



## Water Innovation and Conservation

*Water shortages are coming to a farm near you, perhaps sooner than you think. How can you improve your system? Farmers nationwide are finding ways to protect the water that runs through their farms. This issue of ATTRAnews looks at innovative conservation practices that save water, improve water quality, and increase the water-holding capacity of your soil. To learn more, you can call ATTRA's sustainable agriculture specialists at 800-346-9140.*

## Sundance Water Pioneers

**By Karen Van Epen, NCAT Program Specialist**

Almost 30 years ago Howard Wuertz of Sundance Farms in Arizona saw the handwriting on the wall. The water table was dropping, energy costs were rising, the price of cotton was falling, and things looked bad. He started to experiment with drip irrigation like farmers were using in southern California and Israel. When he saw that Hawaiian farmers buried the drip tape, he thought that might work in Arizona, and he was right. Wuertz came home and worked out the kinks in his fields.



Cotton farmer Howard Wuertz developed irrigation and tillage technology appropriate for arid regions.

Wuertz discovered that when he buried the drip lines 8 to 10 inches deep, he could leave the tape in place for many years. He minimized passes through the field by building (and eventually patenting) specialized machinery to lay and bury tape, shape and cultivate beds around it, pull crop roots, remove the tape, and roll it up on spools.

The Sundance system emphasizes the ability to filter water, flush lines, and maintain pressures of 10 to 12 psi. New "turbulent flow" emitters distribute water uniformly and with less plugging.

When Wuertz and his sons switched to subsurface drip irrigation, they saw water use in their sandy soils drop by 40% at the same time that yields increased. They found they could manage their salty soils better and were able to diversify their crops. Besides cotton, they now grow a mix of crops including lettuce, sweet corn, melons, spinach, broccoli, rapini, fava beans, and chili peppers.

It took a long time for the Sundance innovations to catch on with neighbors, who were skeptical for years. "I remember reading about what Howard was trying to do with drip back in the late 1980s," says Francis Schiflett of Uvas Valley Farms in Deming, New Mexico. (see "Sundance" on page 2)



The Sundance root puller cuts plant roots in front of the tractor and incorporates them behind it, without disturbing the drip irrigation tape buried in the rows.

## Conservation Security Program: Great New Opportunity for Sustainable Farmers

**By Mike Morris, NCAT Program Specialist**

Created by the 2002 Farm Bill, the Conservation Security Program (CSP) is a new alternative to traditional crop subsidy programs.

CSP pays farmers to conserve and improve natural resources like clean water and air, fish, wildlife, and healthy soil – resources that farmers have traditionally provided for free. Instead of paying farmers to fix environmental problems on their land, CSP is supposed to "reward the best and motivate the rest."

If you are using sustainable practices such as cover cropping, crop rotations, conservation tillage, and reduced use of chemicals, you may be eligible for CSP funding.

To qualify for highest-level payments, you'll need to have a comprehensive conservation system in place on your farm. Many organic farmers will fall into this category. While the application paperwork is significant, the effort can be worthwhile. For example, in fiscal year 2004 an average 10-year CSP contract in Montana was worth \$261,225.

Each year, only certain watersheds in each state are eligible for the CSP program – 212 watersheds nationally in 2005. The program is supposed to rotate through all watersheds, giving every producer in the country a chance to sign up sometime in the next eight years. CSP is administered by the USDA's Natural Resources Conservation Service. To find out whether your watershed

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## Good Resources about Water Quality and Quantity

### Drought Advisory for Vegetable Production

North Carolina Co-op Extension Service. NCSU, Raleigh, NC.  
[www.ces.ncsu.edu/disaster/drought/dro-13.html](http://www.ces.ncsu.edu/disaster/drought/dro-13.html)

### Environmental Impact of Irrigation

Washington Water Research Center, Washington State University  
[www.swwrc.wsu.edu/newsletter/fall2001/IrrImpact2.pdf](http://www.swwrc.wsu.edu/newsletter/fall2001/IrrImpact2.pdf)

### Irrigation Water Quality Criteria

Colorado State Univ. Co-op Extension No. 0.506  
[www.ext.colostate.edu/pubs/crops/00506.html](http://www.ext.colostate.edu/pubs/crops/00506.html)

**Montana Rivers Project:** This NCAT project works with irrigators to increase efficiency of water and energy use. Good information on soil moisture monitors.  
[www.ncat.org/mtrivers](http://www.ncat.org/mtrivers)

### National Drought Mitigation Center

University of Nebraska, Lincoln  
[www.drought.unl.edu/index.htm](http://www.drought.unl.edu/index.htm)

### Riparian Area Management Handbook

Oklahoma Co-op Ext., OSU, and Oklahoma Conservation Commission  
[www.okstate.edu/OSU\\_Ag/e-952.pdf](http://www.okstate.edu/OSU_Ag/e-952.pdf)

### Soil Quality: Managing Soil for Today and Tomorrow

USDA Natural Resources Conservation Service  
<http://soils.usda.gov/sqi>

(see "Resources" on page 3)

### Sundance...

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Mexico. "I told my sons that this guy is crazy. There's no way to recover the cost involved. But...we went to him for advice and information, and we started installing drip. In our first year, we put in about 150 acres. And then we couldn't wait to get more in."

In the meantime, the Sundance system was adopted and modified in Australia and other parts of the world. Now growers of specialty crops throughout the arid U.S. are adapting the system for new uses such as U-Pick farms, where muddy fields used to keep customers away during irrigation.

Innovators like Howard Wuertz show that it pays to be persistent and forge ahead looking for improvements to water systems. "I just wanted to save precious water on my sandy soils," Wuertz says. "And I wanted to increase my yields. Now I hardly do any tillage. We've got a system that's catching on." To learn more about the Sundance system, call 520-723-9226 or go to [www.azdrip.com](http://www.azdrip.com).

## ATTRA Publications about Water Quality and Conservation

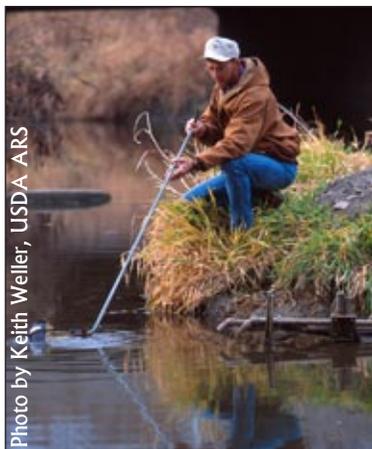
These publications are all available for free from ATTRA at 800-346-9140 or [www.attra.ncat.org](http://www.attra.ncat.org).

- Constructed Wetlands (CT106)
- Protecting Water Quality on Organic Farms (IP214)
- Protecting Riparian Areas: Farmland Management Strategies (IP186)
- Managed Grazing in Riparian Areas (IP223)
- Drought-Resistant Soil (IP169)
- Montana Irrigator's Pocket Guide (IP236) (not on-line)
- Conservation Tillage (CT105)
- Pursuing Conservation Tillage Systems for Organic Crop Production (IP183)
- Sustainable Soil Management (IP027)

Drought Presentations (IP268)

These PowerPoint presentations may be viewed on your computer as information guides or may be projected for use in training sessions.

- Drought Introduction
- Soil Health and Drought
- Pasture Health and Drought Protection
- Irrigation
- Pasture and Rangeland Management during Drought
- Water, Heat Stress, and Drought



Technician Jeff Nichols collects a water sample from the Walnut Creek watershed in Ames, Iowa.

### Conservation Security...

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is eligible this year, go to [www.nrcs.usda.gov](http://www.nrcs.usda.gov). Click on "Programs," "Conservation Security Program," and then "CSP Watersheds." You'll find a map showing eligible watersheds, a self-assessment workbook, and helpful brochures.

If you are in an eligible watershed, call your local NRCS office to inquire when the local CSP workshop will be held. The information at the workshop should help you decide whether you want to participate. Contracts are for five to ten years. Enrollment for fiscal year 2005 is taking place now, with a deadline of May 27.

If you are not in an eligible watershed, plan ahead to make sure you'll have eligible practices already in place for at least two years when your turn comes. You'll need documentation supporting that claim. Remember, all U.S. watersheds are supposed to become eligible sometime in the next several years.

NRCS hopes that CSP will work hand-in-hand with the existing EQIP Program (Environmental Quality Incentives Program). You can use EQIP to help pay for new conservation practices on your land. Then - when your turn comes - enroll in CSP to start receiving ongoing payments to maintain or enhance these environmentally beneficial practices.

## Increasing Your Soil's Available Water Capacity

by Barbara Bellows, NCAT Agriculture Specialist

Cutting back on your irrigation is not the only way to save water. You can also improve your fields so they'll hold the water your crops need. Enhance the ability of your soil to absorb and hold water by using the following methods.

- Maintain crop residue or mulch on the soil surface.
- Regularly plant and incorporate cover crops into the soil.
- Return crop residues and apply manure to fields.
- Minimize tillage and leave a rough soil surface.
- Reduce field traffic, especially when soils are wet.
- Minimize practices that change the soil profile.

Keeping a residue cover on the field will protect against formation of a surface crust caused by the pounding impact of rain or sprinkler irrigation. The porous residues absorb water as it falls, increasing infiltration and reducing runoff and erosion. Residues also keep the soil cool and reduce evaporation. This helps prevent salts from building up on the surface.

Adding cover crops, crop residues, or manure to the soil helps build organic matter. Soil organic matter helps all soil types absorb and hold water. Plant residues also provide food and energy for organisms that build soil aggregates. These are clumps of soil particles held together by moist clay, organic matter such as roots, and organic "glues" from bacteria and fungi. Soil aggregates permit good water infiltration, encouraging healthy root growth and good access to water and nutrients.

Compacted surface soils don't absorb water effectively. You can guard against compaction by minimizing soil tillage. Since moist soils compact easily, you should avoid wheel traffic and harvest activities until the soils dry out after irrigation or rainfall.

Tillage that creates a rough soil surface, including clods, can help absorb water. The surface roughness blocks water flow and provides small depressions for collecting and absorbing runoff water. In addition, specialized tillage equipment can be used to create reservoirs, basins, or small pits throughout the field for collecting and absorbing water.

Land modification practices such as land-leveling or terracing often move topsoil from high portions of the field to lower areas. As a result, the formerly high areas now have exposed subsoil, which is usually less fertile and holds less water than the original topsoil. Regular additions of organic matter can help improve the fertility and water-holding capacity of exposed subsoil.



Photo by Tim McCabe, USDA NRCS

Soybeans planted in the residue of a wheat crop are protected from erosion and water loss.

## Fish-Friendly Irrigation

*Excerpted from Water Management and Equipment Maintenance: The Montana Irrigator's Pocket Guide. This little book is overflowing with practical ways to save water, soil, and energy. The ideas are useful far beyond Montana. Available free of charge from NCAT; see ordering information, page 2.*

Diversions and ditches can act as barriers to fish passage during spawning and migration. Fish can't swim upstream when drops or dams obstruct their passage. They are also blocked when water velocity is too high, or when water is too shallow, as in a culvert under a road. To avoid excessively fast or shallow water, culverts must be sized correctly for water flow and for the gravel, silt, and debris that move down the water channel. Standard corrugated culverts can obstruct fish passage. An arched culvert - with the natural stream bed left in place - allows fish to swim through more easily.

Diversions and ditches can also tempt fish to move into places where they don't belong. During low water, fish frequently move out of rivers and into ditches that aren't screened. Irrigators can save trout and other fish by gradually shutting down diversions instead of abruptly closing them. Farmers have found that gradually reducing flow over a period of three days is remarkably effective in saving fish. Most fish move out of the ditch and back into the river when the diversion is closed in three equal stages over three days. This method is even more effective if hiding places are removed from ditches. Fish travel faster through a canal with a uniformly smooth channel bottom.

Fish screen in an Idaho canal prevents fish from entering irrigation water.



Photo by Joel McNeel, USDA NRCS

Resources...

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### Soil Water Monitoring and Measurement

Washington State Univ. Co-op Extension Service, Pullman, WA.  
<http://cru.cahe.wsu.edu/CEPublications/pnw0475/pnw0475.html>

### Subsurface Drip Irrigation Systems Water Quality Assessment Guidelines

Kansas State Univ. Ag Experiment Station and Co-op Extension Service  
[www.oznet.ksu.edu/library/ageng2/mf2575.pdf](http://www.oznet.ksu.edu/library/ageng2/mf2575.pdf)

### Water Conserve: Water Conservation Search Engine

[www.waterconserve.info](http://www.waterconserve.info)

## President's 2006 Budget Cuts Key Sustainable Agriculture Programs; House to Choose Priorities Soon

Several major sustainable agriculture programs are eliminated or have received major cuts in the President's proposed agriculture appropriations budget for 2006. Congress has begun consideration of that budget, and the House is expected to "mark up" its proposed draft within a few weeks. Cuts would be effective October 1, 2005, unless Congress restores funding for some of these programs.

The Sustainable Agriculture Coalition and the National Campaign for Sustainable Agriculture have provided the funding update below. To learn more about current and proposed funding for these and many other key programs, please contact Margaret Krome at 608-238-1440 or [mkrome@inxpress.net](mailto:mkrome@inxpress.net).

Sustainable Agriculture Program	FY05 Funding Level	President's Proposed FY06 Budget
Sustainable Agriculture Research & Education (SARE) Program	\$12.5 million	\$9.2 million
SARE Professional Development Program	\$4.1 million	\$3.8 million
Organic Transition Research, Education & Extension Program	\$1.9 million	\$0
ATTRA	\$2.5 million	\$0
Rural Business Enterprise Grants	\$40 million	\$0
Rural Cooperative Development Grants	\$6.0 million	\$6.0 million
Value-Added Producer Grants Program	\$15.5 million	\$15.5 million
Renewable Energy Systems and Energy Efficiency Improvements (Sec 9006)	\$23 million	\$10 million

### New and Updated ATTRA Publications

- ◆ **Arsenic in Poultry Litter: Organic Regulations (IP266)**
- ◆ **Organic IPM Field Guide CD-ROM (IP257)**  
English and Spanish versions; available on the Web or as a CD - not in print.
- ◆ **Poultry Genetics for Pastured Production (IP256)**
- ◆ **Preparing for an Organic Inspection: Steps and Checklists (IP261)**

### ATTRAnews

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