

# SUSTAINING THE PACIFIC NORTHWEST

## Food, Farm, & Natural Resource Systems

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World Class. Face to Face.

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### Vegetation Management the Natural Way with Goats and Sheep

[Craig Madsen](#), [Healing Hooves](#), Edwall, WA

While controlling weeds using animal grazing is not a “silver bullet”, it does offer another tool for managing weeds if you take the time to understand plant and animal interactions. Controlling and/or managing vegetation or undesirable plants (weeds) can be accomplished by a variety of methods such as herbicides, mowing, hand pulling, grazing, or a combination of methods. Selecting the best management methods requires understanding your specific situation and desired outcomes. To gain a better understanding of your site and to develop your landscape goals and strategies, we suggest that you consider the following questions:

**What are the undesirable plants on your property?** Undesirable plants, commonly called weeds, are plants out of place. For example, grass comprises an integral part of a lawn, but is a weed when found in the garden. Noxious weeds are legally defined as a plant injurious to public health, agriculture, recreation, or wildlife on public or private land. Identify the type and coverage (number of acres) of undesirable plants on your land.

**What conditions facilitate undesirable plant growth?** Poor current or past management practices may be responsible for the establishment and/or spread of your weed problem. Weeds are typically a symptom of a problem. Poor management (e.g., improper grazing) creates conditions that favor weed invasion and growth. Controlling weeds without determining why they are flourishing may result in those same weeds or different weeds reappearing if the root cause is not addressed. Hence, you must change management to ensure that the tools you use will move you toward your long-term landscape goals.

**What are the requirement and traits of the undesirable and desirable plants?** Understanding plant lifecycles, seed longevity, and requirements for their establishment allows you to make effective decisions on managing vegetation on your site.

**What is your site's history, current condition, and potential?** Understanding your site's past and present resources, impacts, and trends, will help you establish its baseline condition. This would include disturbances, soil types, and past and current vegetation (native vegetation, introduced, and invading). You can evaluate the seeds or other propagules stored in the soil by collecting soil samples and letting any seeds present germinate.

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## Sustaining the Pacific Northwest

Food, Farm, & Natural Resource Systems

This quarterly newsletter provides a discussion forum for people working towards community-based sustainable food, farm, and natural resource systems using interdisciplinary oriented research and practitioner knowledge.

This is a joint newsletter of the WSU [Center for Sustaining Agriculture & Natural Resources](#), the [WSU Small Farms Team](#), the [WSU Small Farms Program](#) and the [Water Quality Management Team](#).



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Next, review the pros and cons of the management strategies (e.g., herbicides, mowing, or biological agents such as insects and livestock) available for controlling undesirable plants and favoring desirable plants. If insufficient numbers of desirable plants are present, you must determine the cause before you can effectively change the situation. It is also very important to determine the site's potential for providing desired outputs such as pasture, wildlife habitat, etc.

**What are your landscape goals?** You need to determine what plants you want to encourage to produce the landscape you desire. It helps to establish short- and long-term goals (for a minimum of 10 years). Decide how you will monitor and evaluate your progress toward your goals. Your focus needs to be on creating conditions that favor the plants you want and eliminate the plants you do not want.

#### Vegetation Management with Goats and Sheep

Livestock reduce undesirable plants only if you have a basic understanding of the management needs and grazing preferences of different animals. Choosing an animal species will determine management input requirements and impact grazing results. Correctly timed grazing is critical and depends on when target plants are most susceptible and palatable.

**Grazing Preference and Behavior.** Foraging behavior varies with site conditions, stocking rates, and grazing duration. In general:

Cattle prefer grasses and grazing will promote the growth and establishment of broadleaf plants, shrubs, and trees.

Sheep prefer broadleaf plants and grasses and grazing will promote shrubs and trees to some extent.

Goats prefer broadleaf plants and woody plants, such as shrubs and trees, and grazing will promote grasses.

People often consider broadleaf and woody plants to be weeds. Weedy plants goats and sheep control include:

thistles (Canadian, Scotch) oxeye daisy  
Dalmatian toadflax yellowstar thistle  
Scotch broom blackberries  
knapweed (diffuse, spotted, Russian) hemlock (poison, water)  
leafy spurge common tansy  
English ivy

**Grazing Timing.** Time grazing when the target plants are the most palatable, and the desirable plants the least palatable, to your particular animal species. Palatability depends on plant species. For example, goats and sheep like leafy spurge, so timing grazing is not as crucial. These animals will select leafy spurge over grass, and even shrubs, at all growth stages. On the other hand, goats like Dalmatian toadflax less, so grazing must be timed after grass forms seed and is therefore less palatable. Goats remove the flowers from the Dalmatian toadflax and leave bare stalks, while any grazing on the grass will have limited impact since the grass already completed the majority of its growth cycle.

**Grazing Management.** Using animal grazing preferences and timing pressures undesirable plants, limits the pressure on desirable plants, and creates a shift in plant composition. Low management levels or improper grazing timing can lead to negative impacts, including a reduction of desirable plants, soil erosion, and under-achieving your desired goals.



Properly managed, goats and sheep grazing effectively defoliates undesirable plants, resulting in reduced seed and other propagule production. Defoliation also lowers survivability and weakens root systems through reduced nutrient storage. Changing the dominant plant species may take up to three or four years to see significant

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changes. However, short-term goals, such as reducing viable seed production and reducing root reserves, can be achieved in one season. As a rule, control requires repeated grazing treatments. Many perennials require at least two grazing rotations per year, for 2 to 4 years. A third grazing rotation may be needed depending on growing conditions. Some plants send out new shoots from the base of the plant the first year after being grazed. If you remove this re-growth through grazing, you can maintain stress on the plant, whereas leaving the re-growth results in new shoots that produce more seed (and therefore plants). Perennial plants frequently produce more stems in the year following first grazing, as the plant attempts to replenish root reserves. It is essential to remember that you reduce plant numbers only through multiple years of grazing.



**Reseeding.** While managing grazing to reduce the spread of weedy plants, it is also important to consider how to establish desired vegetation. Removing undesirable plants and allowing desirable plants to produce seed increases the numbers and vigor of these plants due to their competitive edge. Failure to reseed desirable plants allows nearby invasive and undesirable weeds to fill the void. Animal grazing directly promotes establishment of desirable seedlings in several ways: by reducing unwanted vegetation, such as blackberries and brush, by creating a firm seedbed through hoof action, by knocking seeds and stems onto the ground and tamping the seeds into the soil (thus promoting good soil to seed contact

necessary for germination), by increasing litter cover, and by providing fertilizer in the form of animal manure and urine. For more information about reseeding, you may want to refer to the Washington State University publication, [Pasture and Hayland Renovation in Western Washington](#) (EB1870).

**Other Benefits.** While the primary benefit of grazing is weed management, grazing may also lower fire danger by reducing the amount of fuel present, an important element in initiating and spreading fires. Goats reduce the amount of broadleaf plants, shrubs, and small trees (fine and ladder fuels), while sheep reduce the amount of broadleaf plants and grasses (fine fuels). Another ancillary benefit includes reduced vehicle accidents when removing roadside vegetation improves visibility. Finally, grazing reduces

competition between shrubs and trees in plantations and makes nutrients available to plants by converting slow decomposing vegetation such as woody vegetation and leaves to fast acting urine and manure.

**Summary.** A firm understanding of the interaction between

plants, goats, and sheep helps you determine the grazing system that best controls undesirable plants while promoting the growth of desirable plants. Removing undesirable plants through grazing permits desirable plants to better utilize site resources. Multiple years of well managed grazing will improve your site through vegetation selection and enhancement. In order to do this, you must first understand your site, develop goals, and a detailed plan on how to reach those goals. That plan should include resources, tools, management, monitoring, and evaluation. For more information about managing weeds with livestock in your area, contact your local extension office or NRCS.

**About the Author.** *Craig Madsen brings 15 years of range and pasture management experience to his business that specializes in managing vegetation through goat and sheep grazing. He provides training workshops for individuals or groups. For comments, questions, or additional information on his services, contact Craig at: Healing Hooves, LLC, P.O. Box 148, Edwall, WA 99008 or call 509-990-7132.*



## Dry Bean Variety Trial Comparison - WSU Vancouver REU & Moses Lake

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In 2003, we conducted a dry bean variety trial on-station at WSU Vancouver and on-farm in Moses Lake in order to expand choices for growing dry beans in the ecological zones of the Pacific Northwest. The trial included varieties and breeding lines of traditional U.S. dry bean market classes. We hoped to accomplish several objectives: 1) compare performance of breeding lines to commercially available varieties; 2) study and compare the results of on-station and on-farm trials; 3) encourage farmers to participate in evaluating breeding lines, and 4) expand our results and impacts based on multiple locations and farmers' participation.

### Materials and Methods

Mr. Don Bales volunteered to host our on-farm trial in the Moses Lake area of central Washington where dry beans are grown on a large scale. The on-farm trial included 22 entries (11 breeding lines and 11 varieties) from eight market classes: Light Red Kidney (CELRK and USWA-33), Dark Red Kidney (Montcalm, USWA-39 and H9659-37-2), Great Northern (BelNeb-RR-1), Small Red (UI-239, LeBaron and USRM-20), Black (UI-911, H9673-87 and ICB-10-5), Cranberry (Cardinal, 95:8186C, USCR-14 and USCR-15), Pinto (Othello, Burke, Montrose, USPT-73 and USPT-CBB-1),

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# Climate Friendly Farming™ - Moving from Source to Sink

Chad Kruger, Director of Outreach

CSANR  
On  
The  
Move



Researchers, policy-makers, consumers, and farmers now realize that agriculture can provide benefits to society beyond the production of food and fiber, such as the provision of wildlife habitat and protection of water quality. Recent efforts in sustainable agriculture research and education have focused on the concept of using the multiple benefits of agriculture to address major environmental concerns. The Washington State University Center for Sustaining Agriculture and Natural Resources (CSANR) started a new five-year research project to investigate the potential for agricultural systems and technologies to address one of the most

pressing environmental concerns of the day: global climate change. The *Climate Friendly Farming™ Research and Demonstration Project* is developing and implementing agricultural systems and practices that maximize the potential for agriculture to mitigate global climate change.

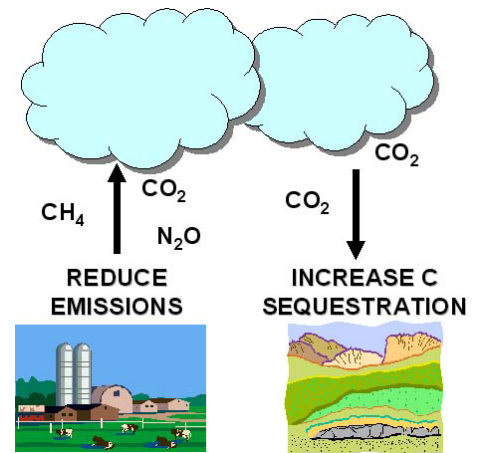
## Background

Climate change is caused in part by the build-up of greenhouse gases (GHG's), such as carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ), and nitrous oxide ( $\text{N}_2\text{O}$ ), in the atmosphere. This build-up of GHG's traps additional heat within the earth's atmosphere and could lead to the long-term warming trends that we have seen over the past 150 years. Responses to global climate change are urgently needed. The Intergovernmental Panel on Climate Change (2001) states that the current rate of global warming is the fastest in recorded history and has started to disrupt many biological and ecological systems on the planet, which has significant ecological and economic ramifications. Recent predictions by the University of Washington's Climate Impacts Group (as published in *Science Magazine*) indicate that climate change could have severe consequences for water resources in the Pacific Northwest (Service 2004). Cascade snow packs could shrink by as much as 60% in the next 50 years, thereby reducing the reservoir of stored water for irrigation, hydro-electric power, fish, and residential needs. This disruption would coincide with the expectation that agriculture provide multiple benefits, such as environmental quality and bioenergy resources, while still increasing food output for a growing human population.

This research explores (1) how agriculture currently contributes to GHG emissions and (2) how agricultural systems and practices might change to help mitigate GHG emis-

sions and sequester carbon from the atmosphere into the soil. Many current agricultural practices contribute to emissions of each of the three most important GHG's. Continuous soil disruption through tillage releases stored soil carbon into the atmosphere as  $\text{CO}_2$ , while also degrading soil quality and structure. Inefficient irrigation and nutrient management leads to the loss of excess nitrogen through the emission of  $\text{N}_2\text{O}$  from the soil. The practice of storing dairy manure in large lagoons creates anaerobic conditions that generate substantial emissions of  $\text{CH}_4$  into the atmosphere.

Agricultural systems and practices can be changed to help mitigate climate change by reducing current sources of GHG emissions and by implementing new practices that sequester carbon from the atmosphere and store it permanently in the soil.



## The Research Project

The scope of the *Climate Friendly Farming™* project requires collaboration between researchers and extension personnel from several departments including Biological Systems Engineering, Crops and Soils, and the School of Economic Sciences as well as county extension educators, USDA Agricultural Research Service personnel, and the CSANR. Environmental monitoring, computer modeling, and economic evaluation will be conducted on three important farming systems for the Pacific Northwest and the world: dairy, irrigated vegetable, and dryland grain.

The dairy component of the project will focus on the improvement and use of anaerobic digestion technology to capture methane from dairies and use it for bio-energy generation. Environmental modeling will help determine the potential of anaerobic digestion and support decision-making for improved nutrient management, water quality, renewable energy production, and GHG mitigation. Team members are also investigating additional high-value by-products from the digestion process, such as fiber with multiple uses and nutrient water for fertilization, to help offset the costs of anaerobic digesters and make them a viable technology for farmers to adopt.

Cropping components will focus on the reduction of soil disturbance through direct seeding technologies and reduced tillage, crop rotations, and improved nutrient and water management. The research will document the potential of various cropping systems to sequester carbon. Environmental modeling will determine the potential of these practices to mitigate GHG emissions and will pro-

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vide the baseline data necessary for development of a carbon credit market for farmers in the Pacific Northwest.

In addition to financial analysis, the socio-economic component of the project will study the adoption of recommended practices and technologies. Research by the USDA Economic Research Service indicates that the economic potential for agriculture to mitigate GHG emissions currently falls far short of the technical potential (Lewandrowski et al 2004). Understanding the financial and socio-economic factors that influence farmer adoption is critical for designing public policies that will facilitate the adoption of practices and technologies with the greatest potential to mitigate GHG emissions.

The final component of the project is the outreach and demonstration of *Climate Friendly Farming* practices and technologies. Team members are coordinating on a variety of methods of providing information to farmers, agricultural professionals, and the public on the benefits of *Climate Friendly Farming*. The project will host field days and technology demonstrations, publish popular and technical articles, present project results in a variety of forums, and provide a [website](#) to document the ongoing research and link with other innovative work in the area.

### Impacts

It is expected the project will have local, regional, and global impacts. Change in agriculture historically follows the “adoption curve”, with a small number of innovators trying an untested practice and refining it, followed by the more numerous early adopters, and then the bulk of farmers. We anticipate that the combination of farm demonstrations with socio-economic analysis will lead to rapid adoption of project findings, particularly those that have low capital requirements (e.g. irrigation water management).

The project will determine the potential reduction of greenhouse gas emissions from the three farm systems, as well as their potential to sequester carbon in soil. Documentation of these values will be of increasing importance

to farmers and policy makers if markets for carbon credits expand in the next few years as expected. In addition to greenhouse gas mitigation, the results of this project will also contribute to conservation and recovery of nitrogen and phosphorus. Efficient utilization of these nutrients not only reduces the need for fertilizer resources, but also reduces energy required in fertilizer manufacturing. In addition, proper combination of technologies for enhancing C sequestration with manure nutrient management in the farming systems will also be helpful in improving water quality and soil con-



servation. Soil erosion can be as high as 10-30 tons per acre per year in some farming systems. Existing technology can reduce this to near zero, thus protecting the land’s productivity and keeping sediment and associated agrochemicals out of surface waters.

### Conclusion

The *Climate Friendly Farming* project is already generating a great deal of interest within WSU, the state and beyond. The systems orientation and scope of this research enables the research team to investigate many related issues, such as climate change, soil quality and renewable energy, together as a comprehensive whole. In addition, the project is creating opportunities for key partnerships and new avenues of research and education that will further agricultural sustainability and economic vitality in the Pacific Northwest. General inquiries about the project can be directed to Chad Kruger, at 509-663-8181 x235.



### Dry Beans Continued...

and Other (Orca). The same entries (except Montrose) were included in our much larger on-station trial (115 entries) at WSU Vancouver Research and Extension Unit (VREU).

Researchers measured plant height (cm) at first flower and at harvest for 10 randomly selected plants in each plot, from the base of the plant (soil surface) to the top node. Plant stand was measured at harvest as the number of plants within 10 feet of row. In the Moses Lake trial, plant vigor on July 11 was denoted on a scale of 1 – 9, where 1 was worst and 9 best. Plants at both locations were harvested from the center 5 feet of both rows in each plot, totaling a harvest area of 10 feet per plot. Whole plants were harvested, placed in burlap bags, and dried in field ovens at WSU VREU for 16 hours at 68° C, until seed moisture reached approximately 12%. We measured pod length (cm) for 10 pods randomly selected from each plot. Total marketable bean weight (g/plot converted to lbs/A) was measured after threshing and cleaning beans by machine and hand. The length and width (cm) of 25 beans were measured for 100 beans also randomly selected and weighed from each plot. Plant stand at harvest, total bean weight, the weight of 100 beans, the length and width of 25 beans were measured from two samples collected from the farmer’s bean field (variety Black Onyx) for comparison.

### Results and Discussion

At Moses Lake, only plant vigor and plant stand at harvest did not differ significantly among entries (Table 1), while plant vigor for all varieties was good (mean 6.8). All other variables at both sites differed significantly among entries. Both locations demonstrated good mean plant stand, however, WSU VREU’s plant stand of Orca was significantly lower. At Moses Lake it was not different from other varieties. Plant height varied at Moses Lake and due to the weight of mature pods that caused plants to bend slightly, a significant reduction in plant height was observed among va-

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ieties at harvest compared to first flowering.

In general, WSU VREU's yield surpassed that at Moses Lake, even after accounting for plant stand differences between the two sites. Weight of 100 beans, bean length, bean width, pod length, pod width, and the average number of beans per pod did not differ between locations (Table 1).

The light red kidney cultivar California Early Light Red Kidney (CELRK) is the predominant cultivar of this market class in Washington. While early maturing in eastern Washington (90 days or less) and resistant to bean common mosaic virus (BCMV), it is susceptible to beet curly top virus (BCTV). USWA-33 (a US Department of Agriculture(USDA)-Agricultural Research Service (ARS)/WSU line), just approved for cultivar release as "Blush" light red kidney, exhibits higher yields than CELRK, resistance to both BCMV and BCTV, and a later maturity (95-100 days).

Montcalm, the standard variety for the dark red kidney market class in the U.S., is poorly adapted to the Pacific Northwest (PNW). USWA-39, the first dark red kidney bred specifically for production in the PNW, is scheduled to be released this year by WSU/USDA-ARS as the cultivar "Fiero". Fiero has better yield potential than Montcalm in Washington and resists BCTV, but matures about 5 days (100-103 days) later than Montcalm (95-98 days).

Quality parameters for the kidneys market class are rigorous. The seed appearance and canning quality for the check cultivars included in this trial all have proven acceptance in the marketplace. However, neither Blush nor Fiero have been tested for acceptance on a commercial scale, but have been found acceptable in small pilot tests. Therefore, it is suggested that growers and dealers first plant these new cultivars on a small scale to confirm their acceptance in the commercial marketplace.

UI-239, a high yielding check for the small red market class, was developed by the University of Idaho. Lebaron, released by USDA-ARS/WSU, is an early season red (< 88 d) developed primarily for late plantings following peas or small grains in a double-cropping system. The larger seeded, high yielding small red breeding line, USRM-20 (ARS breeding program in Prosser, Washington), is undergoing advanced testing for potential cultivar release in 2005 or 2006.

UI-911 is the standard check variety in Idaho, Oregon, and Washington for the black market class. H9673-97 (USDA-ARS, Prosser, WA) has higher yield potential than UI-911 and, therefore, is undergoing advanced testing for potential release in 2006. ICB-10-5 is a black bean with a shiny seed coat which is atypical as most cultivars in this market class have a dull black seed coat. This line has exceptional canning quality and has a nice polished appearance desirable for direct marketing in bulk bins or in clear packages on supermarket shelves. Although shiny

**Table 1: Total Bean Weights & Yields (2003)**

Market Class	T Bean Wt (g)/10 ft of row		T Bean Yld lbs/Ac		Wt 100 beans (g)	
	VREU	ML	VREU	ML	VREU	ML
<b>Entry</b>						
Light Red						
Kidney	623.7	503.3	2988.3	2411.4	64.3	59.9
<i>CELRK</i>	495	545.3	2371.8	2612.6	60.8	60
USWA-33	752.3	461.3	3604.7	2210.1	67.8	59.8
Dark Red						
Kidney	626.6	384.3	3002.4	1841.6	54.9	52.9
H9659-37-2	671.8	396	3219	1897.5	54	50.3
<i>Montcalm</i>	511.5	359.8	2450.9	1723.8	54.3	53.3
USWA-39	696.5	397.3	3337.3	1903.5	56.5	55.3
Small Red	789.7	391.9	3783.8	1877.9	41.7	35.7
LeBaron	647.5	331	3102.6	1586	41.3	34.3
<i>UI-239</i>	974.5	323	4669.4	1547.7	37.8	32
1USRM-20	747	521.8	3579.3	2500	46	40.8
Black	807.4	568.3	3868.6	2723.2	25.8	23.2
H9673-87	961.8	590.5	4608.6	2829.4	24.3	20
ICB-10-5	804.3	521.8	3853.9	2500	27.8	28.5
<i>UI-911</i>	656	592.8	3143.3	2840.2	25.3	21
<i>Pinto</i>	647.4	377	3102.1	1806.2	45.3	38.5
Burke	670.3	294.8	3211.8	1412.3	44.3	37.3
Montrose		315		1509.4		35.7
<i>Othello</i>	626.3	379	3001	1816	43.8	38
USPT-73	794	474.8	3804.5	2274.8	48.5	42
USPT-CBB-1	499	421.3	2391	2018.5	44.5	39.5
<i>Cranberry</i>	655.1	436.6	3139	2091.8	60.3	55.2
95:8186C	847.8	488	4062.3	2338.3	61	54.8
Cardinal	519.8	365	2490.7	1748.9	58.8	56.3
USCR-14	529.8	490.5	2538.6	2350.3	56.5	53
USCR-15	723	402.8	3464.3	1929.8	65	56.8
<i>Great</i>						
<i>Northern</i>	869	267	4163.9	1279.4	40	32
BelNeb-RR-1	869	267	4163.9	1279.4	40	32
Other	403.3	417	1932.5	1998.1	33	30
Orca-2	403.3	417	1932.5	1998.1	33	30
Average	685.7	425.2	3285.8	2037.6	47.2	42.3
P value	0	0.0002			0	0
Black Onyx		501				21

*Check values in italics.*

black beans are consumed in Latin America, the commercial marketability of this seed type in the U.S. has yet to be determined. For instance, Shiny Crow, a new black bean with shiny seed coat released in 2002 from Colorado State University, has not yet established itself in the marketplace. The seed size of Shiny Crow, 28-30 g per 100 beans, may limit its acceptance because it is much larger than the traditional size of 20 to 24 g/100 beans for U.S. black bean market class. Note that the seed size of ICB-10-5 is also large (28 g/100 seeds). At Moses Lake, the mean yield of all black bean varieties grown was 568 g (1.25 lb) per 10 row feet, and the mean yield of Black Onyx (farmer's field) was 501 g (1.1 lb) per 10 row feet. The farmer's field was adversely affected by *Sclerotinia* white mold, and he estimated

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this disease caused a 15–20% reduction in yield as compared to previous years with little or no white mold disease.

Pinto is the primary market class grown in the U.S., and Othello (USDA-ARS, Prosser, WA) has been the most widely grown pinto bean cultivar since its release in 1988. It is widely adapted and is early maturing (88-93 days). Burke (92-97 days), a recent USDA-ARS/WSU release, possesses rust resistance, an advantage for production east of the continental divide where rust is prevalent, but it is a few days later than Othello. Montrose, a high yielding pinto released recently from Colorado State University, possesses rust resistance, but is very susceptible to white mold disease. USPT-73 (USDA-ARS/WSU) has preliminary approval for advanced testing for cultivar release primarily for eastern Washington production. This line performed extremely well in Colorado, but lacks rust resistance which would limit its production there. USPT-73 exhibits wide adaptability like Othello, but potentially yields more. USPT-CBB-1 (USDA-ARS, Prosser, WA) is a multiple disease resistant pinto with promise for national release.

Cranberry beans are synonymous with the Roma beans eaten in Italy and neighboring countries, but are also grown for Green Shell bean production. Harvested once red striping appears on the pods, large immature seeds of the Green Shell beans are used in soups and salads. Cranberry beans are very susceptible to BCTV, a disease plaguing crop production (tomato, pumpkin, pepper, cilantro, and others) in the Columbia Basin on a periodic basis. Cardinal has wide adaptability and resistance to BCTV but suffers from an internal seed discoloration problem called black heart. Cranberry line 95:9186C (Univ. Idaho/USDA-ARS) seed stock is being increased for advanced testing. This line has high yield potential and good seed quality. The breeding lines USCR-14 and USCR-15 (USDA-ARS, Prosser, WA) show promise, but are still in the preliminary stages of testing.

Great Northerns are primarily grown in Nebraska, with some produced in Idaho and a few in Washington. BelNeb-RR-1 (USDA-ARS in Beltsville,

MS/NE) has resistance to halo blight, common bacterial blight, and Fusarium root rot, and is a parent of Montrose pinto but has never been officially released as a cultivar.

In most cases the new cultivars or breeding lines in advanced stages of testing yielded more than the standard check cultivars. This indicates that significant progress is being made in breeding dry beans with improved performance in Washington State. Work is continuing in 2004 to test new cultivars and breeding lines at several farm locations in Washington and Oregon. Based on these trials, we are able to determine if new cultivars or breeding lines are productive in various ecological zones. In addition, the farmer who hosts each trial has an opportunity to see new cultivars, sometimes even before they are released, and to provide input regarding field performance and bean characteristics.



## What's Really Going On in the Field?

**Cathy Perillo**, CSANR & WSU Dept. of Crop and Soil Sciences

In the August gap between summer and fall classes, faculty at WSU and University of Idaho offered the field component of a new course, *Field Analysis of Sustainable Food Systems*, for the second time (it was piloted in August 2003). This course was collaboratively developed by WSU and UI in collaboration with the [Cultivating Success Program](#) for education in sustainable small acreage farming and ranching systems.

Community members, academic students (graduate and upper-level under-



graduate), and the instructors all participated as co-learners in this intensive week-long immersion experience exploring a variety of farming, ranching, marketing, and processing facilities in the Inland Northwest. This experience allowed us to explore the components and connections in our food systems as well as grapple with the concept of “sustainability”.

A key goal of the class was to develop frameworks for assessing sustainable food systems, including understanding our own roles and the potential leverage points where our expertise and disciplines can make a difference.

We visited large and small farms and facilities, some “organic” and others “conventional.” Some fit our pre-conceived notions of practices and approaches, but many did not. Sites were selected to help challenge and further develop our concepts of sustainability and better understand our food systems in the region. A typical daily schedule included visits to different operations for tours and in-depth discussions with farmers, site managers, and other food system personnel. These field visits were punctuated by informal group discussions while traveling between sites.

We reconvened in the evenings in groups to discuss our observations, including any new insights gained about the production, environmental, social, and economic facets of food systems and “sustainability.”

Near the end of the field week, student teams developed and presented oral reports that synthesized their observations of the systems relationships. Those students enrolled for academic credit also developed written analyses of their observations, experiences, and

*Continued on next page*

insights gained during the course.

Students and faculty alike found the experience highly valuable. In the words of one student, "We met visionaries, realists, idealists, businessmen, healers, and vanishing tribes."

Since the 2003 pilot session, both WSU and UI have made the course permanent and will offer it each summer using an immersion approach. In 2005, instructors may add a western Washington component.

For more information, check out <http://classes.css.wsu.edu/Soils445> and/or contact [Cathy Perillo](#), [Cinda Williams](#), [Marcy Ostrom](#), or [Theresa Beaver](#) (Cultivating Success Program coordinator).



## On-farm Composting for Residue Management and Soil Quality Improvement

[Diana Roberts](#), WSU Spokane County Extension, [David Ostheller](#), [Al Anderberg](#), & [Karl Felgenhauer](#), farmers

In 2002, Spokane County farmers David Ostheller, Al Anderberg, Karl Felgenhauer, and WSU Extension Agromonist Diana Roberts received a grant from USDA-SARE (Sustainable Agriculture Research and Education) to assess the effectiveness of on-farm composting of Kentucky bluegrass straw in managing crop residue and increasing organic matter and crop yields on eroded hilltops.

This study compared two methods of composting Kentucky bluegrass straw; a static compost pile consisting of layers of straw and soil (low input), and a regularly turned compost windrow with added water and nitrogen fertilizer (high input).

### Comparison of Composting Methods

Establishing the piles. We established two compost piles in May 2002, using broken or water-damaged Kentucky bluegrass straw bales unsuitable for livestock feed or other industrial uses. We broke up the bales using an International bale processor.

The low input, static pile measured three feet high by five feet wide at one

end, increasing to eight feet high by 20 feet wide at the other end, and was 65 feet long. The irregular design allowed us to determine the optimum dimensions needed for composting. We placed 15 perforated four-inch diameter drainpipes across the base of the pile at four-foot intervals in order to increase aeration. We expected heat build-up in the composting straw would draw air into the pipes and up through the pile. The holes in the pipe were oriented on the lower sides to prevent them from being clogged with straw. We alternately layered bluegrass straw with soil and mature compost in order to increase microbial populations.

The high input, turned pile was a windrow about eight feet wide, four feet high, and 555 feet long consisting of straw bales broken apart using the bale processor. We also monitored a similar windrow established in 2000.

Monitoring temperature and moisture. Using a 30 inch-long Farmex DHT1 brand hay probe, we measured the moisture and temperature of each pile until equilibrium was reached. In 2002, we took combined readings taken at seven marked sites along each of the three piles. In 2003, we took temperature and moisture readings at three sample points from both turned windrows, but not the static pile.

Monitoring weed counts. We collected three one-gallon samples of compost from the mature 2000 turned windrow to test for weed seeds. We mixed the samples with potting soil to ensure good seed to soil contact, placed the mix in aluminum baking trays with drain holes punched in the bottom, and kept the mixture moist. We identified and counted weed seedlings as they germinated. We repeated this in spring 2003 with samples from the 2002 turned windrow.

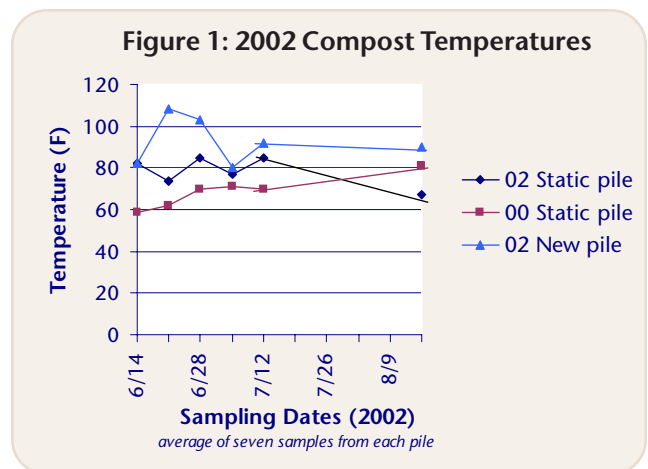
Maintaining the compost windrows. In June 2002 we applied 300 gallons of aqua ammonia (20-0-0-0) onto the windrow using a farm sprayer.



This was a minimal amount of fertilizer over the length of the windrow. We turned the windrow on June 17 and July 25, 2002, using a bulldozer with a metal frame extension bolted to the upper edge of the blade for a combined height of 6½ feet. However, the bulldozer tended to push rather than turn the windrow, so it did not mix the windrow uniformly. As a result, in 2003, we turned the windrows on June 1 and September 18 using a compost turner built on the front of a John Deere 6602 combine. [For construction details, contact the author at [robertsd@wsu.edu](mailto:robertsd@wsu.edu).]

Results and discussion. The static compost pile matured little, and by March 2004 looked much the same as it did in 2002 except for some settling. Pile temperatures (Figure 1) never reached 90°F and tended to reflect the ambient temperature.

The 2000 compost windrow was mature enough to apply to the fields in the fall of 2002. The 2002 turned windrow achieved a mature consistency (like fine topsoil) in the spring of 2004. We anticipate that using the combine turner throughout the process will



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shorten the time to maturity, although moisture will still be a limiting factor.

When newly turned, temperatures within the high input windrow (at a depth of 30 inches) rose quickly to over 100°F, with an average recorded high of 108°F (Figure 1). Although temperatures at individual sample sites reached 130°F and 137°F within the first week after turning, these temperatures were sporadic and short lived. When the composting process was nearing completion the subsequent season, the maximum average temperature was 95°F for a brief period, but then tapered off gradually. The optimal temperature for rapid composting is 130° to 140°F.

Moisture levels remained in the 25% to 35% range, due, in part, to the naturally dry climate. Since microbe populations diminish below 40% moisture content, this was probably the primary limitation affecting composting efficiency.

Table 1 presents the results of the weed viability test for the mature 2000 turned windrow. The high numbers of weeds in the samples indicate conditions within this compost windrow were not hot enough to kill weed seeds. It is also likely weed seeds from the surrounding ground were incorporated into the pile when turning the windrow with the bulldozer. Nevertheless, all the germinating species were endemic to the area and in similar proportions to what would be found in a typical field. There were no noxious weeds among them. When we conducted this test for the 2002 windrow after one year,

**Table 1. Weed Count - Mature 2000 Turned**

Weed species	Average weed count
Kentucky bluegrass	36
Dog fennel	29
Lambsquarter	8
Field pennycress	4
Henbit	1
Clover	1
Sowthistle	<1
Prickly lettuce	<1
Ladysthumb	<1

average of three one-gallon samples

weed seed germination was extremely low (data not shown). We attribute this result to operator error, but numbers may have been low because we only used the bulldozer turner once on this pile. Incorporation of weed seeds should have been less than in the 2000 windrow. Additionally, temperatures in this windrow almost reached 110°F, which may have reduced weed seed viability.

#### Evaluation of Mature Compost

In the fall 2002, we applied finished compost from the 2000 turned windrow to a nearby, eroded hilltop in order to determine yield benefit. Lentils were the previous crop. We rented a manure spreader and used it to spread the compost at 48 tons/acre in strips over the hilltop in plots measuring 40 feet by 300 feet. The experiment consisted of four replications of two treatments, compost vs. no compost.

Prior to spreading the compost, we collected six random soil samples from each plot, including hilltop, side-slope, and toe-slope aspects. Because the ground was very hard, we took the samples by drilling 4 to 6 inches deep with a cordless drill. We combined the samples from each plot for analysis. We repeated this process in May 2003, taking eight cores one foot deep from each plot.

We seeded Rod/Madsen soft white winter wheat across the strips using a direct seed Great Plains 3010 drill with a turbo coulter that incorporated some of the compost. A liquid fertilizer was applied at 80 lb N, 20 lb P, and 20 lb S per acre. Other management was consistent with that for the rest of the field.

In September 2003, we harvested and collected yield and test weight data from each plot.

**Results and discussion.** Average winter wheat yield in the compost treatments was significantly greater (0.05 level) at 64 bu/A when compared with 56.2 bu/A harvested from the check plots (Table 2). There was no difference in wheat test weight due to compost application. The application of compost significantly increased organic matter level in the first foot of soil in the spring. Unexpectedly, there was no difference between treatments in soil nitrogen in the

**Table 2. Yield and Test Weight Data**

Treatment	Winter wheat yield (bu/A)	Spring OM in 1st foot (%)	Spring N level in 1st foot (lb/A)	Wheat test weight (lb)
1 - Compost (48 tons/A)	64.0 a*	2.7 a	99 a	61 a
2 - No compost	56.2 b	2.3 b	110 a	61 a
Least significant difference (0.05)	6.63 **	0.2	43.6	1
Coefficient of variation (%)	6.6	3.7	18.5	0.7

\* Treatment means in columns followed by same letter not significantly different

\*\* LSD for yield is from a one-tailed t test, used as we expected yield to be higher in the

spring, although the nitrogen variable had a high coefficient of variation, which demonstrated little consistency between replications. Most likely, some sample cores coincided with drill rows containing fall-applied fertilizer.

Statistical analysis showed no relationship between wheat yield and either spring organic matter or spring nitrogen levels, probably due to uneven compost application and unrepresentative soil sampling across the whole plot.

The yield increase with compost (eight bu/A) was less than we expected. However, in mature compost samples collected July 2002, the total N was 4,667 ppm on a dry weight basis (average of three samples). While we did not measure moisture content, with a conservative assumption that the compost was applied at 20% moisture, it would provide 3,733 ppm N, or 358 lb N/A at an application rate of 48 tons/acre. The ratio of total C to total N in these samples was 17:1 while a single sample of uncomposted bluegrass straw tested at a C: N ratio of 139:1. A C: N ratio

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between 15:1 and 20:1 is in the neutral range where it neither generates nor consumes N, allowing soil microbes to function at an optimal level. Additional N is needed to digest the carbon above 20:1, and below 15:1 nitrogen is available and released into the soil. We anticipate that as the applied compost breaks down, further nitrogen will be available to subsequent crops, providing possible yield advantage in the following years. We expect the increased organic matter will also provide long-term benefits to the soil, especially improved moisture retention.

Although we can calculate the input costs to the system, we have not yet been able to determine how much mature compost we have produced. Therefore, we are unable to calculate the cost of making the compost on a per unit basis or the cost-benefit ratio, but will do so as we continue to apply the compost.



### Conclusions

Our results indicate that composting residue from cereal crops would enable farmers to recycle crop residue on the farm and increase soil organic matter levels. However, the lower nitrogen content of wheat and barley straw would likely not provide the higher yield benefits produced by composting bluegrass. While the composting research continues, the evidence to-date suggests several conclusions:

Compost made on-farm from crop residue can be a valuable product. When applied to test strips, it demonstrated significant improvement in crop productivity and raised soil organic matter levels.

Compost can be made under ambient environmental conditions, although moisture levels were

drier than optimum and the composting process took almost two years. Furthermore, sub-optimal compost temperatures did not sterilize weed seeds.

Under ambient conditions, the static pile method did not satisfactorily compost straw.

Locating compost windrows closer to application sites greatly reduces the cost and time associated with transporting compost.

Using a locally designed and built grain combine turner increased the efficiency of the composting process.

Using compost to make compost tea would provide nutrients more concentrated and easier to apply.



## The Conservation Security Program: Linking Farm Payments to Clean Air, Land & Water

**David Muehleisen**, WSU Small Farms Program

The Conservation Security Program (CSP) passed in the 2002 farm bill could potentially transform American agriculture by paying farmers for the public benefits that well-managed lands provide. Implemented through USDA's Natural Resources Conservation Service (NRCS), the CSP directs funds to farmers nationwide who use good conservation practices, regardless of the crops they raise. This represents a significant departure from the historical mainstay of farm support payments rewarded to farmers in certain areas of the country for producing certain crops.

### Why CSP?

While agricultural producers represent less than two percent of the American population, they own or control over half of the land base in the contiguous United States (920 million acres). With large amounts of this land under threat from development, both rural and urban communities stand to gain when these lands are managed in ways that are environmentally and economically beneficial. Well-man-

aged farmland offers enormous benefits to the public, such as clean air and water, flood control, fish and wildlife habitat, scenic landscapes, open space, economic opportunities, and a secure domestic food supply.

Under CSP, all United States producers could become eligible to receive payments for employing conservation practices on land under production. As an entitlement program, any producer who qualifies for CSP would receive an appropriate payment. Eligible conservation practices include implementing pest or nutrient management, utilizing cover crops and hedgerows to reduce erosion, and actively controlling invasive weeds. The [NRCS website](#) provides a comprehensive list of eligible practices.

### The Process

CSP had been in the making for over ten years prior to the farm bill's passage. Following passage by Congress and signature by the President, NRCS, as the implementing agency, wrote rules determining how the program would be implemented. Originally, Congress capped funding for CSP at \$3.8 billion over a ten-year period. However, Congress subsequently passed, and the President signed, the 2004 Omnibus spending bill which "uncapped" the CSP and pegged the estimated 10-year cost of CSP at \$7.2 billion. As an uncapped entitlement program, CSP will now operate like the commodity support program: if a producer qualifies, she receives a payment. If the program exceeds the estimated costs, new funds would need to be found.

Before actual spending begins, implementation guidelines must first be published giving the public an opportunity to comment on the "proposed rules." The CSP proposed rules were issued in January 2004. Following the public comment period that ended March 2, the issuance of final rules is pending. After the final rules are published by NRCS, the program can go into effect.

### Current CSP Proposed Rules

CSP funding for FY2004 is capped at \$41 million. In order to stay under

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this limit, the NRCS crafted eligibility rules that would ensure only a limited number of producers would qualify for payment. NRCS estimates it can enroll between 300 and 3,000 farms during FY 2004.

**Eligibility for support.** Producers on cropland, orchards, vineyards, pasture, and range land are eligible regardless of size, type of operation, or crops produced. Land already in CRP, WRP, or GRP programs, as well as recently converted cropland and forestland are *not* eligible.

In a strategy intended to limit the number of qualified producers, NRCS has initially targeted priority watersheds in which to begin CSP implementation. These watersheds have the greatest potential for improving water quality (surface and groundwater), soil quality, and/or grazing land conditions.

In addition, producers' land needs to be privately owned (or tribal land) and compliant with highly erodible lands and wetland provisions of the 1985 Food Security Act. Producers also need to have control of land for the life of the contract, have an active interest in the operation, share in production risks, and be entitled to a share of the crops or livestock.

**Enrollment Categories.** Applications will be placed in the highest category for which they qualify, with categories funded in a priority order until the CSP appropriation is exhausted. There are three tiers in the proposed rules:

**Tier 1.** Producers must have addressed both water quality and soil quality on part of the operation based on standards in the NRCS Field Office Technical Guide (FOTG). Contracts are issued for five years with a maximum annual payment of \$20,000.

**Tier 2.** Producers must have addressed both water quality and soil quality on the entire operation and agree to address one other resource of concern by the end of the contract term. Contracts range from five to ten years with an annual payment of \$35,000.

**Tier 3.** Producer has addressed all resources of concern on the entire operation and agrees to undertake addi-

tional conservation activities. Contracts range from five to ten years with an annual payment of \$45,000.

**Criteria for Annual Payments.** Within the tier system, payment levels for producers are determined by four criteria designed to make program participation valuable for small-acreage producers, while encouraging all producers to go beyond the minimum threshold needed to remain eligible. The payment system is structured so that the financial reward grows as the scope and duration of conservation practices increases.



1. A base payment comprises a per-acre payment for all land enrolled and is based on a national or local average of 2001 rental rates, or a comparable figure.

Tier 1: 1% of the rental rate, up to \$5,000

Tier 2: 1% of the rental rate, up to \$10,500

Tier 3: 1.5% of the rental rate, up to \$13,500

2. A 75% cost-share payment for adopting new conservation practices.\*

3. A 75% cost-share payment for maintaining existing conservation practices.\*

4. Enhanced or "bonus" payments for participating in one or more of five practices: implementing multiple conservation practices; addressing local conservation priorities in addition to resource of concern; conducting on-farm conservation research, demonstration, or pilot projects; participating in a watershed or regional plan that involves 75% of area producers; or assessing and evaluating the impact of

conservation practices in the contract, such as measuring the rate of soil erosion or monitoring for pests.

**CSP Application.** The Secretary of Agriculture will announce a sign-up period this year. NRCS will determine whether a producer is in a priority watershed, and she meets eligibility criteria. If so, the producer must complete a self-assessment inventory (available online) of existing conservation conditions. All applicants must address minimum tier and contract requirements. The NRCS reviews the producer's self-assessment, conducts a follow-up interview, places the application in a tier and enrollment category, and selects and notifies successful applicants. The NRCS or a third-party service provider will then work with each farmer and rancher to complete a conservation security plan.

A Conservation Security Plan for an operation must include schedules of activities to be carried out, schedules of practice maintenance, schedules of new practices or activities to be completed, and documentation of payments related to conservation practices.

For more detailed information, visit:

[NRCS CSP site](#)

[NRCS fact sheet](#)

[NRCS key points about CSP](#)

[NRCS Q & A on CSP](#)

[Economic Analysis of CSP](#)



## Reed Canarygrass - A Formidable Foe for Washington's Riparian Areas

[James P. Dobrowolski](#), WSU

Extension Watershed Specialist,

Pullman, and [Timothy W. Miller](#),

WSU Extension Weed Specialist, WSU

Mt. Vernon R&E Unit

*Updated article that originally appeared in Forest Stewardship Notes, Vol. 11, No. 2, Fall 2002*

As you gaze out over a large wetland, among the occasional purple streaks of loosestrife, reed canarygrass (*Phalaris arundinaceae*) will be grow-

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ing in great bands, already dominant long before the arrival of other more showy weeds. This thickly growing grass that invades watercourses, wetlands, and riparian areas is often ignored in Washington. If it's a grass, and it's green and lush, it must be good at least in some circumstances, and it is, or was. Farmers in Sweden and England began cultivating reed canarygrass (RCG) for pasture from the mid-1700s to the early 1800s, and brought it to the eastern U.S. in the 1850s (Groshek 2000). It has been used for silage, hay, pasture, and as a filter for polluted waters. Sometimes RCG seed was used as birdseed!

Reed canarygrass is considered native to North America and its growth is highly variable; however, a Eurasian subspecies has become an invasive pest in U.S. wetlands. It is extremely difficult to distinguish the native and non-native types, and sometimes difficult to tell RCG from orchard grass (*Dactylis glomerata*). RCG was aggressive and hardy, adapted to marginal, waterlogged soils, and provided early season grazing. Promoted nationwide as an excellent hay and pasture plant, particularly on wetlands, farmers were photographed in 1885 planting and harvesting reed canarygrass in Coos County, Oregon.

Botanists began noticing RCG's invasive nature by 1940, noting that "...it is wise not to plant it if one wishes ever to get rid of it." Today, wetlands and riparian ecologists bemoan RCG's dominance with accompanying loss of plant diversity along waterways, in wetlands and marshes throughout Washington, and across the United States. RCG affects a wetland's ability to attract wildlife. Reed canarygrass stems are too weak to act as nesting sites or singing perches for songbirds, and tend to lie flat at the end of the growing season failing to shelter ground nesting birds. Stand density prevents the movement and migration of young birds and mammals, and RCG seeds have variable nutritive quality. Along Patterson Creek (Snoqualmie River Watershed, Washington), coho salmon have been stranded in RCG choked channels after high flows have receded.

RCG easily invades wetlands in early spring, growing vertically 5-7 weeks after germination and then expanding laterally by rhizomes. Its growth peaks in mid-June and declines in mid-August. Seeds ripen in late June and shatter when ripe, dispersing through the air or floating on water, invading newly disturbed sites downstream or downwind. Once established, RCG shades out other native species, particularly those that begin growth later in the season.

RCG is particularly well adapted to elevated nutrient levels, opportunistically taking advantage of increased nitrogen from urban storm runoff, accelerated sedimentation or other disturbance events. Disturbance appears to be the key factor in RCG establishment, whether that disturbance is a change in nutrient levels, accelerated sedimentation, or denudation of forested sites, riparian areas, and wetlands.



#### Managing Reed Canarygrass

Removing established RCG is a challenge since each area combines unique characteristics, size, and ecology. Joy Zedler, restoration ecologist at the University of Wisconsin-Madison, is identifying what native species satisfactorily compete with RCG in combination with prescribed burning on several wetland acres. Apparently, in some locations annual burning in the late fall or late spring for 5-6 years can help control the spread of RCG and keep it from returning to high quality wetlands. Burning has its greatest effect where seeds of native, fire-adapted species are present in the seed bank, and least effective in RCG monocultures. Others have found RCG to be resistant to or promoted by fire with significant light-triggered germination.

In riparian buffers and disturbed areas, hand removal might be feasible in small stands. There is some evidence that hand chopping of culms (floral stems) might kill small clones. Field observations indicate that reed canarygrass is shade intolerant, and once shaded, it can be replaced by more desirable riparian species (e.g., willows, cottonwoods, sedges, rushes). Some unique removal efforts include: (1) the complete removal of the top 18 inches of soil by a small bulldozer, in the hopes of removing all RCG rooted structures; (2) blasting the reed canarygrass with dynamite on a creek in Kitsap County, Washington using a Navy demolition team.

Certain herbicides can be effective, especially in RCG monocultures. Rodeo® (DowAgrosciences) and Aquamaster® (Monsanto) are two formulations of glyphosate that are labeled for use in wetlands (Roundup® is another glyphosate formulation not to be used on wet sites). Excellent control of RCG can be expected if glyphosate is applied from mid-spring to fall to green RCG plants that are at least a foot tall. Glyphosate is a non-selective herbicide, meaning that most plant species that are actively growing can be injured or killed if they are sprayed. Some selectivity with glyphosate can be achieved by applying glyphosate in early spring when RCG is growing but before most native riparian species have leafed out. If RCG is shorter than 12 inches, however, poorer control will result because herbicide translocation from treated leaves to rhizomes is not as good as when those plants are taller and more efficiently feeding their root systems. Regardless of when the initial stand is treated, it is very important to spot-treat re-growing plants to prevent recolonization of the site. Care must be taken not to overspray desirable vegetation during re-treatment! Amitrol®, also nonselective and labeled for wetlands, is purported to kill reed canarygrass.

Dave Hall, Wisconsin Department of Natural Resources, has used three well-known forestry herbicides to reduce the interference of RCG on tree planting operations. Arsenal AC® (imazapyr)

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and Oust® (sulfometuron) both foliar applied amino acid inhibitors, are labeled for forestland invasions by RCG. The usefulness of Arsenal AC® and Oust® to suppress re-growth of RCG and in mixtures with Garlon 3A® (triclopyr) for control of broadleaf weeds in transplanted broadleaf riparian trees, is being investigated. Aquatic formulations of imazapyr (Habitat) and triclopyr (Renovate) have recently been registered in most states and may ultimately aid in re-establishment of riparian vegetation on RCG-dominated sites. Accord®, a formulation of glyphosate, is not labeled for forestland invasions by RCG, but it is shown to be effective in field trials.

At three sites in Washington, Four Mile Creek south of Lynden, Hovander Park south of Ferndale, and Joe Leary Slough west of Burlington, WSU faculty Tim Miller and Craig MacConnell conducted studies in 1999 through 2002 targeting best management practices for control of RCG coupled with riparian forest planting. Their initial conclusions indicate that RCG control was accomplished using glyphosate at 1.5 pounds active ingredient per acre applied to 2-foot-tall RCG in the spring. If initial RCG control was good, most maintenance programs allowed tree species to establish themselves within two years; if initial RCG was poor, spot treatments with glyphosate gave the best RCG control and tree survival, although tree growth was slightly reduced by these applications. Clipping RCG and broadleaf weeds resulted in good tree survival and growth, but consumed an additional 30% more time than other control methods. Wood chip mulching did not significantly aid in RCG control or improve tree growth/survival if initial RCG control was poor, but was effective if initial RCG control was good. Tree protectors were important to tree survival and growth, but were time consuming to install (about 5.5 minutes per tree). Under typical study conditions, arroyo willow (*Salix lasiolepis*) survived better with greater growth than red alder (*Alnus rubra*). During spring floods, arroyo willow (*Salix lasiolepis*), black cottonwood (*Populus galsamifera*), and red alder (*Alnus rubra*)—in that order—had superior survival and growth, while vine maple (*Acer glabrum*) sur-

vival and growth was poor (Tim Miller, personal communication).

On seasonal wetlands in southwestern Washington, stem densities of RCG were reduced most by spraying with Rodeo®, then disking with a follow-up application of Rodeo® in the next growing season. Continuous standing water appears to kill RCG. Over the long term, shading with conifers offers one of the most effective ways to suppress RCG. Plants in 81% shade produced less total biomass than plants in 0%, 41% and 51% shade. When shade is combined with top removal, RCG puts more emphasis on leaf replacement rather than root growth, thereby limiting rhizome production and invasive spread. Grazing by livestock reduced RCG dominance and improved species diversity (35 to 15 species, grazed versus ungrazed) (Reed Canarygrass Working Group 2000).

**What are the practices that don't seem to be as effective?** *Hand removal* is very slow and too labor intensive for large infestations. Can you be assured that all of the rooted structures will be removed with *heavy equipment*? Herbicides in high-quality plant communities aren't selective enough. *Introduction of competitive species*—few native species can compete with RCG unless burning is combined. *Tillage* is not appropriate for high-quality wetlands and is destructive in wet environments. There are no known *biological controls* that are useful in high-quality wetlands or ecological preserves. *Grazing* may not be practical in wetlands where RCG is a problem. RCG is very hardy and vigorously resprouts from rhizomes, thus *mowing* is not recommended (Gillespie and Murn 1992). The use of *flooding* to restore the original hydrology is restricted by the ever-increasing demand for water. RCG lifts *black landscape* fabric if it is not staked down tightly.

**What does work effectively?** We don't have the final word on effective control, much less reestablishment of native wetland species. Control and management will require an integrated approach and will depend on your infestation, hydrology, and riparian buffer condition, etc.

Although we've enumerated the harmful effects of reed canarygrass, some stream bank restorationists and hillslope stabilization experts use RCG in severely disturbed sites prone to erosion. Few other plant species grow as vigorously or hold the soil more effectively. Some feel it is an easy option, others are emphatic that anyplace RCG can stabilize soils, there are native plants that can replace it.

*(Because these are preliminary research results, the results in this report do not serve as herbicide recommendations. Neither the author, Washington State University, nor WSU Extension attest or affirm that this information is presently appropriate for field application. Application or use of any information included herein shall be the sole responsibility of the grower.)*

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## Soil Organic Matters

Andy McGuire, Lauzier Agricultural Systems Educator

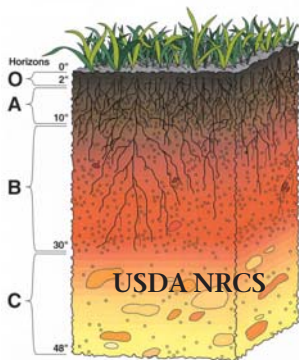
Biologically active soil organic matter has been associated with disease suppression, mineralization, and aggregation but is not usually measured in current soil tests. A new test may allow us to monitor the effects of prac-

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tices such as reduced tillage and green manuring on active organic matter and its benefits.

Organic matter can be separated into two components. The active fraction consists of sand sized particles from recently added crop residues, green manures, animal manures, organic wastes, or compost. It makes up only 7-21% of the *total* soil organic matter, which is the measurement given by soils tests. Humus, the large, stable pool of non-active organic matter, makes up the other 79-93%. It is important for other soil qualities such as cation exchange capacity and water holding capacity. While humus may be from 50 to thousands of years old, active organic matter is less than five years old. It does not persist in the soil because it is readily used as an energy source for a variety of soil microorganisms. Therefore, to maintain this active organic matter, fresh organic matter must be added to the soil regularly. Scientists have found that this characteristic makes it a good early indicator of soil quality changes due to changes in management.

The new soil test for active organic matter was developed by a soil scientist at the University of Maryland. It can be used in the field or lab, and is giving useful results in many soils. Although further field testing is required before it becomes a standard soil test, our testing conducted on Columbia Basin soils last year shows promise in identifying soils that would benefit from improved soil organic matter management. We will continue this testing in 2004. For more information on this test see the American Journal of Alternative Agriculture article, [\*Estimating active carbon for soil quality assessment: a simplified method for laboratory and field use.\*](#)



## EVENTS

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- Wester SARE
- USDA Risk Management Agency

Conference will be held at Green River Community College (south of Seattle, WA). More information in the next issue.

#### Emerging Issues Along Urban/Rural Interfaces Conference

Auburn University's Center for Forest Sustainability, Forest Policy Center, and Environmental Institute invites paper/abstract submissions for the upcoming conference, "Emerging Issues Along Urban/Rural Interfaces: Linking Science and Society," in Atlanta, March 13-16, 2005.

The conference "seeks to bring together individuals with differing perspectives (ecology, chemistry, soil science, water quality, air pollution, economics, politics, public administration, geography, geographic information systems, environmental studies, forestry & wildlife sciences, agriculture, biology) on emerging urban/rural interface issues to help identify challenges, potential solutions, and opportunities, as well as share success stories and viewpoints." For conference information and to submit abstracts, see <http://www.sfws.auburn.edu/urbanruralinterfaces/>.

## Visualizing Food and Farm

The Joint 2005 Annual Meetings of the Agriculture, Food, and Human Values Society (AFHVS) and the Association for the Study of Food and Society (ASFS) will be held June 9 - 12, 2005 at the Benson Hotel in Portland, Oregon. This brings together two multidisciplinary professional and scholarly societies for the purpose of discussing contemporary research and issues about food and agriculture. The theme for the conference is "Visualizing Food and Farm." We encourage people to address the ways in which food and agriculture have been visually represented, and to use the new digital technologies to amplify our understanding of this subject matter.

Papers and panels are sought on any topic related to agriculture, food, and society. See the [ASFS web site](#) for submission details.

#### Organic Livestock: Principles, Practices, and Prospects

Washington State University, in cooperation with the National Center for Appropriate Technology, Western SARE, Oregon State University, and Oregon Tilth, is offering a satellite broadcast examining the basics of organic livestock production and the opportunities it presents. The broadcast is intended to help agricultural professionals (Extension, consultants, suppliers, veterinarians, producers, etc.) become familiar with this growing sector of agriculture and to better answer questions and find resources on the topic. The program will take place on Friday, October 29, 2004, from 10 a.m. to 12:30 p.m. PST. For program details and registration information, go to <http://ext.wsu.edu/noas/>.

#### Joint Agriculture & Water Quality and Ground Water Conference

The fifth *Agriculture and Water Quality in the Pacific Northwest Conference* along with the *Idaho Connections Ground Water Technical Workshop* will be held October 19-20, 2004, at the Boise Centre on the Grove Convention Center in Boise, Idaho.

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This will be a focus on agricultural and water related issues in Idaho, Oregon, and Washington. For details and registration, go to the [web site](#) or contact Steering Committee Chair Gary Bahr, Idaho State Department of Agriculture, at 208-332-8597.

### **Increasing Stakeholder Involvement in Watershed Restoration**

Community groups will share successful strategies for TMDL implementation and watershed protection in the Pacific Northwest in a free satellite/videostream conference on November 16, 2004 from 9:00 to 11:30 am (PST). Contact [Jan Seago](#), WSU Extension at 509-865-8655, or visit the [webpage](#).

## **FUNDING**

### **Farm Aid Grants to Support Family Farming**

(ATTRA news release) "Farm Aid awards grants to organizations that work to maintain a family farm system of agriculture. Grants are awarded in the following categories: emergency needs, hotlines, legal, education, and outreach / organizational development. Farm Aid does not have fixed grant cycles, but proposals must be submitted no later than August 31st of any given year to be considered in that year's grant round."

## **RESOURCES**

### **Agriculture**

#### **Fourth National Organic Farmers' Survey**

The Organic Farming Research Foundation posts the complete results of the *Fourth National Organic Farmers' Survey: Sustaining Organic Farms in a Changing Organic Marketplace* on the [web](#).

#### **King County, WA [TDR Program](#)**

The King County Transfer of Development Rights (TDR) Program started as a pilot project in October 1998 and became permanent in September 2001. The County's award-winning TDR Program is modeled after other successful programs around the country includ-

ing The Pinelands, New Jersey, Boulder County, Colorado, and Montgomery County, Maryland.

### **The WSDA Organic Food Program**

The WSDA Organic Food Program now publishes a quarterly report. Look at the July report at: <http://agr.wa.gov/FoodAnimal/Organic/docs/July%20Quarterly%20Report.pdf>

### **New Online Fact Sheets Help Demystify CAFO Regulations**

The Livestock and Poultry Environmental Stewardship Program posts factsheets to help livestock and poultry producers understand the Concentrated Animal Feeding Operation (CAFO) regulations that the U.S. Environmental Protection Agency. (EPA) released in 2003 will be a challenge for service agencies, Extension personnel, and commodity associations during the next few years. A new set of fact sheets is available online to provide resources that can help answer questions about the federal CAFO regulations.

### **Free Online Export Consulting for California's Organic Industry**

As part of the [Certified Organic Product Export Strategy \(COPEs\)](#) program, [California Certified Organic Farmers \(CCOF\)](#) and the [Monterey Bay International Trade Association \(MBITA\)](#) are now conducting FREE eLearning 'webinars' for California companies interested in improving their global competitiveness.

Designed for organic growers, processors, shippers, and consultants who want to become more competitive in the global marketplace, the online consultations promise:

Current and vital information about organic exports



Access to experts at no cost

Tools for sidestepping organic export barriers

Export readiness, market analysis, and trade lead training

Online export documentation and banking skills

### **Organic Grain Production Listserv**

Diana Roberts, WSU, announces a new email listserv set up through WSU to aid communication among people interested in organic grain production. The list will be used to: announce Extension and other events about organic grain production; update members on hot topics relevant to organic Ag; provide research updates; enable members to get answers to organic grain production questions; and connect buyers with growers of organic grain products. Email Diana at [robertsd@wsu.edu](mailto:robertsd@wsu.edu) if you want to be added to the list.

### **WSU Farm Family Support Network**

The Washington State University Farm Family Support Network announces the addition of three new consultants for the program: Todd Hurlburt of Zillah, Ingalisa Younger, and Scott DeGraw, both of Sedro Woolley. The Network offers free and confidential consulting to agricultural producers throughout the State of Washington on both sides of the Cascades. The Network acts as a resource to assist farmers. Call 1-800-469-2981 or see the [Network website](#).

### **Water Experts Press for Change in Global Food Production**

At the UN Commission on Sustainable Development conference in April, experts warned that the international community will face great difficulties in halving the number of undernourished people in the world by 2015 unless more is done to use less water while producing more food. Initiated by the Swedish government, the report is entitled, [Water - More Nutrition Per Drop](#).

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## Avian Flu

A short information piece on avian flu can be found at <http://metrokc.gov/wsuc/agriculture/AvianFlu.htm>.

## Organic Seed Alliance Workshops

Check their [calendar](#) for dates.

## Organic Farmers Down Under Reflect Global Trend

(ATTRA news release) "The [Sydney Morning Herald article](#) looks at Australia's burgeoning organic food market, which is expected to reach \$400 million (Aus) in 2005. Australia mirrors global organic production, which has been expanding at the rate of 10 to 15 percent a year. Forecasts predict that by 2008 it will be a \$40 billion industry. The Herald reports that in 2000 there were 850 certified organic farmers in Australia; in 2003 that number had grown to 2,500."

## Trends at Farmers' Markets Across the Nation

(ATTRA news release) "USDA's Economic Research Service interviewed managers of farmers' markets in 20 states and analyzed the responses in a new report titled [Organic Produce, Price Premiums, and Eco-Labeling in U.S. Farmers' Markets](#). The report finds that farmers' markets have grown in popularity along with growing consumer interest in organic production and locally produced foods. The research finds that farmers' markets provide important market outlets for many organic farmers, and describes recent shifts in relationships between market managers, organic growers, and customers."

## Growth of Oregon's Farmers' Markets Reflects National Trends

(ATTRA news release) "The number of farmers' markets in Oregon has grown from just 10 in the early 1990s to more than 64 today. All offer an outlet for small farmers while providing products that consumers want and like. More than 1,000 growers participate each year in selling direct at Oregon farmers' markets. Some 90,000 customers

visit Oregon farmers' markets each week throughout the season. More consumers are interested in connecting to the farmer, and they want to know where their food comes from," says Laura Barton, marketing specialist with the Oregon Department of Agriculture."

## New Publication Provides Tips for Tracking Farm Finances

(ATTRA news release) "South Dakota State University Extension has developed a new publication to assist agricultural producers with financial record keeping, reports South Dakota Ag Connection. In "[Record Keeping in Farm Management](#)," author Agustin Arzeno explains why farm record keeping is important, highlights the characteristics of good record systems, explains the two primary methods for record keeping, and outlines four basic phases that a producer will go through to produce good records. The publication is available online. "

## Agriculture Ecosystems Research Group

## Healthy Local Food Systems Can Prevent Sprawl

Check out this [Boston Globe article](#).

## Community Involved in Sustaining Local Agriculture

Check the [CISA website](#) .

## Poll Shows Consumer Trust in Family Farms

(ATTRA news release) "A poll conducted by Roper Public Affairs on behalf of Organic Valley Family of Farms, the largest and only independent national organic farmers' cooperative, shows that more than eight in ten American consumers trust family farms to produce safe, nutritious food. The poll said that smaller scale family farms are more likely to care about food safety than large scale industrial farms. Also, nearly seven in ten Americans (69%) say smaller scale family farms are more likely than large scale industrial farms to use techniques that won't harm the environment. Two-thirds of respondents said

they would pay more for foods produced without chemicals such as pesticides, antibiotics, and hormones, and 73% would like to know if their food is grown locally or regionally."

## Organic Farming and Measures of European Agricultural Policy

[Organic Farming in Europe: Economics and Policy](#), Stuttgart-Hohenheim, April 2004.

## Organic Farm Uses High-tech Adaptation of CSA Model

Covered Bridge Produce, a 26-acre organic CSA selling vegetables to customers in Eastern Pennsylvania. Unlike many other CSAs, Covered Bridge posts weekly produce availability on its website and its members place orders for the vegetables they want. These orders determine the produce the farm grows. Joseph Griffin, the owner, developed the business model and operates with the help of employees and interns. See the full [Morning Call article](#) .

## Alternative Crops for Small Farms

(ATTRA news release) A [list of alternative crops and enterprises for small farms](#) has been compiled by the Alternative Farming Systems Information Center at the National Agricultural Library. Some of the suggested alternative crops may merit consideration as alley or understory crops in agroforests.

## Cost Study Details California Grass-fed Beef Operation

(ATTRA news release) "In the first study of its kind in California, grass-fed cattle practices, revenues, and costs are identified and scrutinized by University of California Cooperative Extension researchers. The study examines the cost of a 200-head cow-calf operation in Sonoma County that produces the grass-fed heifers. The cost study details when most major operations occur, as well as when the cattle are sold. A separate marketing section addresses possible avenues for ranchers to sell grass-fed beef products."

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## Report Looks at Role of Small Farms

Diane Bell Mayerfeld, University of Wisconsin Center for Integrated Agricultural Systems, prepared the report [A Matter of Scale: Small Farms in the North Central Region](#) on the value and role of small farms. The report examines the importance of small farms and what can be done to support them.

## New Listserv Highlights Participatory On-Farm Research

(ATTRA news release) "The North American Farming Systems Association, one of six regional associations of the [International Farming Systems Association](#), has launched a listserv to share information and questions about projects, programs, events, opportunities, publications, materials, and ideas related to on-farm participatory research, whole farm systems approaches, and farmer learning in the United States, Mexico and Canada. To subscribe to the NAFSA listserv: email [sejohnson@smallfarm.org](mailto:sejohnson@smallfarm.org)."

## FORESTRY

### Agroforestry Books

AFTA is pleased to announce that books from one of the leading publishers in botany and horticulture, Timber Press, are now available for purchase. Of particular interest to agroforesters will be several titles relevant to forest farming. These include books on growing shade tolerant plants, references on medicinal plants, and a world guide to mushrooms. Current AFTA members will of course enjoy substantial discounts on these titles compared to non-member prices. See new titles in [Agroforester's Bookshop](#).

### [National Report on Sustainable Forests—2003](#)

### Shiitake Mushroom [Video](#)

(ATTRA news release) "Shiitake mushrooms are a commercially important crop suitable for a forest farming enterprise. "Shiitake Mushrooms on Natural Logs (Growing & Marketing)," a new video developed by Dr.

Deborah Hill at the University of Kentucky, illustrates all the necessary steps to successfully cultivate shiitakes on hardwood logs. Copies are available for \$20 on video or \$25 on DVD from University of Kentucky Agricultural Communications Services."

### Chanterelle Mushroom Management

(ATTRA news release) "The harvest of chanterelle mushrooms is a multimillion dollar industry in the Pacific Northwest. A new report from the US Forest Service PNW Station, "Ecology and management of commercially harvested chanterelle mushrooms," discusses the North American species, international markets, cultivation efforts, and forest management issues. Anyone interested in chanterelles or other edible mushrooms for cultivation and harvest in a forest farming operation will find the book useful. An [electronic version](#) is available for viewing online."

### 9th Agroforestry Conference

Hosted by the University of Minnesota and Southwest Badger RC&D Council, the *Ninth North American Agroforestry Conference* will convene June 12-15, 2005 in Rochester, MN. Centered on the theme "Moving Agroforestry into the Mainstream," the conference will emphasize economic production and environmental protection.

### Human Dimensions Of Family, Farm, and Community Forestry Symposium Report

In March 2004, forestry researchers from around the world gathered for the Human Dimensions of Family, Farm and Community Forestry International Symposium at Washington State University to learn and share knowledge on issues that face family forest owners. Nearly ninety participants from 20 countries attended the symposium sponsored by IUFRO Research Group 3.08: Small Scale Forestry in cooperation with Washington State University (WSU), Rural Technology Initiative (RTI), US Forest Service, and others. View individual papers, photo

album, and streaming video of presentations on the [web](#).

Subject matter covered aspects of family forestry in a variety of countries including: Australia, Bangladesh, Belgium, Canada, China, Denmark, Dominican Republic, Finland, France, Germany, India, Lithuania, Malaysia, Malawi, Nepal, Philippines, Russia, Slovenia, South Africa, Sri Lanka, Sweden, and the United States. Main topics included: financial viability, ecosystem health and biodiversity, well-being, collaboration, cooperatives and organizations, agroforestry, and social and economic determinants.

### World Agroforestry Congress [Session Summaries](#)

Summaries of the recent World Agroforestry Congress, cover the main points of many of the sub-plenary and concurrent sessions. Abstracts of presented papers and posters are available from the [WAC website](#).



**Submitting articles:** Submit articles electronically to [Doug Stienbarger](#) in MS Word or RTF formats. Photos and graphics are encouraged.

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