



# Invasive Species Science Update

Number 7, March 2014

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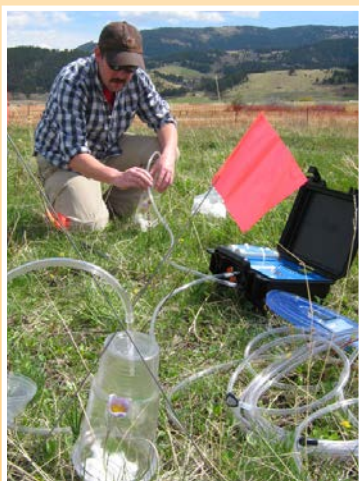
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## Production

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## From the Editors

This newsletter is designed to keep managers and other users up-to-date with recently completed and ongoing research by RMRS scientists, as well as highlight breaking news related to invasive species issues. The newsletter is produced by the RMRS Invasive Species Working Group (ISWG), which is a core group of scientists who volunteer to coordinate outreach of RMRS invasive species science to managers and the public through this newsletter, our website, and periodic white papers. All of our products, including current and past issues of the newsletters and lists of publications, can be found at <http://www.fs.fed.us/rm/invasive-species/>. In this and future issues of the Newsletter we want to continue to recognize partnerships and emphasize their importance in addressing invasive species issues. Partnerships are extremely valuable arrangements that allow individuals and organizations

to join resources and skills to advance a mutual interest, such as investigating and managing invasive species. A perusal of the locations and affiliations of the authors of the papers described below provides a quick indication of the wide variety of partnerships, several of which are international. The acknowledgements section of each research paper recognizes the important role of partnerships in our scientific endeavors. We always encourage feedback on ways to improve this service and encourage anyone who wishes to be an active participant in developing these products to join the ISWG. If you have comments or questions, please contact the ISWG team leader, Dean Pearson, [dpearson@fs.fed.us](mailto:dpearson@fs.fed.us).

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## Invasive Species Webinar Series

The USDA Forest Service Rocky Mountain Research Station is pleased to announce a new webinar series: Invasive Plants—Issues, Challenges, and Discoveries. This free interactive series, which includes seven webinars, will provide attendees with cutting-edge information about invasive plants and their management. We encourage land managers, professionals, scientists, and other interested people to attend. For more information including past webinars in the series, visit <http://www.fs.fed.us/rmrs/webinar-series/invasive-species/> or contact Carly Woodlief, webinar technical coordinator, at [ckwoodlief@fs.fed.us](mailto:ckwoodlief@fs.fed.us) or 505-724-3734.

**Webinar Series Schedule** (All webinars will begin at 12:00 pm Mountain Time):

**February 27, 2014:** Rapid evolution of biocontrol insects in response to climate change—Peter McEvoy

**March 13, 2014:** Merging chemical ecology and biocontrol to predict efficacy and climate effects—Justin Runyon

**March 27, 2014:** Hybridization in weedy species—Sarah Ward

**April 10, 2014:** Biogeography of plant invasions—Dean Pearson

**April 24, 2014:** Pathogen-based biological control of grassy weeds—Susan Meyer

**May 8, 2014:** Classical biological control of weeds—Sharlene Sing

# Research Notes

## Mexican *Armillaria* sp. as an Invasive Species Threat

By: Ned Klopfenstein ([nklopfenstein@fs.fed.us](mailto:nklopfenstein@fs.fed.us)), RMRS Forestry Sciences Laboratory, Moscow, ID.

The fungal pathogens that cause Armillaria root disease on diverse tree hosts around the world are known as potential invasive pathogens. These pathogens cause wood decay, reduced growth, and increased mortality, especially in trees already weakened by competition and other pests. In many areas, surveys of the native *Armillaria* species are lacking, so it is difficult to recognize when an *Armillaria* species is invasive. In recent years, DNA-based diagnostics have allowed for the precise identification of *Armillaria* species present on a site. For example, an *Armillaria* species was recently reported for the first time in Arizona. DNA-based diagnostics were also used in an ongoing collaborative study with Colegio de Postgraduados (Montecillo, Texcoco, Mexico) to identify *Armillaria* species associated with root disease in peach orchards in the State of México, Mexico. For part of his Ph.D. study, Rubén D. Elías-Román conducted DNA-based analysis in the Moscow Forest Pathology Laboratory with Ned Klopfenstein, John Hanna, Sara Ashiglar, Amy Ross-Davis, and Mee-Sook Kim (Kookmin University, Seoul, South Korea). Most notably, this study showed that a previously undescribed species of *Armillaria* was causing most of the root disease on peach (*Prunus persica*) trees. The characterization of this undescribed *Armillaria*



Armillaria root disease is found in fruit orchards established in areas where native forests are cleared in the State of Mexico, Mexico.



Left: Rubén D. Elías-Román, Ph.D., conducts DNA analysis of *Armillaria* species from Mexico. Right: Mushrooms of an undescribed *Armillaria* species frequently isolated from infected peach (*Prunus persica*) trees in Mexico State, Mexico.



*laria* species is of great interest because it represents an invasive species threat for many global areas where it is not known to occur. Continued studies will formally describe this species and further document its distribution and geographic areas where

it represents a potential invasive species threat. For more information on this research, see Nelson and others (2013) and Elías-Román and others (2012, 2013a, 2013b) listed in the Recent Publications section on pages 8 and 9.

## Tracking the Worldwide Distribution of an Invasive Rust Pathogen of Diverse Myrtaceous Trees and Shrubs

By: Amy Ross-Davis ([arossdavis@fs.fed.us](mailto:arossdavis@fs.fed.us)), RMRS Forestry Sciences Laboratory Moscow, ID.

RMRS Forest Pathology Laboratory in Moscow, ID, is continuing international collaborations to examine genetic relationships among populations of *Puccinia psidii*, the invasive rust pathogen of several tree and shrub species in the Myrtaceae, including guava (*Psidium* spp.), eucalypt,

(*Eucalyptus* spp.), rose apple (*Syzygium* spp.), allspice (*Pimenta dioica*), paperbark (*Melaleuca* spp.), and dozens of other species. This rust pathogen is of worldwide concern because it has invaded Hawaii, where it can infect the native ohia tree (*Metrosideros polymorpha*), and it has recently invaded Australia, a center of diversity for myrtaceous trees and shrubs, as well as China (Hainan Province), New Caledonia, and South Africa. This rust disease became a commercial concern when it began impacting eucalypts in Brazil and other South American countries where eucalypt plantations are the major source of fiber. It was long believed that the rust

disease on eucalypt was derived from the rust disease on guava, which appears to be native in Brazil. Collaboration among RMRS (Amy Ross-Davis, John Hanna, and Ned Klopfenstein), Kookmin University in Seoul, South Korea (Mee-Sook Kim, RMRS collaborator), Universidade Federal de Viçosa in MG, Brazil, USFS FHP-Region 5 (Phil Cannon), and Washington State University resulted in a recent publication that concludes the rust disease on eucalypt in Brazil did not originate from guava. Furthermore, genetic studies show that the invasive rust pathogen in Hawaii is genetically distinct from known genotypes in Brazil. Thus, although the

rust pathogen in Hawaii is unlikely to have come from Brazil, the distinct biotypes in Brazil may represent an additional invasive threat to Hawaii and elsewhere. Ongoing studies are examining the genetic diversity of guava-eucalypt-myrtle rust pathogens derived from diverse hosts and geographic origins to determine the genetic relationships, potential pathways of spread, and geographic areas that are at risk from invasion. Recently, this rust pathogen was documented on a new host in Florida. For more information on this research, see Hanna and others (2012), Graça and others (2013), and Rayamajhi and others (2013) listed in the Recent Publications section on pages 8 and 9.



Left photo, Amy Ross-Davis, RMRS collaborator, extracting DNA from a sample of the rust pathogen, *Puccinia psidii*. Right photo, rust disease on guava caused by *P. psidii*; photos by A.C. Alfenas (coauthor).

## Invasive Forest Pathogen Workshops—Pacific Islands

**By: Mee-Sook Kim ([mkim@kookmin.ac.kr](mailto:mkim@kookmin.ac.kr)), College of Forest Science, Kookmin University, Korea, and RMRS Forestry Science Laboratory Collaborator, Moscow, ID.**

Island forests are especially vulnerable to invasive pathogens because often native tree species have evolved in the absence of pathogens found elsewhere. Furthermore, the distributions of forest pathogens on many islands are not well known, frequently because islands do not have forest health professionals on site or ready access to DNA-based diagnostics of forest pathogens. On most Pacific islands, fungal pathogens that cause root- and butt-rot disease are of special concern because of potential long-term damage to diverse tree species. With support from the USDA

Forest Service, Forest Health Protection (FHP), Region 5 and the Western Wildlands Environmental Threat Assessment Center (WWETAC), an international collaborative effort is being coordinated by RMRS to begin surveys of potentially invasive, root- and butt-rot pathogens in diverse forests of multiple Pacific islands, and conduct workshops to enhance local collaboration for surveys and collections of resident fungal pathogens. In September 2013, a team of root- and butt-rot experts, including Ned Klopfenstein (Research Plant Pathologist, RMRS), Mee-Sook Kim (RMRS collaborator, Kookmin University, Seoul, South Korea), Phil Cannon (FHP Regional Plant Pathologist, Region 5), Prof. Robert Schlub (University of Guam), and Yuko Ota and Norio Sahashi (Forestry and Forest Products Research Institute, Tsukuba, Japan) was convened to survey, collect samples, and conduct

workshops on Pacific islands of Guam, Saipan (U.S. Territories), Yap, Pohnpei, Kosrae (Federated States of Micronesia), Palau, and Philippines. Among the many pathogens found, the aggressive fungal pathogen *Phellinus noxius*, which causes brown root rot disease of diverse tree species (e.g., breadfruit tree—*Artocarpus altilis*, flame tree—*Delonix regia*) in tropical and subtropical areas, is of primary concern, especially because this pathogen has not yet been reported in Hawaii. Diverse fungal pathogens were collected and sent to the RMRS Moscow Forest Pathology Laboratory (Ned Klopfenstein, John Hanna, Sara Ashiglar, and Amy Ross-Davis), where they will be identified by DNA-based diagnostics. Continued international collaborations will help determine the pathway of spread of *P. noxius* and perhaps other potentially invasive forest pathogens.



Left photo, the root- and butt-rot team met with Ambassador Rosen of the Federated States of Micronesia (front row center) to discuss the threats posed by invasive forest pathogens. Right photo, the team with native Pohnpeians in front of a nihn tree (*Ficus tinctoria*) with brown root rot disease.

Native student from Northern Marianas College assists in sample collection.

## Is *Pyrenophora semeniperda* the Cause of Downy Brome (*Bromus tectorum*) Die-offs?

By: Owen Baughman ([owbaughman@gmail.com](mailto:owbaughman@gmail.com)) and Susan Meyer ([smeyer@fs.fed.us](mailto:smeyer@fs.fed.us)), RMRS Forestry Sciences Laboratory, Provo, UT.

Cheatgrass (*Bromus tectorum*) is the most abundant exotic plant species in the natural landscapes of the western United States, occurring in near-monoculture infestations over very large areas. Research by RMRS scientists at the Shrub Sciences Laboratory in Provo, UT (S. Meyer, D. Nelson), along with researchers at Gonzaga University (J. Beckstead, C. Molder and C. Smith), Brigham Young University (P. Allen), and Idaho Army National Guard (D. Quinney, J. Weaver) determined the fungal seed pathogen *Pyrenophora semeniperda* to be a significant predator of cheatgrass seeds. Their research hinted at the possibility that this pathogen, known by its spooky moniker “Black Fingers of Death,” could serve as a biological control to reduce cheatgrass seed banks.

Cheatgrass “die-off” is a frequent but poorly understood phenomenon in cheatgrass near-monocultures, wherein complete stand failure results in a lack of cheatgrass growth for one or more years. In summer 2008, Meyer and then-University of Idaho undergraduate O. Baughman investigated the seed banks of nine die-off sites across the West to determine whether the Black Fingers might be responsible for the phenomenon. The pathogen was a significant predator of cheatgrass seeds at all sites, but comparisons between dormant and killed fractions of the seed

banks in and out of die-off areas revealed no evidence that the activity of the Black Fingers pathogen was related to die-off events. This study improved our limited understanding of die-offs by noting that the phenomenon does not directly impact the persistent (or carry over) seed bank, and that some sites recover to cheatgrass dominance the next season while others experience multiple years of stand failure. It also revealed that, while Black Fingers does not directly cause die-offs, it is probably a major player in determining the rate of post-die-off stand recovery from the carry over seed bank.

This research effort represented one of the first organized investigations of die-offs, and it helped generate a multitude of new questions and research interests that were successfully funded in 2011 under the USDI Bureau of Land Management’s ongoing Integrated Cheatgrass Die-off Project. This multifaceted and collaborative project led by Meyer combines microbial ecology and genetics (B. Geary, Z. Aanderud, J. Franke, and J. Nicholson, BYU; J. Beckstead, Gonzaga U), native restoration (E. Leger and O. Baughman, University of Nevada Reno), and remote sensing ecology (P. Weisberg and T. Dilts, UNR) to determine the patterns, causes and consequences of die-offs. This project has already revealed a new suite of cheatgrass fungal pathogens that are candidates as die-off causal agents, has yielding cheatgrass-specific landscape analyses, and is uncovering the promising restoration potential associated with die-offs. For background information on this research, see Beckstead and others (2007) and Meyer and others (2007, 2008), listed on the last page of the newsletter.

## Using Long-Term Data Sets to Characterize Plant Invasion Processes in Western USA Rangelands

By: Stan Kitchen ([skitchen@fs.fed.us](mailto:skitchen@fs.fed.us)), RMRS Forestry Sciences Laboratory, Provo, UT.

Data collected from long-term experimental areas provide opportunities to study changing vegetation patterns through time. Of particular interest for arid rangelands are the changes associated with the introduction of invasive plant species. In a recently published study, temporal patterns of invasion by seven plant species were extracted from long-term vegetation records for five western USA sites, including the RMRS Desert Experimental Range. Records for each site were long, spanning 41 to 86 years. Researchers, including RMRS Research Botanist Stan Kitchen, compared patterns of species occurrence and abundance to a logistic growth curve hypothesized to predict the progression of species invasion and dominance through classic phases of introduction, expansion, and saturation. This idealized model was derived from observed patterns of occurrence and abundance taken from historical accounts and the frequency of specimens preserved in regional herbaria. The seven species analyzed in the study included crested wheatgrass (*Agropyron cristatum*), dwarf allyssum (*Alyssum desertorum*), cheatgrass (*Bromus tectorum*), Lehmann lovegrass (*Eragrostis lehmanniana*), halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola tragus*), and tumble mustard (*Sisymbrium altissimum*) and represent a range of life-history strategies (namely annual and perennial, grass and forb, warm and cool-season species). Local-scale patterns observed in this study were mostly more complex than those predicted, including sporadic spikes and crashes in abundance suggesting that the logistic growth curve model was overly simplistic and therefore not particularly useful for predicting invasion processes at the spatial scale of individual sites. Rather, results infer that invasive plant occupation of these arid rangeland environments is subject to a suite of interacting drivers of vegetation



Left photo, downy brome seeds infested with the fungal seed pathogen. Right photo, researcher recording data from field plots.

change (such as climate variability and grazing pressure) that vary through time and space. In addition to exploring patterns of plant invasion, the study exposed challenges and limitations associated with the retroactive analysis and interpretation of historical data collected from a wide range of sites and conditions using distinct methodologies. However, with the success of this project, researchers demonstrated that such challenges can be overcome and that the benefits of linking multiple sites for regional analyses are worth the extra effort. For more information on this research, see Morris and others (2013) listed in the Recent Publications section pages 8 and 9.



Halogeton (*Halogeton glomeratus*) is a warm-season, salt-loving annual that has invaded cold deserts of North America since the 1930s. Here plant density is relatively low (plants completely absent in background) during a dry year with limited warm-season soil moisture. Dry skeletons remain from prior year's growth. Before occupation by halogeton this area of the Desert Experimental Range was dominated by winterfat (*Krascheninnikovia lanata*), a low-statured native shrub.



Cheatgrass (*Bromus tectorum*) production in a peak year following above average winter and spring precipitation at the Desert Experimental Range. Characteristic red coloration of plants reaching maturity shows dominance of saturation phase; however, abundance (and visibility) is drastically reduced in dry years with the species persisting primarily as ungerminated seeds.

### Sickleweed (*Falcaria vulgaris*) on the Fort Pierre National Grassland—A Case Study on a Recently Introduced Plant Species

By: Jack Butler ([jackbutler@fs.fed.us](mailto:jackbutler@fs.fed.us)), RMRS Forest and Grassland Research Laboratory, Rapid City, SD.

Many of our invasive plant species are often considered benign in their native range; consequently, basic biological and ecological information that may provide insight into their invasibility and potential impact on native populations and communities in their introduced range is lacking. This is especially true for recently arrived species in the early stages of establishment where there is no sharp contrast between the invaded and non-invaded condition. Documenting the pattern of invasion before the species becomes widespread helps identify traits that may contribute to understanding the success of recent invaders, while increasing our knowledge of the factors influencing invasibility. Such is the case for sickleweed (*Falcaria vulgaris*) on the Fort Pierre National Grasslands (FPNG) in South Dakota. Sickleweed was first recorded in the United States in 1922 on a farm in south-central Pennsylvania and is now described as an introduced perennial in 16 states of the U.S. It was first documented in South Dakota in 1961 and was first collected on the FPNG in 1992. Approximately ten years later, sickleweed had become a vi-

sual dominant on approximately 3200 ha of the FPNG. RMRS scientists partnered with FPNG biologists and South Dakota State University faculty and students to develop an aggressive approach to investigating the biological and habitat characteristics of sickleweed. The approach involved using herbarium records of sickleweed to reconstruct the introduction history and potential pathways of spread. Using detailed field surveys, researchers described the pattern of abundance and distribution of the species and identified the factors that can predict the susceptibility of local and regional grassland communities to invasion by sickleweed. This work was complemented by cutting-edge laboratory research on population genetics and seed germination and

establishment characteristics of sickleweed. Genetic analyses identified the number and location of potential sites of introductions, while seed germination trials described the establishment and spread potential of the species. Collectively, these studies will help managers develop a range of management alternatives that reduce establishment of new populations and limit expansion of existing populations. The approach may also serve as a template for future evaluations of newly introduced species before they potentially become invasive. For more information on this research, see Butler and others (2013), Sarbottam (2013), Sarbottam and Nepal (2013), and Sarbottam and others (2012) in the Recent Publications section on pages 8 and 9.



Sickleweed on the Fort Pierre National Grasslands, South Dakota.

# Other News

## Symposium on Russian Olive Control Through Facilitated Researcher-Stakeholder Dialogue

Russian olive (*Elaeagnus angustifolia* L.) is a small tree or multi-stemmed shrub native to south-eastern Europe, central Asia and the western Himalayas (Katz and Shafroth 2003). Russian olive has been cultivated for many centuries within its native range. Selective breeding has produced cultivars with significantly larger fruits that are consumed fresh or preserved in jam, fruit compote, or alcoholic beverages. Russian olives intentionally introduced to North America in the late nineteenth century originated from non-cultivated "wild" accessions. Russian olive is grown in North America primarily for horticultural purposes, in shelterbelts and as shade trees. In the past 50 years Russian olive has escaped cultivation and is now naturalized in 37 U.S. states and widely established in at least 17 U.S. states and 5 Canadian provinces. Russian olive is now categorized as a noxious weed in four U.S. states (Colorado, Connecticut, New Mexico, Wyoming), in seven Utah counties, and in Treasure County, MT. ARS (Dr. Kevin Delaney), RMRS (Dr. Sharlene Sing), and University of Idaho (Dr. Mark Schwarzlaender) collaborators developed a USDA NIFA AFRI conference proposal to fund a two-day symposium that would address such concerns. The symposium will be held on February 10-11, 2014, in Spokane, WA, as part of the 3rd Conference of the Northern Rockies Invasive Plant Council, bringing together researchers and land managers to exchange scientific evidence on the beneficial and detrimental impacts of the weed, to inform on the goals of biological control, identify research gaps, and to discuss potential conflicts of interest. The overall goal of the symposium is to accurately identify and bring together at the early stage of this biological control project key national and regional groups and organizations that may affect or can be affected by a Russian olive biological control program. For more information contact Sharlene Sing, Forestry Sciences Laboratory, Bozeman, MT ([ssing@fs.fed.us](mailto:ssing@fs.fed.us)).

## Bio-control Proceedings Available On-line

The XIII Proceedings of the International Symposium on Biological Control of Weeds, published earlier this year, is now

available online at <http://www.invasive.org/publications/xiiisymposium/>. Research Entomologist Sharlene Sing, Bozeman, an editor for these Proceedings, also co-authored abstracts for presentations on several agent-weed systems. Additional RMRS contributors include Research Ecologist Dean Pearson and Ecologist Yvette Ortega, Missoula, and Research Entomologist Justin Runyon, Bozeman. These symposia, held every four years, provide a forum for researchers and practitioners from around the world to gather and describe the results of scientific studies and progress in implementing ongoing weed biological control programs. The Proceedings document theories explored and problems encountered in conducting weed biological control research over the last 40 years, the most comprehensive record available.

## Strategies for Understanding and Controlling Species Invasion

October 2013 issue of the GSD Update, a newsletter produced by the RMRS Grassland, Shrubland and Desert Ecosystems Science Program is available at (<http://www.fs.fed.us/rm/grassland-shrubland-desert/>). In this issue:

- Long-term Experimental Areas Add Value for Studying Species Invasions
- Biological Control: Preference, Performance and Confounding Influences
- Is All Cheatgrass Created Equal, or Are Some Cheatgrass Ecotypes More Equal Than Others?
- Mountain Pine Beetle Outbreaks Affect Invasive Plants
- Nonnative Plants: A Pro or Con for Riparian-nesting Birds?
- News of Other Projects
- Recent GSD Publications

## The Pesticide Paradox

A Special Section in the Volume 341 (16 August 2013) issue of Science includes a collection of reviews, news stories, and research papers on reducing the negative consequences of using pesticides. Articles in the special section that may be of particular interest include "The War Against Weeds Down Under," an article on developing effective strategies to cope with herbicide resistance weeds in western Australia. A review entitled "Evaluating Pesticide

Degradation in the Environment: Blind Spots and Emerging Opportunities" describes the major challenges of anticipating the extent and pathways of pesticide degradation and transformation under field conditions. One of the most compelling articles is a review entitled "Wildlife Ecotoxicology of Pesticides: Can We Track Effects to the Population Level and Beyond?" The article discusses many of the unintended side effects of pesticides on wildlife by linking the molecular actions of pesticides to their potential interference with biological processes, and how these actions can potentially cross multiple levels of biological organization (individuals, populations, communities, and ecosystems).

## Research Awards

### Justin Runyon, Forestry Sciences Laboratory, Bozeman, MT.

Forest Service scientist Justin Runyon is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers. Runyon, one of 102 recipients of the prestigious annual award, is a Research Entomologist at the Rocky Mountain Research Station's Forestry Sciences Laboratory in Bozeman, Montana. The winners receive their awards at a Washington, DC, ceremony later this year. "The impressive achievements of these early-stage scientists and engineers are promising indicators of even greater successes ahead," President Obama said. "We are grateful for their commitment to generating the scientific and technical advancements that will ensure America's global leadership for many years to come."



Runyon's research focuses on the chemical ecology of plant-insect interactions. He explores the ecological interactions between invasive plants and herbivores to improve use of biocontrol as a management tool. He also examines how bark beetle attack changes the chemistry of trees and how these changes affect tree flammability to better predict and manage wildfires.

The PECASE awards, established by President Clinton in 1996, are coordinated by the Office of Science and Technology Policy within the Executive Office of the President. Awardees are selected for their pursuit of innovative research at the frontiers of science and technology and their commitment to community service as demonstrated through scientific leadership, public education, or community outreach.

#### **Dean Pearson, Forestry Sciences Laboratory, Missoula, MT.**

Dean Pearson received the National Forest System Invasive Species Program Award for Landscape Restoration and Rehabilitation Against Invasive Species, 2012, in recognition of his high level of leadership and expertise on invasion biology and invasive species management, linking management concepts to long-term landscape restoration and rehabilitation.

#### **Susan Meyer, Forestry Science Laboratory, Missoula, MT.**

Research Ecologist, Susan Meyer, Provo, widely recognized for her research on using a native fungal seed pathogen as a control agent for downy brome (see Research Note above and New York Times article [http://www.nytimes.com/2012/07/31/science/earth/a-fungus-emerges-as-weapon-against-cheatgrass.html?\\_r=3&ref=science&](http://www.nytimes.com/2012/07/31/science/earth/a-fungus-emerges-as-weapon-against-cheatgrass.html?_r=3&ref=science&)), recently received the Forest Service Excellence in Rare Plant Management Award for outstanding, dedicated leadership in rare plant management. Susan helped develop an information base for managing the sagebrush steppe endemic Slickspot Peppergrass (*Lepidium papilliferum*) in southwestern Idaho. She worked closely with collaborators on studies examining habitat requirements, demography, seed bank dynamics, and long-term population trends for this ephemeral species. Her studies were used extensively in the process for listing Slickspot Peppergrass under the Endangered Species Act. Susan served on the multi-agency Working Group for the species, was involved in the development of its Cooperative Management Plan, and contributed to and critically reviewed several renditions of "best available information" documents for the U.S. Fish and Wildlife Service. She also worked on many other rare plant species and demonstrated the importance of persistent seed banks in the management of rare plants of semiarid and arid environments, which was largely unrecognized prior to her work.

#### **New RMRS Scientist**

**Dr. Francis Kilkenny** recently accepted a research biologist position with the RMRS Grassland, Shrubland and Desert Ecosystems Science Program in Boise. Francis received his Bachelor's Degree in Environmental Studies with Honors from the University of California at Santa Cruz; his Certificate of Study in Geographical Information Systems and Remote Sensing from Humboldt State University in Arcata, California, where he was a Mark B. Rhea Fellow; and his Ph.D. in Biology from the University of Virginia in Charlottesville, where he was a Presidential Fellow. His research interests include: impacts of climate change on native and invasive plant species; the evolution of local adaptation in native and invasive plant species; pollination biology of herbaceous and long-lived clonal plants; evolutionary consequences of density and intraspecific competition; fundamental niche modeling; and the projection of species range shifts due to climate change. His Ph.D. dissertation focused on the evolution and population genetics of the invasive vine Japanese honeysuckle in eastern North America. As a post-doctoral research geneticist with the Pacific Northwest Research Station from 2011-2013, he studied the adaptation of native grass and tree populations to local climates, and used these data to develop seed transfer guidelines and model the impacts of changing climates on these species. Francis reported for his new job on June 16, 2013.

## **Ask The Expert**



**Q: I am a new Forest Service employee and I am new to the area. I have several questions about the ecology and management of the non-native species where I work. How do I get acquainted with the scientists and their research?**

**A:** Your first stop will likely be our website (<http://www.fs.fed.us/rm/invasive-species/>). There you will find previous issues of this newsletter and research publications authored by RMRS scientists and their research partners. While on the website, you will also likely want to download a copy of our Research Summary and Expertise Directory. In this document, you will find research summaries on invasive plants, pathogens, insects, aquatic species, and terrestrial vertebrates. You will also find the names and contact information for 45 RMRS scientists who are currently researching invasive species. Please feel free to phone or email them regarding any questions you may have. You can also search for information on a specific invasive species using Treesearch (<http://www.treesearch.fs.fed.us/>).

# Recent Publications

- Baughman, O. W., and S. E. Meyer. 2013. **Is *Pyrenophora semeniperda* the Cause of Downy Brome (*Bromus tectorum*) Die-offs?** Invasive Plant Science and Management 6:105-111.
- Beckstead, J., S. E. Meyer, C. J. Molder, and C. Smith. 2007. **A race for survival: Can *Bromus tectorum* seeds escape *Pyrenophora semeniperda*-caused mortality by germinating quickly?** Annals of Botany 99:907-914.
- Butler, Jack L., and Stefanie D. Wacker. 2013. **Sickleweed on the Fort Pierre National Grasslands: an Emerging Threat.** The Prairie Naturalist 45:28-38
- Case, A.E.; Ashiglar, S.M.; Cannon, P.G.; Militante, E.P.; Tadosa, E.R.; Quintos-Manalo, M.; Pampolina, N.M.; Hanna, J.W.; Brooks, F.E.; Ross-Davis, A.L Kim, M.-S.; Klopfenstein, N.B. 2013. **DNA-based approaches to identify forest fungi in Pacific islands: a pilot study.** pp. 149-151 in: Browning, J.; Palacios, P., compilers. Proceedings of the 60th annual Western International Forest Disease Work Conference, 8-12 October 2012, Tahoe City, CA.
- Elías-Román, R.D.; Guzmán-Plazola, R.A.; Klopfenstein, N.B.; Alvarado-Rosales, D.; Calderón-Zavala, G.; Mora-Aguilera, J.A.; Kim, M.-S.; García-Espinosa, R. 2013a. **Incidence and phylogenetic analyses of *Armillaria* spp. associated with root disease in peach orchards in the State of Mexico, Mexico.** Forest Pathology 43: 390-401.
- Elias-Roman, R.D.; N.B. Klopfenstein, D. Alvarado-Rosales, M.-S. Kim, A.E. Case, S.M. Ashiglar, J.W. Hanna, A.L. Ross-Davis, R.A. Guzmán Plazola. 2012. **DNA-based identification of *Armillaria* isolates from peach orchards in México state.** pp. 159-160 in: Zeglen, S.; Palacios, P., compilers. Proceedings of 59th Western International Forest Disease Work Conference. 11-14 October 2011, Leavenworth, WA, USA. USDA Forest Service, Forest Health Protection, Region 5, Portland, OR.
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