New wireworm Pests in Western Washington

**Todd Murray**, WSU Extension King County, **Eric LaGasa**, Chief Entomologist, WSDA Exotic Pest Program, & **Bob Vernon**, Research Scientist, Pacific Agri-Food Research Centre, Agassiz, British Columbia

*Agriotes obscurus* (dusky wireworm) and *A. lineatus* (lined click beetle) (Coleoptera: Elateridae) are agricultural pests of high importance in Europe (USDA APHIS, 1978). Multiple introductions of the two wireworm species from Europe into North America likely occurred in the early 1900’s through shipping ballasts and importation of horticultural material. Both pests were first discovered in North America during the 1950’s in British Columbia, Canada (Vernon and Päts, 1997). In 1991 in the Fraser Valley, British Columbia, researchers estimated that these pests caused damage valued at $800,000 to the potato crop (Vernon, 1998). The two wireworms were documented for the first time in the United States near Lynden, WA in 1997. The Washington State Department of Agriculture Exotic Pest Program surveyed for presence and distribution of the two wireworm species in 2000, 2004, and 2005 (LaGasa et al., 2000, 2004, 2006).

**Life History & Damage:** Wireworms are the larval stage of click beetles. Click beetles are elongate, parallel-sided, compact, streamlined beetles with serrate (saw blade like) antennae (Figure 1). When looking at the beetles from the top, you will recognize that the segment behind the head (pronotum) has corners that are pointed and fit snugly around the corners of the wing covers (elytra). The joint between these two regions is extremely flexible since the underside forms an unusual clicking mechanism used to flip away from danger, a distinguishing characteristic of adult click beetles in the family Elateridae. The two new *Agriotes* click beetles are up to ½ inch long and a dusty brown-gray color. *A. lineatus* is distinguished from *A. obscurus* by the presence of lighter-colored lines on the wing covers.

*Agriotes wireworms* are tubular, segmented, tan-colored larvae that reach about an inch long when fully grown (Figure 2). Their life...
cycle takes between 4 - 5 years to complete, depending on resources and environmental conditions. The length of their lifecycle makes managing this pest difficult. Adult beetles lay eggs in the soil near suitable food sources. Eggs hatch in 2-3 weeks. The larvae then use carbon dioxide (CO$_2$) produced from germinating seeds and growing root tips to find their food and can detect CO$_2$ from up to 20cm (~8”) away in the soil. In spring, the majority of larvae live in the top three inches of soil. However, larvae may move at least two feet down into the soil given favorable soil temperatures and food resources. The larvae pupate in the soil in the late summer. Adults remain in the soil through winter until soil temperatures warm to 50°F in the spring. Peak adult flight occurs in late April or early May, but can extend through late June (Figure 3).

The larvae of these two species prefer feeding on grass seeds and roots, but have also been found in strawberries (roots and fruit), cereals, forages, vegetable, tuber crops, and various weed and ornamental plants. Their preferred habitats are established pastures, sod, and grasslands (considered by some researchers to be essential requirements of high population growth). Growers face the most problems when they rotate crops into land that has been in pasture for some years and remove the larvae’s preferred food source through tilling. In the absence of other food sources, wireworms feed on germinating seeds or transplants of crops planted in spring.

Agricultural production impacts attributed to these exotic pest species are becoming significant in areas of Northwestern Washington. Certified seed potato growers in Whatcom County (adjacent to Canada) are well aware that exotic wireworms are an issue in their area. Some growers survey for wireworms on a limited basis, but all rely on a preventative pre-planting broadcast soil treatment of insecticide, which prevented wireworm damage to their crop. Certification inspections in 2005 noted only minimal and occasional wireworm damage that will not affect quality of grade.

One seed potato grower with extensive wireworm damage to his crop last year had only insignificant wireworm tuber damage following a preventative treatment this year. Extensive wireworm damage occurred in only two seed lots (Pike variety) during harvest/storage inspections this year.
on a site where field corn was grown the previous year and rotated from potatoes the year before that. Both lots failed to make certification grade, and will likely lead to substantial crop loss due to marginal quality (LaGasa et al., 2006).

Corn producers in Northwestern Washington have recently noted significant plant mortality and yield reduction in corn stands due to Agriotes species. Plant damage from wireworms ranges from very little to 50% with significant yield losses of 25% in the remaining crop. Growers are now adopting pre-planting seed treatments or tandem seeding applications of organophosphate insecticides to avoid yield loss. Insecticide applications require high rates to be effective since low rates do not sufficiently prevent wireworm damage. This is the first time that corn growers in Whatcom County used pre-planting treatments of insecticides (Midboe, 2006).

Organic vegetable production in the heavily infested areas is particularly vulnerable to economic damage from these exotic wireworms. Row-crop impacts experienced by one Whatcom County organic producer in 2004 and 2005 were severe. Much of the problem resulted from the grower’s attempts to plant in newly tilled ground that had been in pasture or lawn for at least ten years, the most problematic situation recognized for wireworm damage in Canada. Nonetheless, damage occurred in other situations, with up to 100% loss in some cases. One Whatcom County organic producer reported a 50% loss of watermelons and tomatillos, a 75% loss to Brussels sprouts, and a 100% loss of corn. This grower also experienced a 10% loss of tomato seedlings within 24 hours of planting (Schlamp, personal communication). Monitoring & Management

Vernon recently developed pheromone traps to monitor the presence and activity of adult beetles and these are available at PheroTech Inc. (Vernon, 2004). While interpreting pheromone trap data is difficult, the data is very useful to sample for beetle presence if no previous sampling has occurred in a given area. Visit http://whatcom.wsu.edu/pestsurvey/ for previous and ongoing Western Washington survey results.

Pre-planting field assessments are most useful for wireworm management. Since fields left in grasses for 10-15 years are likely to have high wireworm populations (Unknown author, 2005), it is important to assess fields that have been in grasslands over five years.

Cereal bait stations placed in springtime are best for monitoring wireworm populations. University of Missouri researchers developed an effective cereal bait station for monitoring wireworms prior to planting (Radcliff et al., 2004). The supplies needed for baiting wireworm larvae include:

- Medium-grade vermiculite
- Untreated seed corn (e.g. variety 39K40)
- Untreated hard red spring wheat seed
- 8” Plastic plant pots
- Storage boxes
- Soil corer (golf cup cutter)
- Trowels
- Plastic bags
- Camera film canisters
- Wire flags

To construct a bait station:

- Fill an eight-inch plant pot half-full with vermiculite (Figure 4a).
- Add one film canister of corn seed and one canister of wheat seed (= 100 ml of each) to the pot (Figure 4b and 4c).
- Level the seed, and fill the pot to the brim with more vermiculite (Figure 4d).

Bait stations may be stored in a box until needed, but you should label the box with the date its contents were assembled.

Prior to planting, saturate each bait trap (twice) to get germination going. At each trap site, use the soil corer (if available) to remove a plug of soil 6 inches deep, and place the trap at the bottom of the hole. Use trowels to collapse the sides of the hole so that there are no air gaps around the pot. Carefully fill in the hole. At the top,
place an inverted saucer over the hole so that the rim is completely buried, and the base of the saucer is exposed and level with the soil surface. Each trap should remain in place for 10-14 days. Be sure to flag the trap location so you can easily find the bait station.

Inspect traps for wireworms by sifting through the vermiculite and seeds. This is easiest when you spread the trap contents across a flat surface in a dry working area. If you cannot look for wireworms in the field, place each trap in a bag (one trap per bag) along with a written tag identifying its location and date. Seal the bag and store in a cool dark place until you are able to inspect its contents at a later time; however, do not neglect samples, it is unknown how long they will keep in this condition.

Current research aims to find multiple strategies to manage wireworms while reducing the need for soil applied insecticides. Tilling the soil in the early spring may help reduce wireworm populations as they migrate into the top layer of soil. Research has shown that wireworms move into alleyways planted with a wheat cover crop one week prior to planting crops in the open rows (Vernon et al., 2000). The germinating wheat seeds draw wireworms out of the rows and into the alleyways. Insecticide-treated wheat seeds used between rows can also reduce wireworm populations (Vernon, 2005), although the insecticide used in the study (lindane) has now been banned. Utilizing preplanting soil insecticides may still be an effective management strategy for wireworms during the spring. Check with your local Extension office or licensed crop consultant for current recommendations for seed treatments and soil-applied insecticides.

Currently there are no effective, commercially available natural enemies of wireworms. Researchers are looking at developing naturally occurring strains of entomopathogenic fungi and nematodes to help reduce wireworm larval populations. Alternative soil treatments such as biofumigation with Brassica crops or other insecticidal botanicals are also currently being researched (Frost et al., 2003; and Waliwitiya, 2005).

Canadian growers have adopted the cover crop technique to manage wireworm infestations, and this strategy may enable organic growers to reduce the amount of feeding pressure in the crop rows. Washington State growers who do not attempt to control wireworms can expect significant crop damage as pest populations build.

### Pertinent Literature


Midboe, S. 2006. Personal communication. Whatcom Farmers Coop. Lynden, WA.


USDA APHIS. 1978. Lined Click Beetle: Agriotes lineatus (L.) and a wireworm, Agriotes obscurus (L.) in Pests not Known to Occur in the United States or of limited distribution, No. 5 in Series, USDA Cooperative Plant Pest Report, 3(48-52):731-734, 1978.


Most human cases of AI from the H5N1 strain have resulted from direct contact with sick or infected poultry or indirect contact through contaminated surfaces. The spread of AI from one ill person to another is rare and has not been reported to spread beyond one person.

**Bird Flu and Pandemic Flu: What’s the Connection?**

Currently, the highly pathogenic H5N1 AI virus remains primarily an animal health concern. However, due to the influenza virus’ ability to continually mutate, some scientists are concerned this virus could gain the ability to spread quickly and directly from human to human. Indeed, data reported in Science Magazine points to the possibility of a bird flu origin for the 1918 human influenza pandemic that killed an estimated 20 to 50 million people worldwide.

If the virus gains the ability to transmit quickly and directly between humans, such as happens with the seasonal flu virus, a worldwide outbreak of severe human illness could occur. This has not yet happened and there is no current pandemic flu. However, we are at stage three on a six-stage Pandemic Flu Alert Scale: Human infections with a new subtype have occurred, but no human-to-human spread, or at most rare instances of spread to a close contact. A pandemic can happen when a new, contagious, disease-causing agent emerges against which humans do not have immunity.

Many public health officials believe it is inevitable highly pathogenic H5N1 AI will arrive in the U.S. through wild birds. However, detection of this virus does not mean the start of a human pandemic flu outbreak. This disease remains an animal health issue. Despite millions of humans living intimately with and even consuming infected poultry, only about 100 humans have died from highly pathogenic H5N1 Avian Influenza. There is no sustained and rapid person-to-person spread.

Report sick birds to the USDA’s Biosecurity or the Birds” campaign at 866-536-7593.

**Points of Clarification**

There are many strains of bird flu and many of them cause little or no harm to birds.

AI is not new to our country; the USDA monitors constantly for this important poultry disease and has well-established protocols in place for detection and eradication.

The U.S. has experienced three outbreaks due to AI viruses, yet no cases of severe human illness or death resulted.

The U.S. Department of the Interior routinely monitors for AI in wild migratory birds. Although some of the birds tested so far in 2006 were positive for AI, none were carrying the highly pathogenic H5N1 virus.

Americans typically have much less intimate contact with poultry than do citizens in the countries where human deaths from H5N1 AI have occurred. Americans also usually have much better access to basic sanitation essentials (clean running water, soap and disinfectants) and greater ability to follow safe food handling recommendations.

Due to the highly pathogenic nature of this virus, it is unlikely sick birds would arrive appearing healthy at processing plants. Sick birds would be detected by inspectors and not processed for human consumption.

Properly-cooked poultry poses no bird flu threat to human health. Routine food safety steps are simple and effective insurance measures. Cook poultry products to 165°F to prevent the transmission of food borne illness.

**Monitoring**

Continued on next page
The Pacific Northwest is considered a gateway to Asia and Washington State welcomes more than 42,000 international visitors every week. Also, Washington’s large population of wild waterfowl and other birds carry different strains of the AI virus and can spread them to domestic birds. Large and small flock owners alike can help monitor for H5N1 AI by observing their birds for the signs of illness listed below.

Testing. Funds are available for testing for bird flu antibodies in eggs. Poultry owners can send six to twelve eggs from each chicken, waterfowl or turkey flock for testing. Place eggs in an egg carton and place the carton in a small box. Place crumpled newspaper around the egg cartons to protect eggs during transit. Eggs from a few producers can be placed in the same box but identify each producer’s eggs separately with the name, address and telephone number of the poultry producer. Ship to Dr. A. Singh Dhillon, Avian Health & Food Safety Laboratory (AHFSL), Washington State University, 7613 Pioneer Way East Puyallup, WA 98371.

Test results will be mailed to you upon request. If you have questions, call 253-445-4336 or e-mail asdhillon@wsu.edu.

Signs of Illness in Birds

- Sudden increase in deaths
- Sneezing, open-mouth breathing, gasping for air, coughing, oral/nasal discharge
- Green, watery diarrhea
- Lack of energy
- Poor appetite
- Thin shelled eggs, misshapen eggs or drop in egg production
- Swelling around the eyes, neck, head, comb, wattles and hocks
- Purple discoloration of the wattles, combs and legs
- Weakness or incoordination

There are many strains of avian influenza that can cause varying amounts of clinical illness in poultry. Practice backyard biosecurity and do not mix species of birds together.

**Farm Biosecurity and Sanitation**

- Limit traffic onto your property
- Limit others’ contact with your birds
- Disinfect your shoes, clothes, egg trays, flats, tires, equipment and tools regularly, especially after contact with other flocks
- Wash your hands thoroughly
- Do not use others’ equipment, cages, tools or supplies
- Know the signs of infectious illnesses in birds
- Prevent overlap of wild and domestic bird feeding areas and territories
- Confine domestic birds in pens with solid roofs
- Report sick birds to your Extension agent, veterinarian, state veterinarian or USDA at 866-536-7593.


**Your Role in Preparing for Pandemic Flu**

“Pandemics happen, we’re overdue, and under-prepared,” said United States Department of Health and Human Services Deputy Secretary Alex Azar at the Washington State “Preparing for Pandemic Flu” summit in Tacoma in April. “Prepare, do not panic, take steps. We are much more prepared than three or four years ago, but we have much more to do,” he added. Preparation for a pandemic may be regarded as alarmism if there is no pandemic, yet we run the risk of inadequate preparation if we do nothing. With early and widespread preparation, we could be the first generation to be properly prepared for a pandemic.

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translates into effective preparation for other emergencies, such as prolonged power outages, earthquakes, or even a severe seasonal flu outbreak.

A pandemic flu outbreak would have monumental impact on society. However, proper planning will reduce the duration and amount of that impact. Proper planning by individuals, families, and communities can decrease the impact of a flu outbreak and get things back to normal more quickly. Those who are prepared will not panic; prepared communities will be resilient and quick to respond and return to normalcy.

The federal government has a national strategy for pandemic flu preparation. Efforts include expanding traditional and innovative vaccine production methods, stockpiling antiviral medications, testing wild and domestic birds and conducting public education outreach. Federal and state governments have developed many resources to help individuals, families and communities prepare for pandemic flu. Planning guides for individuals, businesses, schools, health care providers, and communities are available at www.pandemicflu.gov.

### Estimated Certified Organic Crop Acreage in Oregon and Washington States

**David Granatstein & Chris Feise**, WSU CSANR, and **Elizabeth Kirby**, WSU, Wenatchee, WA

The 2005 certified organic farm acreage includes data acreage certified by the Washington State Department of Agriculture’s (WSDA) Organic Food Program, the Oregon Tilth Certification Organization (OTCO), and Quality Assurance International (QAI). The data represent a conservative estimate of the total organic acreage since it excludes acreage: 1) certified by agencies other than those listed above, 2) exempt from certification, and 3) farmed by producers who choose not to be certified. To view the complete reports, visit CSANR.

**Washington** In 2005, Washington’s almost 41,000 certified organic acres produced primarily vegetables, tree fruit, and forages. The types of production on transition acreage indicates organic production of these three crops will continue to expand in the future.

Certified vegetable production increased by more than 1000 acres (10%) in 2005. Substantial increases in the number of pea and sweet corn acres occurred, including 1,172 double-cropped acres in the Columbia Basin. Large-scale vegetable production occurs primarily in the irrigated south central region (Grant, Yakima, Adams, Benton, and Franklin counties), while western Washington farms comprise smaller, more diverse organic vegetable production.

Organic tree fruit production, based in the central, irrigated areas of the state, leveled off in 2005, but can be expected to significantly expand over the next few years due to increasing market demand. Apple acreage dominates (75%) this category and also shows a substantial number of acres in transition, while organic pear production has declined since 2002. Cherry acreage has increased gradually for several years and will likely continued to expand.

The growth in the organic dairy sector created demand for organic forages and grain and represents the primary market for these crops. Although the number of certified acres producing grain (6,347) remains a very small fraction of the total acreage in grain, organic grain acreage increased 17% in 2005.

### Table 1: Estimated Certified Organic and Transition Acreage – Washington (2005)

<table>
<thead>
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<tbody>
<tr>
<td>Vegetables</td>
<td>10,985</td>
<td>35</td>
<td>27%</td>
<td>9,971</td>
<td>10%</td>
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<tr>
<td>Tree Fruit</td>
<td>8,955</td>
<td>1,617</td>
<td>22%</td>
<td>9,468</td>
<td>-5%</td>
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<td>Forage</td>
<td>7,907</td>
<td>136</td>
<td>19%</td>
<td>8,400</td>
<td>-6%</td>
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<tr>
<td>Grains and Beans</td>
<td>6,347</td>
<td>287</td>
<td>15%</td>
<td>5,435</td>
<td>17%</td>
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<tr>
<td>Small Fruit and Nuts</td>
<td>2,535</td>
<td>116</td>
<td>6%</td>
<td>2,528</td>
<td>0%</td>
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<tr>
<td>Other Land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallow / Idle</td>
<td>2,136</td>
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<td>5%</td>
<td>2,562</td>
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<tr>
<td>Timber / Woods</td>
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<td>13%</td>
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<tr>
<td>Other, unspecified</td>
<td>53</td>
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<td>0.10%</td>
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<tr>
<td>Herbs and Mixed Hort.</td>
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<td></td>
<td>926</td>
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<tr>
<td>Other Crops</td>
<td>665</td>
<td>4</td>
<td>2%</td>
<td>372</td>
<td>79%</td>
</tr>
<tr>
<td>Total</td>
<td>40,993</td>
<td>2,195</td>
<td>2%</td>
<td>40,245</td>
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</tr>
</tbody>
</table>

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Oregon

In 2005, Oregon’s certified organic acreage surged 36% to approximately 42,000 acres (Table 2). Since 2002, the certified acreage increased 50%. Seed crops, vegetables, and forages increased the most (189%, 102% and 45% respectively). The transitional acreage in forages indicates this area will continue to expand.

Organic forage acreage accounted for over two-thirds the organic acreage in Oregon in 2005. Principle forage crops include alfalfa, mixed hay, and pasture land. The increasing numbers of certified livestock likely forms the primary market for these crops. Organic dairy operations increased from 26 to 37 and estimated dairy herd numbers certified by OTCO increased by 15% in 2005 resulting in over 13,500 dairy cows and 1500 beef cattle certified organic in the state of Oregon.

Vegetable crops comprise 10% organic acreage (4,231 acres), primarily supporting peas and green bean production. Seed crops are predominantly vegetables so organic seed production is expected to increase in Oregon.

Table 2: Estimated Certified Organic and Transition Acreage – Oregon (2005)

<table>
<thead>
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<tbody>
<tr>
<td>Forage</td>
<td>28,600</td>
<td>871</td>
<td>68%</td>
<td>19,778</td>
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<tr>
<td>Vegetables</td>
<td>4,231</td>
<td>91</td>
<td>10%</td>
<td>2,094</td>
<td>102%</td>
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<tr>
<td>Grains, Pulses, Oilseeds</td>
<td>2,542</td>
<td>50</td>
<td>6%</td>
<td>2,214</td>
<td>15%</td>
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<td>Fruit and Nuts</td>
<td>1,867</td>
<td>78</td>
<td>4%</td>
<td>1,754</td>
<td>6%</td>
</tr>
<tr>
<td>Fallow / Idle</td>
<td>1,795</td>
<td>177</td>
<td>4%</td>
<td>1,499</td>
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<tr>
<td>Other Land</td>
<td>1,712</td>
<td>62</td>
<td>4%</td>
<td>2,737</td>
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<tr>
<td>Herbs, Mixed Hort., Nursuy/GH</td>
<td>529</td>
<td>61</td>
<td>1%</td>
<td>614</td>
<td>-14%</td>
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<tr>
<td>Seed Crops</td>
<td>497</td>
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<td>1%</td>
<td>172</td>
<td>189%</td>
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<tr>
<td>Other Crops</td>
<td>449</td>
<td>31</td>
<td>1%</td>
<td>110</td>
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</tr>
<tr>
<td>Total</td>
<td>42,222</td>
<td>1,423</td>
<td>36%</td>
<td>30,972</td>
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</table>

Totals may not add up exactly due to decimal differences.
Some % Increases not calculated due to category changes from 2004 to 2005.

Save Big on the Farm by Conserving Fuel

Todd Murray, WSU Extension King County, Kim Lyons, WSU Energy Program

One of the best ways to deal with rising gas prices is to conserve fuel on your farm. As with all savings, some simple changes can add up over time. Below are tips on reducing fuel consumption and on adopting alternative fuels. By incorporating these changes into your routine, you will use less fuel and save money!

Avoid unnecessary driving. Use cell phones or other convenient technologies to answer emergencies and solve problems in the field.

Slow down your pace. Rapid acceleration and braking reduces your vehicle's gas efficiency.

Choose the right vehicle for the right job. Use smaller vehicles such as ATVs, motorcycles or bicycles for smaller chores that don't require the hauling power of a truck or tractor.

Match the capacity of your tractor to the job. Using a large tractor for a small job can waste fuel; likewise, pulling a heavy load with a small tractor is also inefficient.

Reduce how often you till and consider trying no-till techniques. Tilling, especially on compacted soils, requires larger amounts of fuel from your tractors.

Share distribution costs with your neighbors. Establish a truck share with neighboring farms that sell at the same markets to reduce fuel costs and vehicle wear and tear.

Mulch in high traffic areas. Reduce the time you spend mowing and prevent soil compaction by mulching with bark chips in heavily used areas.

Maintain your small engines, generators and tractors. Check regularly for leaks, smoke and other signs of improper fuel combustion.

Continued on next page
Regularly check and replace air and fuel filters.

Clean your tractor's fuel injectors regularly. Clogged injectors cause fuel to combust inefficiently.

Keep tire pressure at the lowest recommended level. Tires supporting a full load should bulge out. Over- and under-inflated tires wear sooner and cause engines to work harder.

Avoid using new tires. New tractor tires with long lugs work great in wet soils. However, on flat, dry soils new tires are less efficient in providing power on the ground and require more fuel for a given job. Use tractors with new tires on rainy days and in muddy conditions.

Balance your tractor's towing weight to reflect typical conditions, not worst-case scenarios. Over-ballasting your tractor can result in premature engine wear, burn more fuel and cause your tractor to respond sluggishly.

Limit engine idling time. It is more efficient to restart your engine than to let it idle for extended periods of time. Idling typically consumes about 1 gallon of diesel fuel per hour.

Gear up and throttle down when you are not hauling weight. For applications requiring less than 65-70% of full engine power, it is best to slow down the engine rpm and shift to a higher gear to maintain engine speed. This will reduce the amount of fuel used.

Avoid using winter fuels during the summer season. Winter fuels are refined to be lighter and more viscous, but they contain about 3% less energy.

Biodiesel Fuels

Alternative fuels, such as biodiesel, are becoming a more viable option for farmers interested in reducing their reliance on petroleum. Below are a few considerations to make when transitioning to a new fuel.

Use fuels that meet American Society for Testing and Materials (ASTM) international standards (ASTM D6751 for biodiesel) to ensure fuel quality and engine performance.

Biodiesel blends can be burned in existing engines with little or no modifications. However, as a solvent, biodiesel will degrade seals, gaskets and fuel lines made of natural rubber. Pre-1994 vehicles may need to replace these parts with synthetic materials. Furthermore, biodiesel will clean out fuel tank sediments during initial use, which may plug the fuel filter. It is important to inspect your filters and replace them as needed. Cleaning fuel tanks prior to using biodiesel will help to minimize this problem.

Biodiesel does not void engine warranties. Engine manufacturers warrant for parts and assembly of their engines, and do not warrant their engines for specific fuels. The fuel supplier is responsible for fuel-caused engine problems, so it is important to work with reputable suppliers whose products meet ASTM specifications.

Biodiesel can gel at cold temperatures. Fuel blends and additives can control this, so it is important to make sure your fuel supplier is aware of your operating conditions.

Information on saving fuel around the farm

Alberta’s AgTech Innovator
Colorado State’s Selecting a Fuel Efficient Tractor
Energy Ideas Clearinghouse

University of Kentucky’s Extension: Fuel Saving Tips
University of Minnesota Engineering Notes: Fuel Saving Ideas for Farmers
WSU Extension Energy Program
WSU Climate Friendly Farming
More information on using biodiesel
Biodiesel Handling and Use Guidelines, US Dept of Energy
National Biodiesel Board
University of Idaho Biodiesel Fuel Education Program
WSU Center for Sustaining Agriculture and Natural Resources

Coordinating Sustainability Via General Education

Hope Belli Tinney, WSU University Relations

WSU Today. Sustainability cuts across discussions of the environment and agriculture, but also business, health care, education, politics and a plethora of other issues. Richard Law, Director of General Education at WSU, would like to ensure sustainability discussions form part of the undergraduate curriculum.

Law urged WSU’s Sustainability Workgroup faculty whose courses touch on the topic include their courses in the general education curriculum at the lower levels, but especially at the tier-three level (required 400-level course outside a student’s major). “As members of an institution of higher education,
the nature of our responsibilities compels each one of us to do as much as we can to transform our students and ourselves into citizens who can effectively address the mounting environmental, social and economic challenges before us,” he wrote.

John Glass, coordinator of the Campus Sustainability Initiative, said the sustainability movement really started to ramp up about five or six years ago, and WSU has made great strides in a number of areas, but curricular support for sustainability is still weak. “In all the universities that have tried to tackle this problem,” he said, “that’s the major challenge.”

“Learning about sustainability often has practical and applied implications involving behavior changes that other kinds of environmental studies do not necessarily have,” Law writes. “Therefore, in my view, we can’t have too much on the subject.” Law’s definition of sustainability is quite broad, including anything that deals with resource depletion or that links human activities with systems of reuse. Many faculty members are dealing with these issues, he said, but their efforts are still largely unconnected in the curriculum, except in a few programs.

“What I think we have is a critical mass of people who are profoundly interested in this issue who don’t know about each other,” he said. For more information about curriculum support for sustainability, go to WSU’s sustainability initiative, or the website of the Association for the Advancement of Sustainability in Higher Education.

Climate Friendly Farming™ Symposium and Field Day

Chad Kruger, Director of Communications & Outreach, Climate Friendly Farming, CSANR

Recent research and analysis project climate changes for the Pacific Northwest over the next few decades that will likely have profound environmental and economic impacts on key climate-dependent industries in the region, such as agriculture. The Climate Friendly Farming™ Project (CFF), funded in part by the Paul G. Allen Family Foundation, aims to develop and implement agricultural systems and practices that mitigate global climate change and help Washington farming systems become more resilient and adapted to changing climates. Agriculture can help mitigate climate change by reducing emissions of greenhouse gases (e.g., carbon dioxide, methane, and nitrous oxide), removing atmospheric carbon and storing it in soils and vegetation, and replacing fossil fuel-derived energy and products with biomass-derived energy and products. Agriculture can adapt to climate change through improved soil health, improved diversity in cropping systems, “precision agroecology”, and adaptive management.

In partnership with the Pacific Northwest Direct Seed Association (PNDSA), USDA’s Agricultural Research Service, and WSU’s Department of Crops & Soil Sciences, CSANR hosted a two-day event in June to demonstrate aspects of CFF in dryland agroecosystems of the Pacific Northwest. Participants first toured the Palouse region, stopping at Read and Jeremy Smith’s farm near St. John and John Aeschliman’s farm near Colfax. Read described how the Glacial Lake Missoula floods carved out the channeled scablands bordering his ranch and described how three generations of conservation management will make it possible to pass along his land to his son Jeremy. Read led the group through a neighbor’s field onto his own, demonstrating a remarkable difference in quality and health of fields under different management systems.

Canola and mustard trials.

John Aeschliman served tour participants cake prepared with Shepherd’s Grain flour made from grain produced by 12 local farmers (including the Aeschliman’s and Smith’s) in sustainable production systems. In the fields, John demonstrated the improved health of his soils by conducting a water infiltration test and deep soil probes to examine carbon and earthworms. The group ended the first day at the WSU Dairy where Shulin Chen, WSU Biological Systems Engineering, demonstrated the novel anaerobic digestion technology developed as part of the CFF Project.

In the evening program, Amy Snover, Research Scientist with the University of Washington’s Climate Impacts Group, described the research and modeling efforts evaluating past and future changes and variability in climate in our region. She described likely impacts, such as reduced snowpack, increasingly erratic precipitation, potential pest infestations, etc., likely to affect natural resource-based industries. She recommended the agricultural industry adopt a “no-regrets” type of adaptation strategy to prepare for continued climate changes.

The second day featured the efforts of the CFF Team during the annual Dryland Cropping Systems Field Day at the USDA Palouse Conservation Farm in Pullman. Field stops included an overview of the Agroecosystem Research Trials (ART), including the perennial wheat/spring wheat polyculture and the direct-seed organic trials, by Dave Huggins (USDA ARS); precision nitrogen management...

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technology by Dan Long (USDA ARS); canola and mustard trials by Jack Brown (UI); canola economics by Kate Painter (WSU CSANR); biofuels variety trials by Hal Collins (USDA ARS) and biofuels zoo by Mark Stannard (USDA NRCS); and carbon and nitrogen cycling and carbon credits by David Granatstein and Lynn Carpenter-Biggs (WSU CSANR). The lunch presentation was a dedication to Dr. Robert Papendick, the retired USDA Soil Scientist who was an early leader in research efforts promoting conservation farming and sustainable and organic agriculture.

**Symposium on “Sustainable Agriculture, Communities, and Environments in the Pacific Northwest”**

**David A. Sonnenfeld**, WSU Community and Rural Sociology

In May, WSU’s Department of Community & Rural Sociology, in partnership with Humanities Washington, CSANR, and WSU’s Food and Environmental Quality Laboratory, sponsored a symposium on Sustainable Agriculture, Communities, and Environments in the Pacific Northwest at WSU’s Tri-Cities campus.

Over 120 participants from around the Pacific Northwest listened to the keynote speaker, Dr. John Allen, Director of the USDA Western Rural Development Center at Utah State University, talk on The Role of Community in Supporting Sustainable Agriculture. Dr. Allan provided a brief history of the evolution of the structure of agriculture in the United States and the influence of federal agricultural development principles and policies on that structure. Dr. Allan stated that local communities play a vital role in the development of sustainable agricultural practices, but these communities must be effective in understanding and constructively intervening in the market economy.

On the second day, academic researchers, extension specialists, graduate students, and private sector consultants from around the Pacific Northwest presented current research efforts. Presentations included oral panel presentations and discussions and parallel poster presentations and discussions. Themes included: science, agriculture, and sustainability; equity, diversity, and sustainability; pesticides and alternatives; markets, trade, and sustainability; agriculture, health, and sustainability.

Three guided field trips took place the third day: to the Pasco Farmers’ Market, a culturally diverse, local fresh market; to a local, organic, artisan winery; and to the Thundering Hooves certified organic livestock pasturing ranch in Walla Walla. These trips helped participants link concepts discussed in research presentations to living agriculture, community relations and dynamics.

**Announcements**

**CSANR Begins Work on Small-scale Biogas Technology**

The December 2005 issue of Sustaining the Pacific Northwest highlighted the potential for anaerobic digestion technology to address waste management issues on small farms. CSANR will use a grant from Western SARE to conduct a pilot project constructing and evaluating the performance of three individual small-scale biogas plants on small farms in different agro-climatic regions of Washington State.

An initial producer workshop will be held in late summer to overview various types of existing biogas systems, describe how they function, identify benefits and challenges for implementation in our region, and seek input from the producers on preferred technologies, desired uses for the biogas, and how these systems might be incorporated into existing small farms. WSU’s extensive video-conferencing network will facilitate program delivery to areas all around the state. Check CSANR’s website for announcements related to this workshop and project or contact Chad Kruger (cekruger@wsu.edu or 509-663-8181 x235) to be notified of coming events.

**WSU Organic Agriculture Major Approved**

**Dennis Brown**, College of Agricultural, Human, and Natural Resource Sciences

**WSU Today.** It’s been a long time coming, but Washington State University received approval from the state Higher Education Coordinating Board to offer a Bachelor’s of Science degree in Agriculture and Food Systems, the nation’s first major in organic agriculture systems.

The new interdisciplinary degree integrates coursework from all agricultural disciplines in the College of Agricultural, Human, and Natural Resource Sciences. “We have changed our agricultural program to meet the demands of employers for well-rounded graduates who have critical thinking, communications and leadership skills, as well as strong technical skills,” said Ray Folwell, Associate Dean and Director of academic programs in the college.

Starting this fall, five majors will be offered: Organic Agriculture, Agricultural Business and Technology Systems, Agricultural Education, Pest Management Systems, and Plants and Soil Systems. “In each major, emphasis is placed on gaining a solid background in the agricultural

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The new Organic Agriculture Systems (OAS) major will appeal not only to aspiring organic farmers but also to people interested in related industries, such as global marketing, direct marketing, or organic food, according to Perillo. "There's quite a bit of industry interest in the new degree, too," Perillo said. "Large corporations are increasingly interested in meeting the nation's growing appetite for organic foods are seeking employees who understand organic agriculture systems, which are significantly different than conventional agriculture."

Organic food is one of the fastest growing segments of agriculture with retail sales escalating 20 percent annually since 1990, according to a 2002 U.S. Department of Agriculture report.

New BIOAg Coordinator at CSANR

Dr. Lynne Carpenter-Boggs was named the first BIOAg Coordinator. BIOAg stands for biologically-intensive agriculture and organic farming and comprises a growing research, outreach, and education program of Washington State University's Center for Sustaining Agriculture and Natural Resources (CSANR).

Dr. Boggs says "The BIOAg program fosters the development, understanding, and use of biologically intensive and organic approaches to building sustainable agriculture, farming systems, communities, and ecosystems. Examples of BIOAg include biological pest and weed control, organic farming, direct seeding (no-till farming), cover crops, management intensive grazing, and agroforestry. BIOAg practices are useful to the full spectrum of farming operations in Washington -- conventional and organic, small and large, eastside and westside. Growers are interested in BIOAg options to deal with rising fertilizer costs, pest management challenges, changing climate, and new market expectations. With the BIOAg program, CSANR is helping to meet the growing demand for this type of information among both farmers and consumers."

Dr. Boggs goes on to announce a small research and demonstration grant program which will hire a value-added specialist who will focus on economics and marketing of BIOAg products. According to Dr. Boggs, BIOAg research projects will include practical alternatives in the short-term, and some more visionary and far-reaching. The program will also develop outreach and demonstrations that put our current best knowledge into action. She also hopes to expand the grants program and draw in more partners to support the BIOAg program and enhance WSU's contributions to sustainable agriculture in Washington.

Dr. Boggs grew up on farms and in rural communities in Oregon and Idaho. While her research background is in soil and compost microbiology, her personal goal is to foster the growth of a sustainable and vibrant agriculture using knowledge of biological cycles. "I'm ecstatic about this new opportunity for myself, WSU, and Washington agriculture to combine traditional knowledge with new innovations and researcher knowledge with producer know-how, to create paths toward increased sustainability," says Dr. Boggs.

For more information, contact Dr. Boggs at 335-1553, 227 Johnson Hall, or by mail c/o Crop and Soil Sciences, PO Box 646420, Pullman, WA.

WSU Farm Family Support Network Enter 4th Year

This network of consultants are trained by WSU Extension to understand agriculture in Washington and the resources available for farm families. Free and confidential, consultants approach the farm family’s needs on a holistic basis; one consultant deals with all of the issues. The consultants are trained in financial analysis, to review business plans, mediate family issues, and deal with a myriad of topics pertinent to the farm family and the farm. We also act as a source of information that may be useful in assisting with a solution. Consulting is available in English and Spanish.

Shiitake Mushroom Market Study Planned

ATTRA. The University of Missouri Center for Agroforestry (UMCA) is launching a nationwide survey including all individuals and businesses that are active participants in the shiitake mushroom market, in order to obtain information about the market to aid businesses. Producers who participate in the survey will receive copies of the resulting report, which will provide an industry snapshot and predict trends for the next five years. The information...
in the report will help producers better identify market opportunities and problems, generate, refine and evaluate marketing actions, and monitor marketing performance. If you are a shiitake mushroom producer and have not received a survey, please contact UMCA at goldm@missouri.edu, cernuscam@missouri.edu, or 573-884-1448.

**Events**

**Sustainable Small Acreage Farming & Ranching Course**

Aimed at local farmers and those interested in becoming farmers this class will be offered in several Washington and Idaho counties as part of an expanding partnership between Washington State University and the University of Idaho. This 12-14 week course combines classroom and on-farm experience to give students lessons in technical aspects of farming along with practical whole farm management skills. Guest speakers range from research scientists to local producers. Students will tour local farm and market operations, meet key community resource people, and build a network of resources and connections. In addition to this, learners explore internet resources to provide critical production and marketing information.

“"This course was designed for beginning farmers and for current producers who are interested in taking their farm in a new direction," said Marcy Ostrom of WSU’s statewide Small Farms Team. As part of the Cultivating Success Sustainable Small Farms education program, over 800 people have taken the course in several locations throughout Washington and Idaho. For more details about the Cultivating Success Program and other courses, contact Theresa Beaver at 360-379-5610 ext. 230.

Course topics include:
- Sustainability Concepts
- Whole Farm Planning
- Resource Evaluation
- Direct Marketing
- Enterprise Assessment
- Sustainable Crop Production
- Ecological Soils Management
- Integrated Pest & Weed Management
- Sustainable Livestock & Poultry
- Grazing Mgmt. on Small Acreages
- Equipment & Facilities
- Enterprise Budgets
- Tools for Whole Farm Success

The cost of the 12-14 week course ranges from $125 - $200. Scholarships, college credit, and/or continuing education units will be available.

Funding for Cultivating Success is made possible by The USDA Risk Management Agency, USDA SARE, and USDA Higher Education Challenge Grants.

To sign up, contact:

**Washington**

- Mason County, Kirsten Workman (360) 427-9670
- Kitsap County, Arno Bergstrom 360-337-7225
- Jefferson County, Theresa Beaver (360) 379-5610 ext. 230
- King/Pierce County, Todd Murray (206) 205-3121
- Franklin County, Vicki Contini 509-545-3511
- Whatcom County, Colleen Burrows
- Snohomish County, Mike Hackett (425) 357-6017
- Skagit County, Don McMahan 360-428-4270

**Idaho**

- Latah County, Cinda Williams (208) 885-7499
- Bannock County, Paula Jones (208) 237-4628

**Master Dairy Goat Farmer Program**

This program runs October 27 – 29 at the WSU Puyallup Research & Extension Center (7612 Pioneer Way E., Puyallup, WA). Learn about nutrition, management and marketing of milk, herd management, genetics, reproduction, business techniques, and the management and marketing of meat.

A $30.00 fee covers speakers and participant notebooks. Please make checks payable to WSU-SFA. For an application and information, contact Gary Fredricks at 360-397-6060 x7714. Applications are due by October 19, 2006. Please return your application to Gary Fredricks, Building C, Suite 100, 11104 NE 149th Street, Brush Prairie, WA 98606. If you have any questions, contact Gary.

**WSU Announces the First LAMB 300 Short Course for All Sheep Producers**

Sarah M. Smith, Animal Sciences Faculty, WSU Grant-Adams Extension

Washington State University Extension and Animal Science Departments, in cooperation with the Washington State Sheep Producers Association (WSSP), announce the first WSU LAMB 300 short course October 5-7, 2006, at the WSU Animal Science Department on the Pullman Campus.

WSU LAMB 300 will be a three-day hands-on workshop designed for progressive individuals involved with the sheep industry. The course will focus on teaching producers (regardless of the size or type of operation) how to produce and market quality lamb and lamb products. Participants will learn how environmental, nutritional, genetic, and managerial factors contribute to meat quality. Participants will also learn how meat quality factors influence the price.

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producers receive for lamb and lamb products marketed through various outlets. This program will increase one’s understanding of lamb meat quality and marketing, enabling participants to make informed decisions to improve profitability, competitiveness and wholesomeness of the food products they are producing. The course will feature nationally recognized speakers in the area of lamb production and marketing.

The registration fee of $150 per participant covers all meals, materials, and parking arrangements. Hotel accommodations will be the responsibility of the participants. Registration will be available on a first-pay, first-serve basis and limited to 32 participants. Registration forms must be received by September 8, 2006.

For additional information, contact Jan Busboom at 509-335-2880 or Sarah M. Smith at 509-754-2011 x 413.

Tidbits

Warming Climate Plays Large Role in Western U.S. Wildfires, Scripps-led Study Shows

A new study led by scientists at Scripps Institution of Oceanography at the University of California, San Diego, implicates rising seasonal temperatures and the earlier spring conditions with a dramatic increase of large wildfires in the western United States.

The most systematic analysis to date of recent changes in forest fire activity compiled a database of large western wildfires since 1970 and compared it with climate and land-surface data from the region. The results show that large wildfire activity increased “suddenly and dramatically” in the 1980s with longer wildfire seasons and an increased number and more potent wildfires.

Parkinson’s Disease Risk Linked with Pesticide Exposure

ATTRA. A study published in the July issue of Annals of Neurology evidences a link between pesticide exposure and Parkinson’s disease, reports Scientific American. The study, which included 143,000 men and women, found that those exposed to pesticides were 70 percent more likely to develop Parkinson’s than those who were not exposed. The pesticide exposures were not necessarily occupational; low-dose pesticide exposure such as from home and garden use significantly increased risk. Lead study author Alberto Ascherio of the Harvard School for Public Health commented, "I think this is one reason to be careful about using pesticides in general."

Study Shows Potential Economic Payoffs Tied to Healthy Eating

Leopold Center. Answering the question, “Does five-a-day pay?” could mean a lot more to Iowans than eating five servings of fruit and vegetables every day. It could mean an additional $302 million in sales and more than 4,000 jobs added to the Iowa economy if just 25 percent of the extra fruit and vegetables are Iowa grown.

Churches Supporting Farmers

Five churches in Corvallis, OR selling “That’s My Farmer” coupons to encourage more sales for local farmers markets. For details about this “Congregational Supported Agriculture,” see the weblog by Cathleen Hockman-Wert, author of Simply in Season.

Promoting Good Health by Bringing Farms to the Workplace

AFT. Dr. Preston Maring of Kaiser Permanente Medical Center in Oakland, California, has launched a movement to promote healthy eating by connecting Kaiser Permanente employees and patients with farmers who sell locally grown produce. Maring started one of the nation’s first hospital-based farmers’ markets in 2003, inspiring more than 25 markets in Hawaii, Georgia, Colorado, California and Oregon at Kaiser Permanente hospitals.

Sustainability and Local Foods - Conversations from the Field

ATTRA. Josh Slotnick, a community farm director and sustainable agriculture educator at the University of Montana, discusses the importance of local foods and sustainable agriculture in this interview.

Western Montana Growers Develop ‘Homegrown’ Label

ATTRA. A group of 12 organic farmers in Western Montana developed a “Homegrown” label to certify that food is locally and sustainably raised, according to an article on the New West. Western Montana Sustainable Growers Union members sign a pledge to use sustainable practices and to market their products within a 150-mile radius. The label is designed to foster a closer relationship between growers and their customers within the local community, in place of the impersonal third-party certification of the National Organic Program.

Ontario Organic Cooperative Markets to Farmers Markets

This article looks at the Quinte Organic Farmers Cooperative’s first year efforts.

More Farm Family Income Coming from Off-Farm Sources

ATTRA. The U.S. Department of Agriculture’s Economic Research Service shows farm family incomes are keeping pace with non-farm households, but most of the income comes from off-farm sources. Economic Well-Being of Farm Households and Growing Farm Size and the Distribution of Farm Payments used 2003 income statistics. The first report revealed that off-farm sources provide 85 to 95 percent of income for farm households. The statistics also showed that large-scale farms, while they represent only seven percent of farm operations, are responsible for 70 percent of total farm sales.

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usage, best management practices, and present market conditions, as well as personal success stories, references, resources, and a unique disease list.

Managing Agricultural Landscapes for Environmental Quality Workshop

The Soil and Water Conservation Society has organized a workshop on environmental quality at the Westin Crown Center Hotel in Kansas City, Missouri from October 11-13, 2006. The primary objective is to bring together individuals in the technical and scientific communities who are working to quantify the environmental benefits of conservation practices on agricultural land at landscape and/or watershed scales.

Farmers Market Resource Guide

This guide, from the USDA Agricultural Marketing Service, lists grants, programs, and other financial and information resources available from public and private organizations. It also provides details about over 100 projects and grants available to help start or improve farmers markets.

National Agroforestry Center Updates Website

The USDA’s National Agroforestry Center just released an updated website. New features include and an image gallery dedicated to agroforestry in the United States and an NAC blog that covers agroforestry related news and issues. The online gallery provides high quality images in various resolutions for anyone interested in promoting agroforestry.

New Alternative Fruit Crops for Western Washington

Many of the alternative fruit crops presented in this bulletin were initially tested for suitability to the home grower. This bulletin will help answer questions about new crops that have the potential to be profitable.

New Organic Dairy Farming Book Available

Organic Dairy Farming: A Resource for Farmers provides an excellent resource for new and transitioning organic dairy farmers, as well as agricultural professionals.

Report Offers State-by-State Picture of Agriculture

ATTRA. A new report from the Center for Food Safety offers a state-by-state portrait of agriculture in the United States. A New View of U.S. Agriculture includes a list of the top five agricultural commodities for each state by percentage and value, the value of total organic sales in the state and the state’s organic sales ranking, and a description of any state legislation or regulations regarding genetically modified organisms.

White Paper on Organic Farming Research Leadership

An important new White Paper on organic farming research leadership has been written for the USDA Cooperative State Research, Education and Extension Service (CSREES) by the recent and current CSREES Interim Program Leaders for Organic Agriculture, Jim Kotcon and Dawn Thilmay. The paper is intended to help USDA-CSREES determine how best to meet the needs for organic research, education and Extension.
The paper first summarizes the growth in demand for organic products, the historical deficit of attention by USDA research agencies, and the specialized nature of organic research, education and Extension needs.

The paper also describes the way organic agriculture relates to the Strategic Goals of CSREES. The need for CSREES leadership in organic farming is further explored in relation to international competitiveness. With a brief overview of current USDA research agency activities, the paper offers a series of goals and action items for CSREES.

**The June Issue of the AgMRC Action**

This newsletter, published by the Agricultural Marketing Resource Center, targets producers, service providers and those interested in value-added agriculture.

**Book Offers Solutions for Future of Family Farming**

*The Next Agricultural Revolution: Revitalizing Family-Based Agriculture and Rural Communities* introduces the reader to the Washington State Farm Summit and its findings. The publication, edited by Dr. Kent Mullinix, contains personal testimonials from farmers across the state of Washington about the problems they face today and the viable solutions they see.

**The Omnivore’s Dilemma**

Michael Pollan’s new book shakes up America’s understanding of what and how we eat. Humans in the past have had to learn what foods are safe, but today the omnivore’s dilemma takes the form of choosing between the plethora of choices at the modern supermarket and fast food restaurants where we must worry which of those tasty-looking choices might harm us. And we now face the issue that our choices not only affect our health, but also affect natural environment we live in. This book explores these subtle dimensions of eating in America.

The Omnivore’s Dilemma looks at three food chains: industrialized food, alternative or “organic” food, and food people obtain by hunting, gathering, or gardening. *Look at No Bar Code*, an excerpt from Pollan’s book found in Mother Jones.

**Publication Considers Habitat in Agricultural Landscapes**

*ATTRA. Through The Biodiversity Partnership, the Defenders of Wildlife offers a review of literature on biodiversity status and trends on farmland. The publication, Habitat in Agricultural Landscapes: How Much Is Enough? (3MB) provides a synthesis of current understanding regarding conservation of fish and wildlife habitat and biodiversity in agricultural landscapes, and establishes a framework for setting conservation goals, policy, and future research priorities. See the executive summary for more details.*

**Report Shows Grazing Dairies Succeeding in Wisconsin**

*ATTRA. UW-Madison’s Center for Integrated Agricultural Systems (CIAS) and Program on Agricultural Technology Studies (PATS) compares production systems, technology, labor, performance, and satisfaction with quality of life on grazing dairy farms and more conventional dairy farms. Grazing in the Dairy State says farmers using managed grazing make more money per cow and have less enterprise debt than other dairy farmers. “In general, dairy farmers using managed grazing are a lot like other Wisconsin farmers in terms of age, farm background and experience. However, they earn similar household income with half the number of cows, have less debt and are more satisfied with their overall quality of life,” said report co-author Jennifer Taylor.*

**University of California Releases Study on Organic Beef Operation**

*ATTRA. In what may be the first study of its kind, the University of California has released results of an intensive examination of an organic beef production operation. Management practices, revenues, costs, and marketing were studied on a hypothetical 800-acre ranch in Mendicino and Lake Counties running 50 cow-calf pairs. The study by UC Davis investigates all aspects of a small-scale beef operation that has already transitioned to certified organic status.*

**New Energy Estimator for Nitrogen From the USDA**

*AFTA. This new tool helps farmers and ranchers identify cost savings through efficient nitrogen fertilizer. The energy estimator allows farmers and ranchers to estimate the cost of nitrogen product use on their fields. All of the cost estimates are based on management methods for the predominant crops within a particular state, and suggest using manure or compost instead of petroleum-based fertilizers, and management intensive grazing practices. Switching to any single one of these options could potentially save up to $55 per acre.*

**Online Journal Explores Medicinal Plants and Traditional Medicine**

*AFTA. The non-profit, Trees for Life, launched a scientific online journal focusing on scientific studies and traditional knowledge of medicinal and other beneficial plants. It is intended to bring together formal and informal medicinal plants and trees, and also the herbal remedies that accompany these. The journal features international articles, small-scale field studies, and scientific evidence portraying natural remedies and potential benefits.*
Report Identifies Best Labor Practices for Sustainable Agriculture

ATTRA. As a means of promoting improved labor practices on sustainable farms, the California Institute for Rural Studies, with support from the Columbia Foundation, conducted case study research on 12 California farms with a reputation for positive workplace conditions. The findings reveal a broad range of positive workplace practices, which have resulted in a more satisfied and motivated workforce, and numerous benefits for growers, including increased retention, reduced training and supervision costs and increased revenues. The research also identifies the workplace conditions that farmworkers most value, including many that are no- or low-cost, yet greatly contribute to farmworker satisfaction and motivation.

No endorsement is intended of any businesses listed in this publication, nor is criticism of unnamed businesses implied.

Submitting articles: Submit articles electronically to Doug Stienbarger in MS Word or RTF formats. Photos and graphics are encouraged. Submit photos, graphics, and the original tables separately.

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