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In This Issue

Articles

The Potential of Marigolds to Control Insect Pests and Plant Parasitic Nematodes...1

Sticky Droppings: A Problem in Poultry Due to Feed...4

Implementing Mustard Green Manure Crops on the Fort Hall Indian Reservation...4

Micro Plastic Pollution in Puget Sounds and Northwest Straits...5

Classes...8

Announcements...9

Tidbits...9

Tidbits...10

Tidbits...11

Resources...11

Resources...12

Locate Local Farm Products

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The Potential of Marigolds to Control Insect Pests and Plant Parasitic Nematodes

Ekaterini Riga, Washington State University, IAREC, Prosser, WA

Marigolds belong to the family Asteraceae (Compositae), genus *Tagetes*. Their natural range extends from the southwestern United States into Argentina, with the greatest diversity being in south-central México (Trostle, 1968). Approximately 50 species are known, but the three most extensively used are *T. erecta*, known as African marigold, *T. patula* known as French marigold, and *T. tenuifolia* known as signet marigold (Underwood, 1971; Beck and Binetti, 2000).

Background

Marigolds have several compounds in their tissue which have biological activity against a range of organisms (Vasudevan et al., 1997; etkovi et al., 2004). One such compound, thiophene, demonstrates antiviral, antibacterial, antifungal, nematocidal, and insecticidal properties (Riga et al., 2005; Marles et al., 1992; Margl et al., 2001). The thiophene concentration in the marigold plants varies according to the marigold species, the stage of the plant development, and the vegetative organ (Jacobs et al., 1994; Margl et al., 2001; Gil et al., 2002). For example, Jacob et al. (1994) reported higher thiophene concentrations in *T. patula* than in *T. erecta*. In addition, marigold roots contain the highest diversity and contents of thiophenes (Tosi et al., 1991) and their concentration levels increase as the plant gets older, reaching a maximum during the reproductive stages (Gil et al., 2002).

Marigolds have the potential to control a range of plant pests including insects and plant parasitic nematodes. Marigolds can be used safely by home gardeners and growers wishing to avoid the use of synthetic pesticides, which can be especially important if

the growers live on the farm or farm close to communities. Furthermore, several insects are developing resistance against some insecticides and some nematocides are being removed from the market. These issues have led scientists to search



Marigolds in greenhouse.

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WSU Small Farms Team

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.

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for alternative management strategies. The following are a few examples of findings where marigolds have been used successfully against economically important insects and plant parasitic nematodes.

Insect Control Studies

In 1978, Morallo-Rejesus and Eroles isolated two pesticidal compounds from the roots of *T. patula* and *T. erecta*. Compounds from *T. patula* were more toxic against the house fly, *Musca domestica*, and the diamond back moth, *Plutella xylostella*, than compounds from *T. erecta*, however compounds from *T. erecta* provided better control against the rice green leafhopper, *Nephotettix* spp. Arnason et al. (1989) reported that compounds isolated from *Tagetes* species were more toxic than DDT against the mosquito, *Aedes aegypti*. Dosdall et al. (1991) reported that marigold compounds were effective in reducing larval populations of black flies, *Simulium* spp., in streams. In Washington, Catalina Leger and Ekaterini Riga have investigated the efficacy of marigolds against insects, while Ekaterini has done further work in Canada on using marigolds to control plant parasitic nematodes (Leger and Riga, 2009; Riga et al., 2005).

Control of Cabbage Maggot

The cabbage maggot, *Delia radicum*, is a serious pest that attacks the roots of crucifer crops. Young cabbage plants may wilt, turn yellow, and even die due to maggots feeding on and tunneling in the roots. Yield losses can be as high as 50% in severely affected fields or gardens. Up to now, cabbage maggot control



Maggot damage.



Cabbages in greenhouse.

required synthetic insecticides. The marigold species selected by Catalina and Ekaterini for this research were *T. erecta* var. 'Crackerjack' mix and *T. patula* var. 'Gypsy Sunshine'. They were chosen due to high numbers of compounds present in their tissues, which makes them useful in phytochemical investigations. Marigold plants of both species were washed and separated as follows: aerial parts of non-flowering plants (ANF), roots of non-flowering plants (RNF), aerial parts of flowering plants (AF), and roots of flowering plants (RF). Thus, this experiment included 8 treatments: 2 marigold species (*T. erecta* var. 'Crackerjack' and *T. patula* var. 'Gypsy Sunshine') and 4 marigold tissues (ANF, RNF, AF, and RF). Each plant material was weighed and chopped in deionized water in a 1:2 weight ratio of vegetal material to water to make fresh tissue extracts (FTE). Each extract was then placed in a separate labeled opaque container and stored at 6°C for up to 3 hours until bioassays were performed. Each treatment extract was applied to 7-week old cabbage plants in a greenhouse pot study in a completely randomized design. Ten eggs of the cabbage maggot were added to the base of each cabbage plant. The eggs were 48 hours old at the time of application. Immediately following the egg application, 15 ml of each of the above extracts was applied on the soil surface of the potted cabbage plants. The rate of application of the fresh tissue extract was calculated as 1% of the volume of the soil contained in each pot.

Both marigold species were able to control the cabbage maggot's

Continued on next page

first instar. Up to 95% reduction of cabbage maggot pupae was achieved from fresh root extracts (RNF and RF) derived from both *Tagetes* species in comparison to the untreated controls. In addition, RF extracts of both species achieved 81% mortality for *T. erecta* and 100% mortality for *T. patula* against cabbage maggots' first instar larvae.

Control of Nematodes

Plant-parasitic nematodes are cosmopolitan parasites of many crops worldwide and can cause losses of 10-50% within a single crop year (Barker et al., 1998). For example, the sugar beet cyst nematode, *Heterodera schachtii*, occurs in many parts of the world, including Canada and the USA (Baldwin and Mundo-Ocampo, 1991). This nematode infects numerous cruciferous plants, including sugar beets. *H. schachtii* infections may damage up to 90% of sugar beet crops (Steele, 1984). Other examples of plant-parasitic nematodes are the root-knot nematode, *Meloidogyne hapla*, and the lesion nematode, *Pratylenchus penetrans*, both of which occur in temperate regions, cause varying degrees of economic loss, and infect a wide range of plants worldwide and in the Pacific Northwest (Loof, 1991; Ingham et al., 2005). Until recently, controlling these nematodes required synthetic nematicides, some of which are environmentally undesirable (Dunn and Noling, 1997). Thus, there is a need for novel plant-derived nematicides that are non-persistent, biodegradable, and non-toxic to non-target organisms. Marigolds have been known to produce nematicidal compounds (Kimpinski et al., 2000). Ekaterini Riga et al. (2005) used water extracts from seed exudates of *T. erecta* var. 'Crackerjack' and *T. patula* var. 'Polynema' against the above nematodes species. The marigold seed extracts caused significantly higher mortality to all of the studied nematode species as compared to the untreated controls.

Field and Garden Applications

Future research is needed to determine effective and affordable control methods using marigold plants or

marigold plant extracts in the Pacific Northwest to control a variety of insect pests such as the cabbage maggot fly and plant parasitic nematodes. Although the cost has not been estimated, marigold seed can be relatively expensive, especially if a whole field needs to be planted; the cost could be substantially lower for a home garden. Further work is needed to identify and isolate biologically active compounds in the marigolds and to develop new biologically derived nematicides which will consist of known concentration of marigold derived compounds, thus leading to consistent and effective control.

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Sticky Droppings: A Problem in Poultry Due to Feed

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'Sticky droppings' refers to the consistency of poultry droppings and are undesirable because they pose potential health risks to the birds, through respiratory stress from ammonia and potential increase of coccidiosis. Cereal grains are widely known to cause sticky droppings in poultry as well as limited nutrient uptake and growth retardation (Francesch and Brufau, 2004). Barley is generally unpopular as poultry feed because it contains high amounts of a non-starch polysaccharide (NSP) known as mixed-linked -glucan.

Mixed-linked-glucan and other NSPs form important components of endosperm cell walls and are ubiquitous among cereal grains and other seed crops. In barley, NSPs comprise 70% of endosperm walls. Poultry is largely unable to digest these NSPs. NSPs bind with water in the intestinal track, thus increasing the viscosity of the fluid within

the digestive system. The resulting glutinous consistency of droppings causes fecal matter to stick to the cloaca of the bird (also called pasting), which in turn causes dirty eggs and skin infections on chickens' feet. Sticky droppings also reduce the water retention in litter on which broilers are raised, resulting in increased disease incidence and reduced meat quality.

There are several enzyme poultry feed supplements available that enable poultry to break down the NSPs in feed (Peterson and Åman, 1989; McNab and Smithard, 1992). In addition, new barley varieties being developed have low mixed-linked-glucan content. However, the majority of current research efforts in barley breeding focus on maximizing -glucan content for human health benefits. Farmers should be aware of the -glucan content of the barley varieties they feed to poultry.

Sticky droppings should not be confused with normal "caecal" excretions which are the dark brown, glutinous contents of their caecal tubes. Healthy chickens will pass caecal excretions twice a day (Ross Tech, 2006) in addition to the regular brown droppings that have a characteristic white cap of uric acid which they pass 12-16 times each day. When chickens pass only sticky droppings, growers should be aware that there is likely a dietary problem.

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Implementing Mustard Green Manure Crops on the Fort Hall Indian Reservation **Jennifer Miller, Ph.D.,** **Sustainable Agriculture Program** **Coordinator, Northwest** **Coalition for Alternatives to** **Pesticides**

When pesticides drifted onto tribal members during a sacred ceremony in 1998 and nitrates and pesticides were discovered in their well water, members of the Shoshone and Bannock Tribes launched an effort to reduce fertilizer and pesticide use in their agricultural practices on the Fort Hall Indian Reservation.



Project logo, designed by Sara Irwin, a tribal member, to represent the dawning of a bright, new agricultural future on the Reservation.

The reservation and surrounding counties in eastern Idaho comprise one of the largest potato-growing areas in the country. Some Tribal members are active in ranching, while most of the land is leased to neighboring non-tribal members for the production of irrigated row crops.

As a result of a three-year project with the University of Idaho, the Natural Resources Conservation Service (NRCS), and Western Ag Research, the Tribes established a maximum allowable nitrogen fertilizer level that could be used on the Reservation. With the new standard, growers were able to make significant changes using new irrigation equipment and

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by planting potato varieties requiring less nitrogen.



The Shoshone Bannock Tribes' Water Resource Commissioners and NCAP's program coordinator in a field of mustard green manure during an October 2006 field day.

Next, the Tribes invited Three Rivers Resource Conservation & Development Council and the Northwest Coalition for Alternatives to Pesticides (NCAP) to work on a project to reduce pesticide use. The team first explored the option of lengthening the routine two-year rotation to include a season-long green manure, but determined this was not economically feasible for potato growers on the Reservation. Instead, a cooperating grower developed a demonstration field in 2002 and 2003 where a fall mustard green manure crop was used as an alternative to fumigant use.



Fred Brossy describes his soil building practices during a September 2008 organic potato field day at his farm near Shoshone, Idaho.

The demonstration field focused on the management and economics of using a mustard green manure crop as well as sharing that information with other growers on the Reservation. The project relied upon the research and

materials developed by Washington State University Extension educator, Andy McGuire.

Mustard green manure crops are often planted after wheat harvest, in a potato-wheat rotation. Growers plant by drilling, broadcasting with dry fertilizer, or aerial seeding into standing wheat. For fall incorporation, the crop is disked under before the first hard frost. For Brassica crops, chopping is used to break open plant cells, releasing cell contents to produce biologically active glucosinolates. The plant material is then quickly incorporated into the soil.

In two subsequent years, the project offered a free mustard cover crop seed incentive program to help interested farmers implement the practice. NCAP also partnered with the Potato Growers of Idaho and the University of Idaho to help Idaho NRCS offer farm bill funds through EQIP to help farmers try green manure crops for



Organic potato farmer, Kris Taylor, inspects his organic potato crop near Idaho Falls along with Jeff Bragg, product development manager of Potandon Produce (Green Giant).

pest control. Idaho NRCS now offers EQIP funds for the practice (\$50 per acre for up to 160 acres each year for up to three years), resulting in 25 contracts encompassing 3,900 acres planted across southern Idaho in 2006.

As a result of this project, farmers planted 3,575 acres of mustard cover crop on the Reservation in 2006. Seed salesmen estimated a total of 30,000 acres were planted to mustard cover crops in 2006 across southern Idaho.



Micro Plastic Pollution in Puget Sound and Northwest Straits

Jen Kingfisher, Port Townsend Marine Science Center, **Cinamon Moffett†**, **Chrissy McLean**, **Anne Murphy**, **Jean Walat**, University of Maine

For the last several years, the Port Townsend Marine Science Center has been leading research and education programs focusing on marine plastic pollution in the Puget Sound.

Marine plastic pollution poses a growing problem. The United States alone manufactures more than 115 billion pounds of plastic annually (Casey, 2007). Each American sends an estimated 63 pounds of plastic into landfills each year (Algalita, 2008). Less than 4% of manufactured plastic gets recycled (Werthmann, 2007) and 25% of all manufactured plastic goes unaccounted for in the waste stream (Algalita, 2008). Plastic polymers do not biodegrade, but instead breakdown into smaller fragments. These tiny fragments remain synthetic molecules, and accumulate in many ecosystems throughout the world. The immediate benefits of plastic products are many, but the long term impacts of plastic debris can no longer be ignored.

Most plastic enters the marine ecosystem from land, while marine vessels dump about 20%. In the marine environment, plastics end up on the ocean floor, floating in the open ocean, or deposited on beaches. Certain plastics, such as PVC, drop to the bottom and interrupt the feeding and oxygen exchange of bottom-dwelling benthic organisms. Other plastics, such as polyethylene, float. They are carried by the prevailing ocean currents into open water and concentrate in large gyres, ring like systems of ocean currents, or are deposited in the intertidal beach zone. Each one of these plastic

Continued on next page

collections potentially impacts specific ecosystems.

Plastic debris is more than an aesthetic problem; it also poses a danger to marine organisms through entanglement and ingestion (Ryan, 1987; Casey, 2007). Turtles, whales, fish, and diving birds are just a few species vulnerable to entanglement and are often trapped and killed by floating marine debris. In addition, many species of marine organisms accumulate large numbers of plastic particles in their stomachs. It is thought that they ingest plastic particles not only accidentally, but also selectively by mistaking them for food (Ryan, 1987; Thompson 2008). Plastic consumption by marine animals can lead to starvation. In addition, plastic adsorbs hydrophobic pollutants such as polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT) (Takada, 2003). Studies indicate plastic resin pellets act as a pollutant accumulator capable of transferring hydrophobic pollutants to organisms (Mato et al., 2001). If chemical-laden pieces of plastic enter the food chain at a low trophic level, these chemicals can bioaccumulate and biomagnify up the food chain, eventually making its way into human populations (McKee, 2004).

Much of the research done on marine plastic pollution and its effects take place in the North Pacific Ocean. Little is known about the extent and effects of plastic pollution in the Puget Sound and the Northwest Straits of Washington State. The Port Townsend Marine Science Center has taken the lead in establishing and conducting a citizen science based research program with two components: examining boli (pellets) collected from Glaucous-Winged Gulls nesting in Protection Island National Wildlife Refuge for the presence of plastic,



Bolus.

and sampling beach sediment for the presence of micro plastic from sandy beaches around the Puget Sound and Northwest straits .

Protection Island Glaucous Winged Gull Study

Numerous species of marine birds regularly ingest plastic from the marine environment (Vlietstra & Parga, 2002). Ingesting plastic likely limits foraging behavior, causing birds to consume less food and grow slower than plastic-free birds (Ryan, 1988).

Research shows that Glaucous-winged Gulls (*Larus glaucescens*) are carnivorous opportunists; they feed along the coast, scavenging for dead or weak animals, forage fish, invertebrates, and scraps, as well as other gull eggs (Trapp, 1979; Schmutz, 1998). Scavenging feeding behavior often correlates with plastic ingestion in seabirds although there has been no previous record of plastic ingestion in Glaucous Winged Gulls.

Seabird diet studies have relied upon examination of boluses, food remains, and stomachs. Pellets, or boli, of regurgitated non-consumable food items alone have been shown to accurately represent gull diets (Schmutz & Hobson, 1998). Gulls regurgitate ingested plastic along with other non-digestible items in the boli (Ryan, 1988). Many studies have focused on the ingestion of small debris by birds because the boli can be collected by researchers without causing harm to the animal (Moore, 2001).

Methods

PTMSC staff and volunteers collected and dissected 212 Glaucous-Winged Gull boli (boluses) in 2007 from Protection Island National Wildlife Refuge to determine if gulls are ingesting plastic. Located in the Strait of Juan de Fuca at the mouth of Discovery Bay between Port Townsend and Sequim, WA, Protection Island is home to the largest nesting colony of Glaucous-Winged Gulls. Managed by the US Fish and Wildlife Service, the island is closed to the public.

Boli were collected during the breeding season when gulls tend to forage near their nest, after the eggs were laid but not hatched, in order to decrease impact on the colony. All intact boli within the sample plots were collected.

Boli were desiccated prior to dissection using a food-grade dehydrator. Each bolus was weighed prior to desiccation and approximately every two days thereafter. Once the weight of a particular bolus stabilized to 0.01 grams of its previously recorded weight, it was considered desiccated, and its dry weight was recorded. Each individual component (Table 1) was then weighed. The percent of each component is calculated for the whole pellet and of total pellets collected.

Table 1: Bolus Component Categories

Mollusk Shells	Wood
Snail	Vegetation
Mussel	Feather
Clam	Plastics
Arthropod Shells	Pellets
Crab	Film
Barnacle	Filament
Fish (Bones)	Fragment
Other Bones	Foam
Insect	Cigarette Part
Egg Shell	Inorganic Other
Egg Membrane	

As part of their public outreach program, trained volunteers at the Port Townsend Marine Science Center assist in the dissections of the boli, often during open exhibit hours to encourage public inquiry.

Results

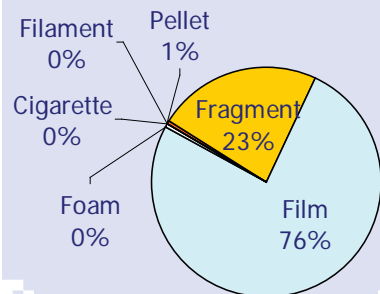
Of the 212 boli, 14% contained plastic (Table 2). The percentage of plastic in any particular bolus varied considerably, from less than 1% to 98% by weight, while the mean

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Table 2: Boli Characteristics

Average weight of boli	2.29 (g)
Average percent of plastic in plastic-containing boli, by weight	13%
Percent of boli containing plastic	14%

Figure 1. Frequency of Plastic Categories in the 2007 Boli



plastic.

Beach Sediment Sampling

PTMSC staff and volunteers, along with volunteers from partnering community groups including WSU Beach Watchers, Beach Naturalists, and Shore Stewards, are biannually sampling beach sediments from sandy beaches around Puget Sound and the Northwest Straits. At each beach, three 7.5 liter samples of sediment are collected, sieved to create two size classes, and then sorted for marine debris. The debris is further sorted by type, counted, and weighed.



Collecting beach sediment sample.

Methods

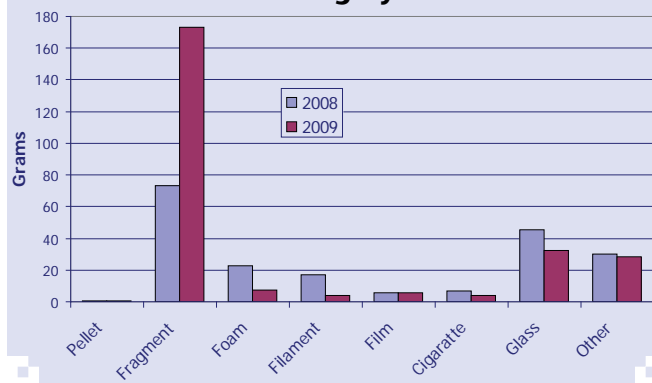
We chose sandy beaches in seven Puget Sound/Northwest Straits counties based primarily on ease of access. Each beach was sampled twice, once during the week of October 20th, 2008, and again during the week of March 23rd, 2009. We will continue sampling through Spring 2010.

At each beach, 7.5 liters of beach substrate is collected from three one meter squared areas in the highest wrack line, the highest line of deposited debris. The substrate is placed through a series of two sieves, thus separating the material into 'large' (5-20 mm) and 'small' (1-5 mm) size classes. Natural material is discarded while the man-made material is sorted into eight debris categories, counted, and weighed.

Results

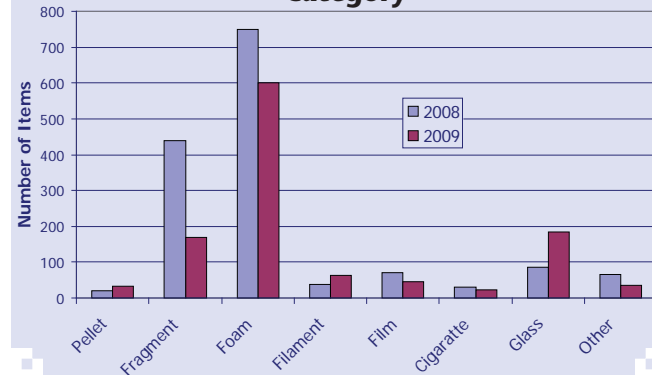
While amounts varied during the Fall 2008 sampling, plastic was found in all 15 beaches samples. All but one beach sampled in Spring 2009 had plastic in the sample. While the total weight of the material collected were remarkably similar, 253.4 grams in Fall 2008 and 253.7 grams in Spring 2009, the make up of the plastic components differed (Figure 2). Notably, when looking at debris by count, more than twice as many pieces were found in 2008 (2540 pieces) than in 2009 (1156) (Figure 3). This difference can be explained by the number of small glass pieces found

Figure 2: Weight of Debris Collected in Each Category



(over 1,000) at one particular beach in 2007; this beach was excluded from the spring sampling in 2009. Also noticeable when looking at plastic items by count is that while pieces of foam make up a small portion of debris by weight (about 6%) they represent nearly half of the collected pieces by count.

Figure 3: Number of Items Collected in Each Category



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Discussion and Future Plans

We are currently analyzing our beach sampling data for geo-coastal factors that may affect plastic accumulation in the Sound and Straits. We will monitor beaches through Spring 2010, convene a summit of all beach samplers, and determine future plans, ideally turning this into a long-term monitoring program.

We are processing boli from 2008 and have collected boli in 2009 and are planning to collect boli in 2010. This time span will enable us to see how plastic consumption changes with availability of food during El Nino (2007), La Nina (2008), and a predicted normal weather year in 2009.

During the fall 2009, we plan to begin surface water sampling for micro plastic debris in waters adjacent to Port Townsend, with the intention of expanding surface sampling Puget Sound wide.

This project sets the stage for further research on the impact of plastic on Puget Sound and Straits, and its effects on resident organisms, especially Glaucous-winged Gulls. Importantly, these studies provide concrete evidence of the plastic waste accumulation in our marine ecosystem. This evidence can help support plastic policy changes.

Acknowledgements

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Classes

Bamboo - Green & Sustainable

The American Bamboo Society is hosting a conference [Bamboo - Green & Sustainable](#) in Tacoma Oct 1-4.



Clackamas Community College Workshops & Short Courses

Classes are for individuals desiring information to improve job skills, for completion of Certificate and Associate Degree programs, community education, and personal interest.

Visit the [Clackamas Community College Horticulture website](#) for a [description of courses](#) offered and schedules.

Continued on next page

Announcements

WSU Faculty Receive USDA-CSREES Integrated Organic Program Funding

WSU faculty have been successful recently in receiving funding from the Integrated Organic Program at USDA-CSREES.

Craig Cogger, WSU soil scientist at Puyallup, led a proposal that will allow continuation of the field research at Puyallup that started in 2003. The research is looking at various crop rotations, focused on fresh-market vegetables, and the integration of cover crops for fertility and weed control, along with impacts on the soil. An economic component is included. These trials are featured each year at a field day.

Project title: Designing production strategies for stewardship and profits on fresh-market organic farms

Investigators: Cogger, C.G., M. Ostrom, R. Alldredge, A. Fortuna, A. Kennedy, and K. Painter.

Funding: USDA Integrated Organic Agriculture program. \$644,232.

Project period 2008-2012.

Pat Fuerst led the proposal for continuation of the field trials on organic wheat at the Boyd Farm in Pullman. Organic wheat production is still very low in the state despite continued strong demand in the marketplace.

Project title: Sustainable Dryland Organic Farming Systems in the Pacific Northwest

Investigators: Patrick Fuerst, Richard Koenig, Ian Burke, Kathleen Painter (U. Idaho), Diana Roberts, David Huggins, Ann-Marie Fortuna, Stephen Machado (OSU), Byung-Kee Baik, Jessica Goldberger, and Jodi Johnson-Maynard (U. Idaho).

Key personnel: Dennis Pittman (WSU research technician), Julia Piaskowski (WSU graduate student) and Cindy Kinder (U. Idaho Extension Educator).

Dr. Kevin Murphy and colleagues put in a proposal for organic hop production that was funded.

Project title: Plant breeding and agronomic research for organic hop production systems

Project Director: Dr. Kevin Murphy, Small Grains and Specialty Crops Breeder, Dept. of Crop and Soil Sciences, WSU, Mt Vernon, WA.

Co-PD's: Dr. Lori Hoagland, Soil Scientist, Dept. of Crop and Soil Sciences, WSU; Dr. Heather Darby, Extension and Adjunct Faculty, University of Vermont; Dr. Ron Godin, Research Scientist, Organic/Sustainable Agriculture, Colorado State University; Dr. Scot Hulbert, Professor and Cook Endowed Chair of Cropping Systems Pathology, WSU; Dr. Rob Sirrine, County Extension Director, Michigan State University Extension – Leelanau County; Dr. Stephen Jones, Professor and Scientist of Plant Breeding and Genetics, WSU.

Funding amount: \$410,000

Project Dates: Fall 2009-Fall 2012

Farm Succession Planning Program Wins National Award

The [Western Center for Risk Management Education](#) funded Farm Succession Planning program (Diana Roberts, WSU, is PI) won the [National Association of County Agriculture Agents' Search for Excellence in Farm and Ranch Financial Management Education](#) programming award. Team members included: Diana Roberts (PI), Margaret Viebrock, Extension County Director, Douglas County, Aaron Esser, County Director, Adams County Extension, John Fouts, Extension Educator, Walla Walla County Extension, Susan Kerr, County Director, Klickitat County Extension, and Oregon State members

Brian Tuck, Randy Mills, and Mary Corp.

US Peace Corps – Agricultural and Environmental Skills in High Demand

Our [agriculture](#) and [environment](#) programs are growing rapidly. Extension organization staff possess the crucial technical skills required to participate in these high-demand Peace Corps programs. Applying to be a Peace Corps volunteer is the first step toward working abroad with local communities to design and implement projects such as the following:

Forest & natural resource conservation

Organic gardening & nutrition education

Environmental education

Agri-business education

Sustainable agriculture promotion

Livestock management



Grad School or the Peace Corps... Why Not Both? Volunteers can earn a master's degree during or after Peace Corps service through one of our [graduate school programs](#).

Tidbits

NCAT Releases Two Livestock Project Reports

ATTRA. NCAT has released reports on two recently completed livestock projects. *Building a Montana Organic Livestock Industry* was a study of the cost of production of and marketing possibilities for certified organic and grass-finished beef. The report is based on data from Montana certified organic and grass-finished beef producers who are members of the Montana Organic Producers Cooperative. The second report, *Natural Livestock Feasibility Study: Eastern Sierra, California*,
Continued on next page

was a study for the development of a regional alternative livestock market in the eastern Sierras of California. The study includes a survey of livestock producers and livestock product retailers. Also included is discussion of mobile and stationary meat processing development. For more information on these projects, or to obtain a copy of the reports, contact [Jeff Schahczenski](#) or call the ATTRA line at 1-800-346-9140.

Bee Losses Reported in New Survey

ATTRA. Honey bee colony losses nationwide were approximately 29 percent from all causes from September 2008 to April 2009, according to [a survey](#) conducted by the Apiary Inspectors of America (AIA) and the U.S. Department of Agriculture. About 26 percent of apiaries surveyed reported that some of their colonies died of colony collapse disorder (CCD), down from 36 percent of apiaries in 2007-2008. The survey checked on about 20 percent of the country's 2.3 million colonies.

Forest Carbon Storage Dilemma

Reported in the [Seattle Times](#), two government-funded studies show Pacific Northwest forests possess a large potential to store more carbon to combat global warming, but not if they are heavily thinned to prevent wildfire.

Articles mentioned include: [Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems](#), and [Carbon dynamics of Oregon and Northern California forests and potential land-based carbon storage](#).

Soils Evaluated for Ability to Hold Carbon

eXtension. A team of Experiment Station scientists from Clemson University and Virginia Tech [analyzed](#) the 12 major soil groups in the continental United States, ranking them for their potential ability to form new soil inorganic carbon based on average annual atmospheric wet deposition of calcium, or the amount

of ionic calcium present in rainfall. The results were first presented at the Soil Science Society of America Annual Meeting in November 2007 in New Orleans and recently have been published in the May-June 2009 issue of the [Soil Science Society of America Journal](#).

Direct Marketing Booming

eXtension. A [new report](#) by the U.S. Department of Agriculture's Agricultural Marketing Service (AMS) shows direct-to-consumer farm marketing in the United States is growing faster than total agricultural sales—the two categories increased 104.7 percent and 47.6 percent, respectively, from 1997 to 2007.



AMS's Marketing Services Division developed *Facts on Direct-To-Consumer Food Marketing* to examine the contribution that direct-to-consumer marketing is making to the food system in different regions of the country. The report compares data from the 2007 Census of Agriculture with those from previous years. The Census, which is updated every five years by the Department's National Agricultural Statistics Service, looks at crop production, farm size by sales and acreage, and marketing outlets, among other factors, giving a snapshot of U.S. agricultural production.

The AMS fact sheet focuses on farm sales made directly to consumers in

marketing outlets such as farm stands, farmers markets and community-supported agriculture, and highlights the growing importance of direct marketing to U.S. farmers nationwide, and in specific regions and states.

Medical Association Supports Sustainable Food Systems

The American Medical Association (AMA) has approved a [new policy](#) that supports a healthy and sustainable food chain within healthcare systems at a recent AMA meeting in Chicago. AMA also plans to work with healthcare and public health organizations to educate their community and the public about the importance of healthy and ecologically sustainable food systems. The AMA's new Sustainable Food policy builds on a report from its Council on Science and Public Health, which indicates that locally produced and organic foods "reduce the use of fuel, decrease the need for packaging and resultant waste disposal, preserve farmland [and] the related reduced fuel emissions contribute to cleaner air and in turn, lower the incidence of asthma attacks and other respiratory problems."

Report Shows Small Slaughterhouses in Decline

[FoodWaterWatch](#). A new report issued by Food & Water Watch examines how the slow demise of local small slaughter and processing operations in the United States is preventing farmers and ranchers from fully satisfying rising consumer demand for meat from sustainably raised livestock. Entitled [Where's the Local Beef?](#), the report identifies the reasons for the disappearance of small plants, presents examples of the next generation of processors and offers policy solutions to rebuild the small slaughterhouse sector of the meat industry.

Report Discusses Food Deserts

USDA. The USDA Economic Research Service has released [Access to Affordable and Nutritious Food—Measuring and Understanding Food Deserts and Their Consequences](#):

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[Report to Congress](#). This report fills a request for a study of food deserts—areas with limited access to affordable and nutritious food—from the Food, Conservation, and Energy Act of 2008. The report summarizes findings of a national assessment of the extent and characteristics of food deserts, analysis of the consequences of food deserts, lessons learned from related Federal programs, and a discussion of policy options for alleviating the effects of food deserts.

Study Results Discuss Barriers to Farmers' Market WIC Program

ATTRA. The Community Food Security Coalition's new report, [State Implementation of the New WIC Produce Package: Opportunities and Barriers for WIC Clients to Use Their Benefits at Farmers' Markets](#) (PDF/3.42MB), provides an overview of the current status of the new WIC Package Rule [at 7 CFR 246.12(v)] and the issue of states authorizing farmers as vendors for the new cash value vouchers for fruits and vegetables. The report includes an overview of survey data, barriers, and case examples collected from 36 states regarding their decision to authorize or not to authorize farmers as vendors for the new cash value fruit and vegetable vouchers. It also includes policy recommendations.

Resources

Washington Ag News

The Office of Farmland Preservation presents a 'News and Views' feature, a collection of news features, articles, and editorials on the subject of agriculture from media outlets around the state. The information and opinions contained in the articles are those of their respective authors, and are not necessarily those of the Office of Farmland Preservation or the Washington State Conservation Commission.

Farmer-to-Consumer Marketing Publication Series

Successful direct farm marketing businesses require knowing and understanding effective marketing

and management practices. This series of Extension publications provides information about establishing and developing a direct farm marketing business. The publications discuss production and marketing costs, management practices, personnel management, and financial management, among other topics.

PNW 201-E, [Farmer-to-Consumer Marketing #1: An Overview](#) by Larry Burt, Blair Wolfley. Revised June 2009, 11 pages.

PNW 202-E, [Farmer-to-Consumer Marketing #2: Production and Marketing Costs](#) by Larry Burt and Blair Wolfley. Revised June 2009, 7 pages.

PNW 203-E, [Farmer-to-Consumer Marketing #3: Merchandising, Pricing, and Promotional Strategies](#) by Larry Burt and Blair Wolfley. Revised June 2009, 12 pages.

PNW 204-E, [Farmer-to-Consumer Marketing #4: Place of Business and Product Quality](#) by Larry Burt and Blair Wolfley. Revised June 2009, 9 pages.

PNW 205-E, [Farmer-to-Consumer Marketing #5: Personnel Management](#) by Larry Burt and Blair Wolfley. Revised June 2009, 6 pages.

PNW 206-E, [Farmer-to-Consumer Marketing #6: Financial Management](#) by Larry Burt and Blair Wolfley. Revised June 2009, 9 pages.

PNW 241-E, [Marketing Alternatives for Fresh Produce](#) by Larry Burt, Curt Moulton, and Jim Kropf. Revised February 2008, 36 pages.

Publication Offers Information on Grass-fed Beef

ATTRA. Farmers use a variety of systems to raise healthy animals. Today, most meat in the grocery store or at the local restaurant comes from animals raised in a feedlot and fed significant amounts of grain in addition to hay and pasture. Grass-fed meat is from animals that are put "out on grass," or fed a forage diet. This allows animals to harvest their own food and dispose of their own manure

in the pasture. A [consumer's guide](#) to grass-fed beef provides information about the health and environmental benefits of grass-fed beef and how to buy and cook this beef.

Oregon State University Small Farm News

Check out the [latest edition](#):

Small Farms Program Faces Cuts
Farm Profile: Windflower Farm
Oregon Food Bank Seeks New Partnerships with Small Farm Operators
Liming Coastal Pastures
Seed Saving Basics
Selected Seasonal Livestock Health Concerns
Can You Identify Fatal Hazards on Your Farm or Ranch
Calendar



Small Farm Marketing Opportunities Discussed in New Report

[USDA-ARS](#). The U. S. Department of Agriculture's (USDA) Agricultural Marketing Service (AMS) released Proceedings of a Special Session from the 2008 USDA Partners Meeting: Emerging Market Opportunities for Small-Scale Producers. The report describes ways for small farms to

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establish more lucrative and stable markets by selling their crops directly to supermarkets, institutional foodservice establishments, and specialty distributors.

Growing Groceries Web Site

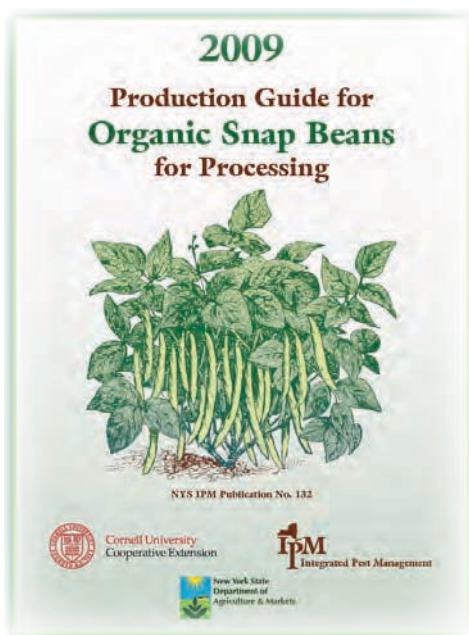
Started by WSU Master Gardeners in Snohomish County, this site lists [Puget Sound area gardens](#) by city, along with links to information about each one including the classes taught there.

Organic Pricing Data Now Available

ATTRA. The Economic Research Service released [a data set](#) that provides farmgate and wholesale prices for certain organic and conventional fruits and vegetables, wholesale prices of organic and conventional eggs and broilers, and f.o.b. and spot prices for organic grain and feedstuffs.

Cornell Releases Organic Vegetable Publications

ATTRA. Cornell University has published four new guides about producing organic vegetables for processing. The new guides cover [carrots](#), (1.2 Mb) [peas](#), (1.4 Mb) [snap beans](#) (1.3 Mb), and [squash/cucumber](#) (1.7 Mb).



Factsheet Tells How to Protect Organic Land from Chemical Sprays

ATTRA. A [new factsheet](#) from Midwest Organic & Sustainable Education Service (MOSES) covers ways to lessen the chance of contamination of organic land. The publications covers six ways to stay proactive and protect your land.

Selling at Farmers Markets

Growing for Market. Growing for Market created [this special report](#) to help new growers become acquainted with the practical information you will find in every issue of GFM. Selling at Farmers Markets includes articles and photos on all the most important topics about selling at farmers markets including:

Creating great displays, and managing customer traffic;

Setting fair prices;

Food safety and sampling;

What kind of insurance do you need?

What are the most profitable crops?

Keeping yourself and customers safe;

Should you take credit and debit cards?

Calculator Developed for Farm Sustainability

Researchers at the University of Illinois at Urbana-Champaign have just completed a research project called the Illinois Farm Sustainability Calculator. The Calculator is a very extensive Excel spreadsheet designed to calculate fuel consumption and production, greenhouse gas emissions and sequestration, nitrate runoff and capture, among many other things. It was designed to be user-friendly for farmers.



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