Plant Science Says

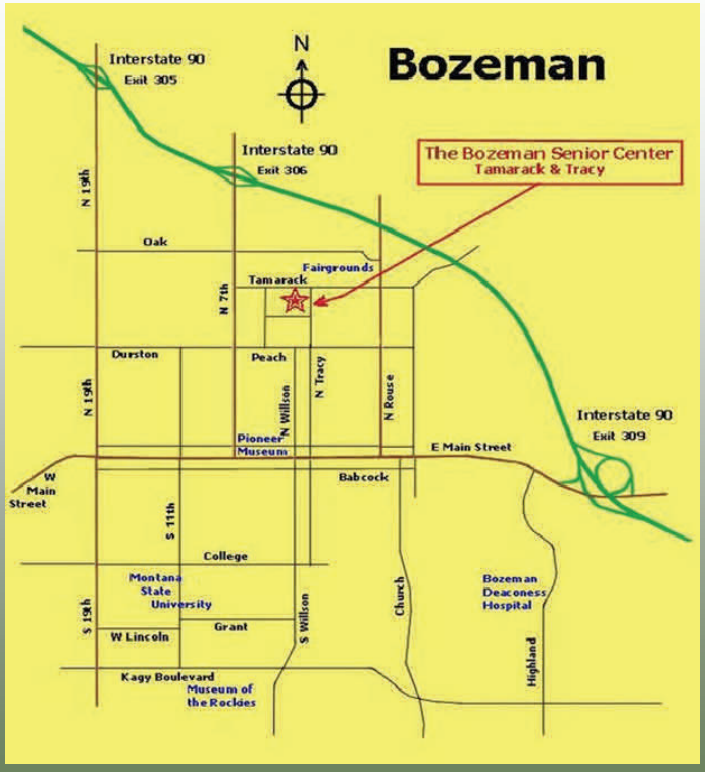
Merry Christmas!

Volume 15, No. 11 *December, 2012*

PSPP Departmental Christmas Party

The Departmental Christmas party will be on Friday, December 7, at 5:30 p.m. at the Bozeman Senior Center. Dinner will be at ~5:45 p.m.; Santa will be showing up around 7:00 p.m., and after that you will have the opportunity to play Bingo.

Please bring one of the following to share: Hors d'oeuvres, a vegetable or potato dish, salad or dessert. The meat, rolls, and drinks will be provided. Please join us! Note: They do not allow alcoholic beverages as it is a city owned facility.



Burrows Receives National Extension Award

Mary Burrows accepted the Association of Public and Land Grant University's Western Region Award for Excellence in Extension during the APLU annual meeting on November 11, 2012. The APLU is a research and advocacy organization of public research universities, land-grant institutions, and state university systems with member campuses in all 50 states, U.S. territories and the District of Columbia. The Regional Awards are given annually to an Extension professional in each of five regions who excel at Extension programming, provide visionary leadership for their Extension System, and make a positive impact on constituents served.

Montana State was prominent at this meeting, with President Cruzado giving the Seaman A. Knapp Lecture honoring the 150th anniversary of the signing of the Morrill Act in 1862 which created the land grant university system. A press release on her

Mary Burrows and Mike Vogel – neighbors and award-winners! Mike received the regional extension award last year, so Mike and I encourage hopefuls to move to the Mountain View subdivision. It seems to be a prerequisite.

speech is at http://www.montana.edu/cpa/news/nwview.php?article=11601. Mike Vogel and his staff won the National Award for Diversity with the MSU Extension Housing and Environmental Health, Tribal Housing and Environmental Health Program (a.k.a. Tribal Healthy Homes). It was also fun to see Doug Steele, our former Extension director, Jill Martz, the interim director of Extension, and a group of pathologists including Doug Jardine (Kansas State) and Anne Dorrence (Ohio State) receiving awards for excellence in Multistate Research for their work on soybean rust. Sonny Ramaswamy, director of NIFA, presented the awards.

Congratulations Mary!

The current (and former) Montana State contingent at the APLU awards reception: Doug Steele, Mary Schaad, Deborah Albin, Mike Vogel, Barb Allen, Myla Kelly, Jill Martz, Mary Burrows, and Glenda Barnes. Jeff Jacobsen attended the awards ceremony, but is not pictured here.

Dunkel Receives ESA Teaching Award

Florence Dunkel, PSPP Associate Professor of Entomology, received the Distinguished Achievement Award in Teaching from the Entomological Society of America (ESA) at their annual meeting in Knoxville, Tennessee on November 11, 2012. This award is presented annually to the member of the Society deemed to be the most outstanding teacher of the year. Criteria judged as fundamental to this award were: Innovations in developing new programs, courses, and teaching methods. About 3,000 entomologists attended the Knoxville meetings out of a membership in ESA of 6,000.

At national meetings in Knoxville, Tennessee, Florence Dunkel received the Entomological Society of America 2012 Teaching Award, the first such award to a Montana Professor. Photo courtesy of Ky-Phuong Loung.

At MSU, Dunkel developed ten courses, including two university-wide core courses: "The Issues of Insects and Human Societies", and "Health, Poverty, Agriculture: Concepts and Action Research". She teaches entomology as part of a system with foreign language faculty in service- learning courses, using the holistic process in long-term relationships established with material-resource poor communities. She links middle school students, teachers, and the local community with nearby scientists to conduct local research. Middle school students become fellow scientists with entomology professors while learning Montana Standards of Learning (SOLs).

Excerpt from a letter of support: "The impressive history of accomplishments in innovative teaching programs, courses, and methods development from Dr. Dunkel and her team supports the need for entomologists to connect in a trans-disciplinary way to address our world's urgent problems, climate change, sustainable food systems, and intercultural competency."

Congratulations Florence!

Entomology Society of American Annual Meeting
By Mike Ivie

The 60th Annual Meeting of the Entomological Society of America and related groups met November 10-14 in Knoxville, Tennessee. With nearly 3,000 attendees descending on this quiet, medium-sized city, we were certainly noticed! For the first time in several years, this mass inspection of hotels and motels by attending entomologists turned up no reported bed bug infestations.

The Montana State University Entomology Group was well represented in Knoxville, with faculty and students from four Departments participating. MSU faculty and students received awards, served as officers, organized symposia, delivered invited and submitted papers, and presented posters. Our three entomology departments co-hosted (with Washington State University, University of Idaho, and Oregon State University) the annual Pacific Northwest Universities Mixer, where current, former, and future MSU people met up. It is amazing to see so many of our former students succeeding in entomology, and this was a great place to have a bit of time to talk and catch up.

As reported at http://www.montana.edu/cpa/news/nwview.php?article=11498 Florence Dunkel received the ESA Distinguished Achievement Award in Teaching. Bob Peterson finished his term on the Governing Board and Executive Committee, and was honored at the closing business meeting. Michael Ivie finished out his term on the Coleopterists Society Executive Committee as well. Florence Dunkel finished her term as Chair of the Publication Council. Gadi Reddy serves as Subject Editor for Environmental Entomology and Annals of the Entomological Society of America, and participated for the first time as an MSU faculty member.

Kevin Wanner and Florence Dunkel each co-organized a symposium: "120 Years After Comstock the Wireworm Battle Continues", and "Remembering the Life and Work of Nancy Beckage", respectively. The latter included a reception and photo/video presentation. Each also presented at the symposium. Kevin also delivered "Candidate sex pheromones from the yucca moth (*Tegeticula yuccasella*), an archaic lepidopteran", on behalf of himself and his co-authors, including MSU's Jean E. Allen and Peggy Bunger.

Michael A. Ivie co-presented **"**Systematics of elaterid pest species in North America" in the Wanner symposium, and was a non-presenting coauthor on two papers: "A new lepidopteran fossil from the Canyon Ferry Reservoir Deposit in southwestern Montana", and "Scarabaeoid beetles of the West Indies".

Anuar Morales-Rodriguez presented a poster titled "Wireworm survey of small grain and potato fields in Montana**"**, coauthored by Ruth O'Neill and Kevin W. Wanner as well as a symposium paper titled "A complex of wireworm species infesting small grain fields in Montana" in the Wireworm symposium sponsored by Wanner.

Frank E. Etzler's paper "Resolving pest wireworm species identities using DNA barcoding" rounded out the MSU presentations in the wireworm symposium. Bob Peterson presented **"**Introduction to insect macrophotography in the symposium Entomologists Beyond Borders: Hands on Macrophotography to Help Think Globally**"**, and was a non-presenting co-author on **"**How likely is resistance to neonics to develop? Is IRM needed or possible for neonic seed treatments?"

David Weaver was a non-presenting co-author of "Integrating the building blocks of agronomy and biocontrol into an IPM strategy for wheat stem sawfly (*Cephus cinctus*)".

Barry Jacobsen delivered "Use of *Trichoderma* spp., *Pseudomonas fluorescens*, and *Bacillus* spp. in seed and soil treatment", in the "IPM for Horticultural Crops in the Tropical World Symposium"**.**

Of course the major work of the meeting was seeing the results of research via the thousands of papers and posters, and discussing future opportunities for collaboration, and just catching up with colleagues. All MSU participants spent many hours on this critical activity.

Advancement of Industrial Crops Conference
By Chaofu Lu

The 24th annual conference of the Association for the Advancement of Industrial Crops (AAIC) was held November 12-15, 2012 in Sonoma, California. About 70 people attended including Dr. Catherine Woteki, the Undersecretary for Research, Education and Economics for the USDA, and Dr. Carmela Bailey, the National Program Manager of the NIFA Bioenergy Division. The AAIC was formed in 1988 from its predecessor, the Guayule Rubber Society, to encourage and promote the activities of those involved in the production, processing, development, and commercialization of industrial crops and products derived from industrial crops. Currently there are five Divisions (General Crops and Products, Fiber and Cellulosic Crops, Medicinal & Nutraceutical Plants, Natural Rubber and Resins, and Oilseeds) in the society that serve the interests of members in seven countries.

I was invited to give a keynote presentation in the Oilseed section entitled "Bioengineering Camelina Oilseeds for Enhanced Biofuels and Oleochemicals". I was surprised to find that there were several talks on camelina with most dealing with agronomy and processing. The other major oilseed crop discussed in the meeting was castor bean. Although I am not a member of the AAIC and I rarely go to applied-types of meetings, I found it was very beneficial to me since I have been doing genetic engineering of camelina to express genes from castor in order to produce superior bio-lubricants.

The meeting was held in the wine country in California. So there was an interesting talk from the local company about the utilization of grape pomace that would significantly add value to the industry. Grape seeds and skins represent approximately 20% of the wet weight entering the winery. The vast majority of the pomace is composted and returned to the land. This presentation described the technical and functional attributes of micronutrients in grape skin and flours and how their use can support the sustainable agriculture and human health.

Of course meeting attendees are usually also tourists. The winery tour took place before the meeting so I did not catch up with it, but I am not a wine drinker anyway. I did get in the tour to the Luther Burbank Home and Gardens in Santa Rosa, which is a Registered National, State & City Historic Landmark containing the former home, greenhouse, and gardens of noted American horticulturist Luther Burbank. During his career, Burbank introduced more than 800 new varieties of plants.

Luther Burbank Home and Gardens, where the famed horticulturist Burbank experimented with plants for most of his 50 year career. Photo courtesy of Chaofu Lu.

Multi-faceted cherry tree in Burbank Gardens. Photo courtesy of Chaofu Lu.

We also visited the Cornerstone Sonoma, featuring nine acres of garden installations created by world renowned designers, distinctive wine tasting venues, a handful of gracious home and garden shops and alleries.

"Red Lantern" designed by Andy Cao and Xavier Perrot . This work displayed in Cornerstone Sonoma is an assemblage of Chinese-inspired elements referencing the history of Chinese migrants who came to California during the mid-19th century Gold Rush, and stayed to build the Central Pacific Railroad. Photo courtesy of Chaofu Lu.

MSU Represented at Canadian Pulse Research Workshop
By Linnea Skoglund

I attended the 9th Canadian Pulse Research Workshop in Niagara Falls the first week of November. Niagara Falls certainly isn't one of the easiest places to get to from Bozeman (three flights and then a bus trip across the river/border).

The meeting was attended by about 175 pulse workers from across Canada, the U.S., and the U.K. MSU was represented by Perry Miller, LRES, Chengci Chen, CARC, and myself. Perry was an invited speaker and talked about the role of pulses in Montana wheat production systems. Chengci presented a poster in collaboration with former PSPP graduate student Dai Ito on adaptability of pea and lentil varieties in Montana. There were 2½ days of oral presentations and posters covering many aspects of pulse research: Food and Nutrition, Agronomy, Breeding and Genetics, and pests. It is interesting to note that pulse flour and fractions (starch, proteins, etc.) have beneficial short-term health effects due to having a low glycemic index as well as containing many health-promoting bioactive compounds (polyphenols, saponins, lectins, phytic acid, dietary fiber). There may be long-term health effects on cardio-vascular disease by lowering LDL and total cholesterol. There is evidence that eating snack foods made from pulse flours increases satiety, which could impact obesity.

Pest management papers were few and far between. A very important paper (in my opinion) was presented on the development of fungicide resistance to one fungus in the Ascochyta blight complex on pea, *Mycosphaerella pinodes*. Resistance to Headline, the most commonly used fungicide, occurred in 8% of 300 isolates collected from Saskatchewan, Alberta and North Dakota. All of the resistant isolates were from southern Saskatchewan. Though not a big problem yet, this situation bears monitoring. Testing for fungicide resistance will become part of the pulse seed Ascochyta testing done in the Schutter Diagnostic Lab.

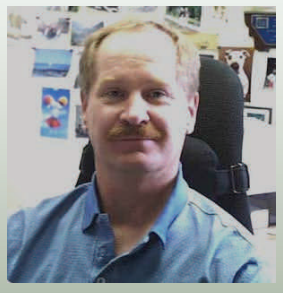
And for those who want to know - Montana is #1 in U.S. dry pea and lentil production over ND, WA, ID and OR. However, yields are lower than all these states, primarily due to lack of adoption of improved cultivars. Pulses (0.5 million acres) account for 1/10th of the acreage of wheat (5.4 million acres) but are worth over $1 billion compared to $ 1.4 billion for wheat. Now that is economic impact!

Photo courtesy of Linnea Skoglund

Everyone wore Canadian poppies for Remembrance Day, Nov. 11th.

Do you know there are actually three falls? Horseshoe Falls, American Falls and Bridal Veil Falls are all visible in this picture. Canada definitely got the better side. Photo courtesy of Linnea Skoglund

Class Focus
Bill Dyer - BIOB 110CS- Intro to Plant Biology

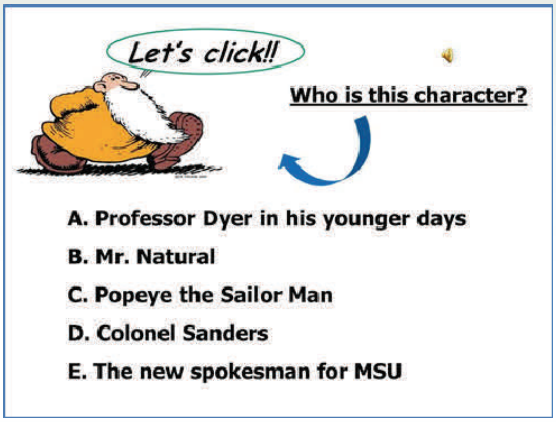


BIOB 110CS Introduction to Plant Biology has been the introductory class about plants in our department (or its previous versions) for a very long time. It was taught by Pete Fay for many years when it had a lab component—quite an undertaking with eight to ten lab sections. I actually took the class from Pete myself, and I can still remember some of the labs on herbicides, root systems, and photosynthesis. Ron Lockerman took over after Pete's departure, and then I volunteered to teach it in 2003. I had previously only taught graduate courses, and I wanted to expand my skills by teaching freshmen. Needless to say, it is a completely different experience!
I regard BIOB 110CS as a primary recruiting course for our department and college. My goal is to share the incredibly interesting 'world of plants' with these students, with the hope that they may decide to major in one of our options. I also want to give biology-related majors a firm foundation in the subject matter for their further studies. At the same time, this is an important core course for non-majors, and may be the last biology course they ever take. For these students, I try to give them enough background and content so they can appreciate plants and understand how they grow, interact with the environment, and defend themselves. For example, we discuss how sunflowers follow the sun, how photosynthesis works, and why roots grow down.

The course starts with an overview of agriculture and ethnobotany: two different aspects of the ways that people interact with plants. This is followed by a survey of plant systematics and taxonomy, and I use selected families to illustrate plant anatomy and various uses of plant species. I realized early on that, in order to explain the legume/rhizobia symbiosis, I needed to first explain the similarities and differences among plants, bacteria, and fungi. Similarly, we take a step back and discuss some basic chemistry as an introduction to a survey of the vast array of plant secondary compounds. Naturally we cover growth and reproduction, seed dispersal, photosynthesis, and phytohormones. Over the years I have expanded our section on the Central Dogma and genetics, both as an introduction to discussing genetically modified crops, and because most of my students seem to be woefully deficient in this area. A particularly interesting discussion focuses on the co-evolution of plants, animals, and microorganisms. We finish up with a short overview of soil fertility and environmental quality.

Teaching in an auditorium to 180 or more students can be challenging. I still use PowerPoint for the central course content, but also use selected chapters from a

textbook for background information. I believe that video is a great teaching tool, and I've made several short videos to illustrate processes. Some of the students' favorites are *Bernie Explains the Combine*, *DNA Electrophoresis*, and *Wild Oats* (https://www.youtube.com/watch?v=Z33C46_qnK8). With such a large enrollment, I take full advantage of Desire2Learn's automatic grading feature for my online homework quizzes. I started using iClickers about four years ago, and I think they help with student participation as well as giving me some immediate feedback about their comprehension. Here is the 'practice' iClicker question I use on the first day of class.



As our colleague Rich Stout once told me, "Thirty students in a class is teaching, but 200 students is entertainment." I try to find a good mixture of both.

Lonergan Defends Thesis

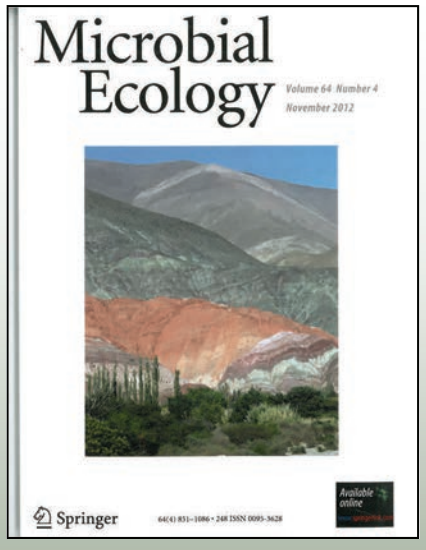
Photo courtesy of Elliot Johnson

Erin Lonergan successfully defended her thesis on Friday November 9th on "The Use of Native Ectomycorrhizal Fungi in the Restoration of Whitebark Pine". She will continue on here in the Mycology Lab of Cathy Cripps as a Research Associate for a period of time and then hopes to find employment in the Pacific Northwest.

Strobel is Inspiration for High Schoolers

Each year, at the International Science and Engineering Fair, The American Society for Microbiology presents awards in Microbiology to some of the 1,500 high school students in attendance. The three students who won first place, Meredith Tooley, Erika Williams, and Jenna Petterson from Brevarard, North Carolina, were awarded the first place prize for their project entitled "Isolation, Identification and Characterization of Endophytes from Cherokee Medicinal Plants: Yellowroot (*Xanthorhiza simplicissima*), Down Rattlesnake Plantain (*Goodyera pubescens*), and Indian tobacco (*Lobelia inflate*). The trio found that at least one endophyte that produced antibiotic compounds was present in each of the three Cherokee medicinal plants they studied. This led them to suggest that these endophytes have the potential to be used in drug discovery. The students credit Gary Strobel as their motivation for the project. One of the judges, Eric Eisenstadt explained, "The students were inspired by a Gary Strobel lecture about his worldwide search for naturally occurring medicines made by plant endophytes."

Publications



The Cover photo of the November 2012 issue of Microbial Ecology was taken by Gary Strobel.

Grants

Mary Burrows, Montana Dept. of Agriculture, "Management of Ascochyta blight in lentil". $15,400.

Bill Hoch, Montana Department of Agriculture, "Production of Tetraploid Russian Olive, (*Elaeagnus angustifolia*) for

Use in the Development of Sterile Horticultureal Varieties. $17,935.00.

Nina Zidack, Montana Department of Agriculture, "Equipping MSU Potato Lab for Real-Time PCR, adopting real-time protocals for important potato pathogens, developing a procedures manual for assays, and surveying imported garden seed for PVY strains, late blight, and powdery scab", $50,000.

David C. Sands, Barry Jacobsen, Alice Pilgeram, and Nina Zidack, Western Region SARE Program, "Low Glycemic Potatoes, a value-added crop for Montana, $55,550.

Toby Day and Jennifer Dunn win Bozeman Beautification Award

Toby Day and Jennifer Dunn have won the Bozeman Beautification Award in the Fantastic Fence and Frontyard Garden category. The process to select winners starts with the Bozeman Beautification Board sending out letters to all the neighborhood associations asking them to make nominations within their neighborhoods. The board then votes to select the winners within each of the 13 categories. A few of the things they take into consideration are if the person has previously won any of the awards and unique ways in which the community has been enhanced by what they have done to their property. A few of the other categories and this year's winners are: Historic Landscape Enhancement - Story Mansion; Bronze tribute to community - the bronze of Gary Tschache that is in front of the Kagy Corner Store, and lastly, a Functional Community Art Project - the fish water fountain at Bogart Park. Toby, along with the other winners, received their awards at the award ceremony on November 7 at the Bozeman Public Library.

Following is a list of the other properties and projects that won awards for demonstrating a keen commitment to beautifying the Bozeman community.

- Residential Landscaping and Rehabilitation Award, McDonald House at 308 S. Tracy Ave. The house is one of the oldest in Bozeman.
- Community Sculpture and Mosaic Award, water fountain at Bogert Park.
- Attractive Outdoor Patio Award, Sola Café at 290 W. Kagy Blvd.
- Fantastic Fencing and Front Yard Garden Award, Toby Day's home at 522 S. Ninth Ave.
- Public Art Award, Downtown Bozeman Artistically Reclaimed Traffic Boxes project.
- Exceptional Signage Award, Mountain Home Exterior Signs at 224 E. Main St.
- Commercial Landscaping Award, Ridge Athletic Club at 4181 Fallon St.
- Inviting Public Space Award, The Baxter lobby at 105 W. Main St.
- Remarkable Commercial Rehabilitation Award, 35 to 37 E. Main St., which houses Schnee's Boots and Shoes and Powder Horn Outfitters.
- Residential Landscaping Award, 305 N. 25th Ave.
- Community Tribute Award, statue of Bozeman humanitarian Gary Tschache at Kagy Korner on West Kagy Boulevard. Historic Landscape Enhancement Award, Story Mansion at the corner of Willson Avenue and College Street.

Winter Watering
By Toby Day, Extension Horticulture Associate Specialist

Watering trees before and during winter is probably the most misunderstood concept in tree and shrub winter care. Fluctuating temperatures, lack of soil moisture, intense winter sun, dry air and windy conditions are quite hard on trees, particularly evergreens. Watering of evergreens is very important because they retain their leaves (needles) throughout the winter. In late winter, evergreens can start to transpire. If water is not available in soil, either due to lack of water or that the groundwater is frozen, the

trees or shrubs will become very dry and brittle – a term called *desiccation*. In extreme desiccation, evergreen needles can turn red, brown and very brittle – a term called *sun scorch*. Sun scorch usually occurs on the west and south side of the trees where the trees are subject to intense winter sun.

To prevent desiccation or even sun scorch, water evergreens considerably, late in the fall before the ground freezes. The root system should be watered to depth of at least 12 inches. Many Montana soils may need several inches of water and also may require several hours of watering for larger trees. Evergreen tree roots can extend two times the diameter of the tree. Be sure to water from the trunk to much past the dripline of the tree to be sure all the roots get the moisture the tree needs.

In areas where the is little continual snow cover, such as the Highline and Eastern Montana, evergreen trees and shrubs should be watered again in late winter from about mid-January until spring when the ground thaws. This is especially important during times of unseasonably warm winter days when we experience Chinooks. If the daytime temperatures increase above forty degrees, water evergreens again. If there are continual warm spells, you may need to water as often as twice a month in February, March and April.

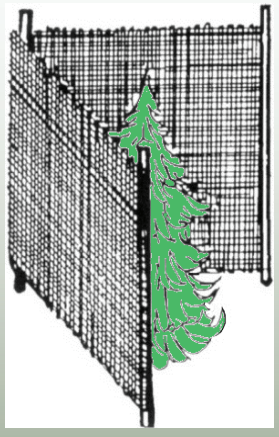
Although it may seem unconventional to water a tree in the winter due to the ground being frozen, water does get to the roots through the cracks in the frozen soil much like street trees can get water though the cracks in the sidewalks and pavement. Don't be afraid water evergreen trees in winter whenever you get the chance.

Tree and Shrub Protection

Newly planted evergreens as well as smooth and dark bark deciduous trees need to be protected from the intense winter sun that rises and sets low in the horizon. This intense sunlight can cause sun scorch in evergreens as described above, but it can also cause sun scald in deciduous trees that have smooth or dark bark. Sun scald causes damage to the bark and the tissues below and usually occurs on the west and south side of deciduous trees. The sun warms the trunk, causing the cells to metabolize during warm, sunny winter days. When the nighttime temperatures plummet, the cells the freeze and burst causing damage not only to the bark, but often to the whole tree.

Corrugated tree wrap, photo courtesy of Utah State University

For deciduous trees with smooth or dark bark, it is best to wrap the tree with tree wrap or use any of the many types of trunk guards to protect the tree. Wrap or attach the guard up to the first branch before the first of the year. You also can paint the tree with white latex paint to reflect the intense light. However, paint can be unsightly and never use oil-based paint. For landscape aesthetic purposes, I would stick with the wraps or guards and be sure to remove them in the spring.



Newly planted evergreen winter protection, Photo courtesy of University of Minnesota

For newly planted evergreens, it's a good idea to protect the south and west side of the tree or shrub from the intense sun in the winter. This can be accomplished by standing pallets on end, putting up snow fence or even burlap tied between two fence posts. The idea is to protect the evergreens from the sun, while allowing some air movement.

Common Mistakes Around Sidewalks

Evergreen and deciduous shrubs next to sidewalks often get quite a beating in

winter due to snow removal. It is a common myth that one should cover the plants for insulation. This may be true for herbaceous ornamentals (those that die back to the ground each year), but woody ornamentals can be damaged by the heavy snow loads. Never pile snow on woody shrubs. If they are in an area that is convenient for snow removal, you may want to remove or relocate the shrub.
Sidewalk salts also can be deadly to trees and shrubs next to the sidewalks. This is especially true for evergreens. If you use sidewalk salts, use them sparingly, but preferably not at all. Sometimes washed sand will do the trick. It won't affect the shrubs and it even costs quite a bit less.

Pruning
Winter, most commonly late winter, is the best time to prune most trees and shrubs. When deciduous trees are dormant it is easier to see the branching habit and it makes it easier to cut and remove the unwanted branches. Winter is also a better time because there are fewer bacteria and fungi around that can get into the wounds caused by pruning. The exceptions to winter pruning are spring flowering ornamental trees and shrubs. These usually set their flower buds in the summer. Pruning in winter will only remove the flower buds. It is best to prune spring flowering ornamental trees and shrubs in the late-spring, just after they are done flowering.

Caring For Your Christmas Tree
By Dr. Ricky M. Bates
Department of Plant Science at
Penn State University
(former faculty member of PSPP)

Maintaining a high moisture level in your Christmas tree is the single most important factor in reducing needle loss and keeping the tree fresh. This is accomplished primarily through the use of proper water-holding stands and maintaining the water level in the stand above the base of the tree. The following tips will help you to maintain the freshness and aroma of your live Christmas tree this holiday season.

1. Use a tree stand with an adequate water-holding capacity. A tree stand should have a water basin that provides 1 quart of water per inch of stem diameter. For most Christmas trees, the stand should hold at least 1 gallon of water. A cut tree will absorb a surprising amount of water, particularly during the first week, so replenish the water daily.

2. The tree stand should fit your tree. Some stands have circular rings at the top, so the ring must be large enough for the trunk to go through the hole. Do not whittle down the sides of the trunk to fit a stand. The outer layers of wood are the most efficient in taking up water and should not be removed.

3. If it has been more than 2 days since the tree was harvested, make a fresh cut to remove a ¼" to 1" disk of wood from the base of the trunk before putting the tree in the stand. Make the cut perpendicular to the stem axis. Don't cut the trunk at an angle, or into a v-shape, which makes it far more difficult to hold the tree in the stand and also may reduce the amount of water available to the tree.

4. Once at home, place the tree in water as soon as possible. Most species can go 6-8 hours after cutting the trunk and still take up water. If needed, the tree can be temporarily stored for several days in a cool, shaded and protected area such as an unheated garage. Place the freshly cut trunk in a bucket that is kept full of water.

5. The temperature of the water used to fill the stand is not important and does not affect water uptake.

6. Keep displayed trees away from sources of heat (fireplaces, heaters, heat vents, direct sunlight). Lowering the room temperature will slow the drying process, resulting in less water consumption each day.

7. Check the stand daily to make sure that the level of water does not go below the base of the tree. With many stands, there can still be water in the stand even though the base of the tree is no longer submerged in water.

8. The use of "I-V" type devices to supply water directly to holes drilled into the sides of the tree trunk is not as effective as displaying the tree in a more traditional, water-holding tree stand. Drilling a hole in the base of the trunk does not improve water uptake.

9. Applying anti-transpirants to the tree does not significantly reduce the rate of moisture loss. These products are marketed as a way to block evaporation from the foliage surface, but in reality they have little effect on a cut tree displayed indoors.

10. Adding water-holding gels to the stand is not beneficial and they can reduce the amount of water in the stand that is available to the tree.

11. Do not use additives in the water, including floral preservatives, commercial tree preservatives, molasses, sugar, bleach, soft drinks, aspirin, honey, and other concoctions. Clean water is all that is needed to maintain freshness.

12. Displaying trees in water with proper care is the most effective way of maintaining a tree's moisture. The use of flame retardants is not recommended and certain brands can damage needles and actually increase the rate of moisture loss from trees.

13. Always inspect light sets prior to placing them on the tree. Use of miniature lights will produce less heat and reduce drying of the tree. Do not overload electric circuits.

14. Monitor your tree for dryness. Run your fingers across the needles to determine if they are dry and brittle. If the needles break easily or fall off in your hand, the tree is dry and should be removed from the house.

15. It is better to recycle the tree than to use it in your wood stove or fireplace. Go to the following website to find out about Christmas tree recycling:

http://www.realchristmastrees.org/dnn/AllAboutTrees/HowtoRecycle.aspx

A Pugilist Among Us
By Mina Talajoor

You wouldn't guess it, but there's a boxing champion in our department!

Alanna Schlosser (Giroux lab) has been training here in Bozeman since June with national boxing champion Amy Sowers. And on the 10th of this month Erin, Duke and I drove to The Eagles in Helena to watch Alanna in her debut boxing match.

We walked into The Eagles and found our seats beside the boxing ring. But we didn't need chairs. We were on our feet. The entire time.

During the first of three one-and-a-half-minute rounds, we all watched Alanna dance around her opponent as they each took a few tentative jabs to feel out the situation. Then it happened. With a quick one-two, Alanna took advantage of the gap in her opponent's defensive stance and landed the first of what would be many solid punches of the match.

Alanna delivering one of many well placed punches at a recent boxing match. Photo courtesy of Erin Lonergan.

By the time the bell rang to signal the start of the second round, it was clear who was dominating the ring. Alanna even got sent to the other side of the ring while the ref gave her opponent an 8-second resting countdown. As the crowd cheered, our shouts mixed with the goading cries of “Get ‘er!” and “Uppercut! Uppercut!” and created a brilliant cacophony that shook the very bedrock beneath The Eagles.

Throughout the nail-biting, heart-racing, beer-spilling four-and-a-half minutes of the match, all eyes were on the two people in the ring. And by a unanimous vote by the judges, Alanna was declared champion.

Way to be a boss, Alanna.

Recipe of the Month

Cranberry Salad

2 c chopped cranberries
1 large orange
1 c white sugar
1 c chopped walnuts
1 c finely diced celery
1 c crushed pineapple drained
1 3 oz. package raspberry flavored Jell-O mix
2 c hot water

Combine the gelatin with hot water (don’t let stand). Grind cranberries and orange (including rind), mix with sugar. Stir in nuts, celery and pineapple. Mix with prepared gelatin and chill.

December Birthdays

Ted Clack	3
Bill Grey	4
Cheryl Moore-Gough	23
Sue Brumfield	26
Duke Pauli	27
Lucy Cooke	30

Once again, it has been great working for all of you this year. We wish each of you a very Merry Christmas and a Happy New Year!
Tamara, Courtney, Jill, and Irene