers in the Appalachian Harvest program adhere to organic standards. Most are former tobacco growers who converted to organics with ASD's assistance, a switch that builds healthy soil after decades of growing tobacco conventionally. ASD also works with dozens of farmers who do not grow organically for Appalachian Harvest but are nevertheless interested in adopting sustainable practices.

QUALITY OF LIFE

A SARE-funded research and education project in the late '90s helped ASD leaders settle on what Flaccavento calls an “ordinary food for ordinary people” approach to sustainable farming. This means that instead of encouraging farmers to grow high-value niche items, they should focus on the everyday produce found in supermarkets. “If we can get regular people to recognize the value of locally grown produce and pay a little more for it, it'll create a market pull for farmers to make the transition,” Flaccavento says.

ASD staff work with partner organizations to maintain a community kitchen where local producers and entrepreneurs create and package value-added foods at a minimal cost. Kitchen staff provide business planning, consultation and technical training.

AT A GLANCE

PROFIT: In trials, perimeter trap cropping earned growers \$11,000 more on average.

STEWARDSHIP: Growers can cut pesticide use up to 90 percent.

QUALITY OF LIFE: Neighbors are sharing the cost-saving technique; consumers have more access to food grown with less insecticide.



Photo by Nelson Cecarelli

FREE RESOURCE!

SARE BOOKS: *Manage Insects on Your Farm: A Guide to Ecological Strategies and Crop Rotation on Organic Farms*. Download for free or purchase hard copy: www.sare.org/books.



Photo by Jude Boucher

Innovative Technique Cuts Costly Pesticide Use

When University of Connecticut Extension Agent Jude Boucher was working toward a horticulture PhD in the late 1990s, he researched methods for stopping maggots from devastating sweet and bell pepper crops. The pest has long frustrated growers in southern New England, oftentimes destroying entire crops. Controlling it often involves the use of chemical insecticides that can encourage outbreaks of other pests, such as aphids.

Boucher started by planting rows of hot cherry peppers between sweet pepper plots and the tree line. The rows of cherry peppers would attract the maggots, making it easier to kill them with smaller, well-timed sprayings, thus shielding the main crop from both pests and heavy insecticide use. He later settled on the improved strategy of surrounding the entire sweet pepper plot with a “poisoned fence” of hot cherry peppers. “It worked like a charm,” Boucher says.

In on-farm research trials, Boucher found that this technique—called perimeter trap cropping—could reduce insecticide use by up to 90 percent and could result in almost no pest-related crop damage. Later trials using perimeters of squash to protect cucumbers bore similar results: better yields, fewer insecticides and higher earnings.

PROFIT

In 2004, nine New England growers participating in Boucher’s research used perimeter trap cropping to, on average, increase yields of cucumbers and other vine crops by 18 percent and reduce insecticide use by 96 percent. This led to an average increase in earnings of \$11,000 per grower.

One of the growers, who sometimes lost entire cucumber crops to voracious beetles, was able to achieve harvests two years in a row using perimeter trap cropping.

Along with money, the growers say they saved time. Instead of doing extensive pest scouting and spraying entire fields—sometimes

up to four times per season—growers monitored and sprayed just the perimeters.

STEWARDSHIP

Boucher has encountered some organic growers who reject perimeter trap cropping because the strategy works better with synthetic pesticides than with organically certified products. But to Boucher, the benefit is obvious. “For conventional growers, where they would be applying insecticide one or several times to an entire field, they can reduce that by 90 percent,” he says. The technique, which can be used on plots of any size, gets more efficient the larger the field gets, because the area of the perimeter becomes smaller relative to the area of the field.

One grower has essentially been able to retire his 60-foot boom sprayer in favor of a backpack sprayer, thanks to perimeter trap cropping.

QUALITY OF LIFE

There are few better neighbors than those who share cost-saving advice—and that is just what is happening with perimeter trap cropping. Boucher’s research drew in about 30 New England farmers. Now the word is spreading farmer to farmer, as well as through Boucher’s workshops and one-on-one efforts. He also travels around the country to collaborate with other researchers and growers who are using the technique.

“Most growers are pretty thrilled to try it,” Boucher says. “I get lots of reports of great results.”

Along with helping growers save money, perimeter trap cropping benefits the consumer, who has increased access to produce that has not been exposed to pesticides.

SARE is...



GRANT MAKING

SARE offers grants to farmers, ranchers, researchers and ag professionals for on-farm research, education, and professional and community development. SARE-supported projects address pest management, energy, stewardship, marketing, systems research and much more.



ENGAGEMENT

SARE shares research results by funding trainings for ag professionals and requiring project outreach such as field days and workshops.

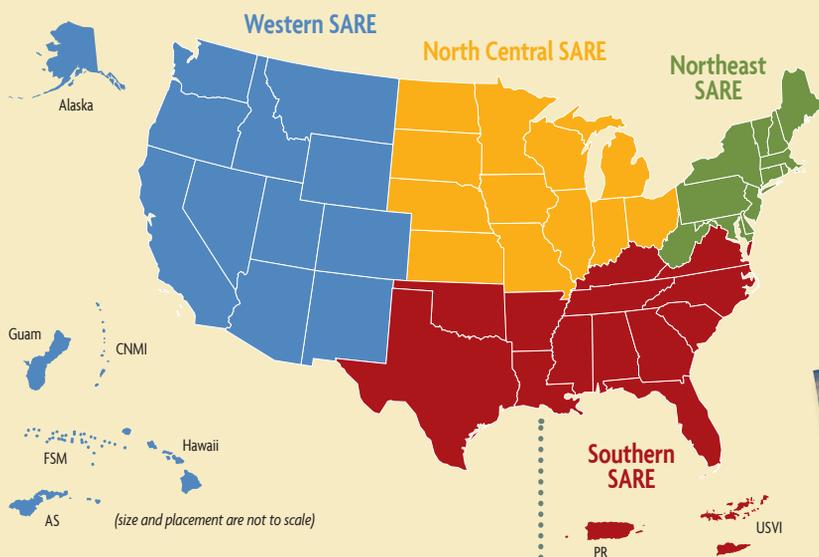


FARMER LEADERSHIP

Hundreds of producers from all corners of the nation advise SARE.

RESOURCES

SARE Outreach and regional communications specialists translate SARE's more than 20 years of applied research results into newsletters and practical books, bulletins and online resources for farmers, ranchers and ag professionals.



LOCAL LEADERSHIP, NATIONAL IMPACT

Four regional councils—including farmers, educators, scientists, government, NGOs and other stakeholders—set priorities and make grants.



Photos (from left): courtesy Karl Kupers; Natural Resources Conservation Service; Robert Fry

YOU, EXPLORING YOUR SUSTAINABLE INNOVATIONS!

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This material is distributed by SARE Outreach for the SARE Program and is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2014-38640-22173. SARE Outreach operates under cooperative agreements with the University of Maryland to develop and disseminate information about sustainable agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the USDA or SARE. USDA is an equal opportunity employer and service provider.