WERA 1017 2018-2019 Report for Montana

Mary Burrows – Montana State University
Annual Report – September 2018 to August 2019

Participants

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Performing Department Plant Sciences & Plant Pathology, Land Resources and Environmental Sciences, Animal and Range Sciences

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WERA-1017 goals:

1. *Increase participants' skills, knowledge, and awareness of regional/national IPM issues, systems, and strategies.*

Montana's Integrated Pest Management Program has two primary and two secondary foci: Agronomic Crops, Communities, Pest Diagnostic Facilities, and Pesticide Applicators. As detailed below, our team of experts have made significant progress educating citizens of Montana including farmers, county extension agents, agricultural professionals, pesticide applicators, and home and landowners about IPM principles. We cooperate widely with private and government agencies ranging from the Montana Nursery and Landscape Association, county weed districts, and Housing Authorities, to the Montana Department of Agriculture and APHIS-PPQ. We have excellent cooperative relationships with neighboring states especially Idaho, Utah and Nevada, and conduct a number of interdisciplinary training opportunities in cooperation with other states. The PestWeb was an invaluable resource for wheat growers and their advisors to monitor populations of the Orange Wheat Blossom Midge. The service was expanded in 2018 to 19 Montana and 20 North Dakota Counties, with 1,300 users of the website. A hands-on workshop with a focus on entomology included perspectives from colleagues in Colorado, Nebraska, and from Monsanto. Participants influenced decisions on over 876k acres. In addition to standard extension methods such as presentations and use of media, we had an app released in 2018 that was used for 190 samples, mostly for plant identification. We are also expanding our production of video content based on feedback from our stakeholder advisory committee and filmed content for three videos. Our Schutter Diagnostic Laboratory processed 2967 samples for plant disease, insect, weeds, mushrooms, herbicide injury, and abiotic causes during the reporting period and feedback from our annual client survey consistently indicates the lab and the IPM personnel associated with the lab is an invaluable resource for the state. The estimated economic impact of the lab in 2018 was over $7.5 million. We are expanding our services to local foods production based on perceived need measured in multiple

surveys by extension specialists. We distributed diagnostic tests for rapid plant diseases in county extension offices (Tobacco mosaic virus, fire blight, and late blight). These kits helped increase the authoritativeness of the county agent in identifying plant diseases and provide management recommendations to clients without delays caused by submitting a physical sample to the diagnostic lab for testing. The Pest Management Tour for pesticide applicators was held in six counties with 160 participants. Due to increased sample submission of herbicide injury (90% increase from 2013 to 2018), a hands-on workshop was developed and delivered in 13 workshops reaching over 500 participants. A written guide is also being developed.

2. Increase relevance of federal and regional IPM RFA's, programs, and policies to better align them with regional stakeholder needs.

Montana has participated in Pest Management Strategic Plans for Pulse Crops and Wheat in recent years. We participate in regional and national committees including WERA-97, WERA-1017, the NCIPMC's Pulse Crop Working Group, etc. to provide feedback to agencies. We hold an annual stakeholder advisory meeting where representatives from all major foci of the project are represented including state and federal agencies.

3. Enhance collaboration, sharing of ideas, and hence creation of regional outputs such as multi-state grants and shared outreach materials.

- In July of 2018, a 2 day IPM Horticultural Workshop was hosted in Missoula, MT. 33 extension agents from Montana and Idaho along with level three Montana Master Gardeners attended. Presentations included: 'Plant disease diagnostic kits for rapid diagnosis,' 'How do herbicides kill plants?', 'Organic pest management for gardens and orchards' and 'Facts and myths of western spiders,' among other topics. 95% of those surveyed either somewhat or strongly agreed to the statement "The education content of this session…helped me better understand the issues surrounding urban pests and plant disease."

- The IPM Workshop: Entomology was held on June 18 and 19th of 2018.Topics included were floral biodiversity, insecticide modes of action, wheat stem sawfly. Ten workshop participants managed >876k acres. 95% of respondents to the survey replied that by attending the IPM workshop it had improved their ability to present IPM alternatives to customers.

- Information from Montana was included in the Guide: apple maggot, spotted-wing drosophila, codling moth, and other relevant insect pests in tree fruits. 95 copies of the Intermountain Tree Fruit Guide were distributed to County Extension Agents and Fruit Tree Producers in the Fall of 2018.

- Dr. Cathy Cripps of Montana State University presented a talk on on Native Mycorrhizal Fungi and Whitebark Pine Restoration at the Utah State Forestry Learn at Lunch webinar with 291 attendees. 34% surveyed indicated that they were involved with arboriculture.

4. Improve coordination of IPM programs that address on-going, emerging and other critical pest and related environmental issues.

Several PIs have grant active research and extension programs addressing emerging and critical pest issues including invasive grasses, pulse crop root rots, alfalfa weevil, nontarget herbicide injury, herbicide resistant weeds, and First Detector training. These programs are funded by state, regional, and federal grant agencies such as the Montana Wheat and Barley Committee, the Montana Noxious Weed Trust Fund, the Western Region IPM Center, and USDA-NIFA, among others.

Accomplishments

Total number of peer-reviewed publications:22
Total number of non-peer reviewed publications: 77
Total number of presentations: 67 + 11 appearances on Montana Ag Live (Montana PBS) =78 total presentations
Total number of people reached during this reporting period: 3,872 + Montana Ag Live (20,000/episode) 220,000 = 223,872

Publications

Peer reviewed publications

1. Smith, D., Wise, K., Freije, a., Sisson, A., Friskop, A., Tenuta, A., Byamukama, E., Marshall, J., Burrows, M., Mueller, D. A Farmer's Guide to Wheat Diseases. APS Press (in press)
2. Burrows, M., Chen, W., Harveson, R., Pasche, J., Porter, L. Compendium of Pea Diseases and Pests. APS Press. (in final review)
3. McKenzie, S., Parkinson, H. h., Mangold, J., Burrows, M., Ahmed, S., Menalled, F. Perceptions, experiences, and priorities supporting agro-ecosystem management decisions differ among agricultural producers, consultants, and researchers. Sustainability.
4. Friskop, A., Shashi, Y., Gudmestad, N. C., Fuller, K. B., Burrows, M. Low Benefits from Fungicide Use on Hard Red Wheat in Low-Disease Environments. Plant Health Progress, 19(4), 288-294.
5. Owati, A., Agindotan, B., Burrows, M. First Microsatellite Markers Developed and Applied for the Genetic Diversity Study and Population Structure of Didymella pisi Associated with Ascochyta Blight of Dry peas in Montana. Fungal Biology.
6. Agindotan, B., Finoglio, J., Najib, M., McPhee, K. E., Burrows, M. (in press). First report of Bean leafroll virus in chickpea, lentil, and dry pea in Montana. Plant Disease
7. Owati, A., Agindotan, B., Burrows, M. (2018). Owati, A, B. Agindotan, M. Burrows. 2018. Characterization of fungi species associated with Ascochyta blight of field peas in Montana. Poster 317-P. July 29-Aug 3, 2018. Boston, MA.. Plant Disease.
8. Robertson, H., Waterhouse, R., Walden, K., Ruzzante, L., Reijnders, M., Coates, B., Legai, F., Gress, J., Biyiklioglu, S., Weaver, D., Wanner, K., Budak, H. (2018). Genome sequence of the wheat stem sawfly, Cephus cinctus, representing an early-branching lineage of the Hymenoptera, illuminates evolution of hymenopteran chemoreceptors. Genome Biology and Evolution, 10(11), 2997-3011.
9. Davis, S., Mangold, J., Menalled, F., Orloff, L. N., Miller, Z., Lehnhoff, E. (2018). A meta-analysis of Convolvulus arvensis (field bindweed) management in annual and perennial systems. Weed Science, 66(4), 540-547
10. Davis, S., Mangold, J., Menalled, F., Orloff, L. N., Miller, Z., Lehnhoff, E. (2018). A meta-analysis of Canada thistle (Cirsium arvense) management. Weed Science, 66(4), 548-557.
11. Mangold, J., Fuller, K. B., Davis, S. C., Rinella, M. J. (2018). The economic cost of noxious weeds on Montana grazing lands. Invasive Plant Science and Management, 11, 96-101
12. Menalled, U. D., Davis, S. A., Mangold, J. (2018). Running off the road: roadside non-native plants invading mountain vegetation. Invasive Plant Science and Management, 11, 101-106.
13. Ehlert, K., Thorton, A., Mangold, J., Menalled, F., Miller, Z. (in press). Temperature effects on three Bromus tectorum (cheatgrass, downy brome) populations inoculated with the fungal pathogen Pyrenophora semeniperda. Invasive Plant Science and Management.
14. Ehlert, K., Mangold, J., Menalled, F., Miller, Z., Dyer, A. (in press). Seeding, herbicide, and fungicide impact on perennial grass establishment in cheatgrass infested habitats. Ecological Restoration.

15. McDougall, K. L., Lembrechts, J., Rew, L., Haider, S., Cavieres, L. A., Kueffer, C., Milbau, A., Naylor, B. J., Nuñez, Martin A., Pauchard, A., Seipel, T., Speziale, K. L., Wright, G. T., Alexander, J. M. (2018). Running off the road: roadside nonnative plants invading mountain vegetation. Biological Invasions, 20(12), 3461–3473. https://doi.org/10.1007/s10530-0181787-z
16. Adhikari, S., T. S., Menalled, F., Weaver, D. (2018). Farming system and wheat cultivar affect infestation of, and parasitism on, Cephus cinctus in the Northern Great Plains. Pest Management Science, 74(11), 2480-2487. https://onlinelibrary.wiley.com/doi/full/10.1002/ps.4925
17. Haider, S., Kueffer, C., Bruelheide, H., Seipel, T. F., Alexander, J., Arevalo, J., Cavieres, L., McDougall, K., Milbau, A., Naylor, B., Rew, L., Speziale, K., Pauchard, A. (2018). Mountain roads and non-native species modify elevational patterns of plant diversity. Global Ecology and Biogeography, 27(6), 667-678. https://doi.org/10.1111/geb.12727
18. Ishaq, S., Seipel, T. F., Yeoman, C., Menalled, F. Rhizosphere bacterial communities of wheat vary across the growing season and among dryland farming systems.
19. Rhanabhat, N., T. Seipel, E. Lehnhoff, Z. Miller, K. Owen, F. Menalled, M. Burrows. 2018. Weather and alternative hosts surrounding wheat influences wheat curl mite (Aceria tosichella Keifer) infestation and wheat streak mosaic virus infection during autumn in Montana, USA. Plant Dis. 102: 546-551. (Editor's Pick) https://doi.org/10.1094/PDIS-06-17-0782-RE
20. Owati, A, B. Agindotan, M. Burrows. 2018. First Microsatellite Markers Developed and Applied for the Genetic Diversity Study and Population Structure of Didymella pisi Associated with Ascochyta Blight of Dry peas in Montana. Fungal Biology (submitted).
21. Friskop, A., S. Yellareddygary, N. Gudmestad, M. Burrows. 2018. Low benefits from the from fungicide use in hard red wheat in the absence of disease. Plant Health Progress. 19:288-294. doi:10.1094/PHP-06-18-0028-RS
22. Agindotan, B., J. Fenoglio, M. Najib, K. McPhee, and M. Burrows. 2018. First report of Bean leafroll virus in chickpea, lentil, and dry pea in Montana. Plant Disease. (accepted

Extension Publications

1. Kerzicnik, L. M. (2018). Fall 2018 Newsletter for AMTOPP_To treat or not to treat
2. Eilers, S. E., Grimme, E., Kerzicnik, L. M., Orloff, L. N., Day, T., Palmer, D. (2018). 2019 Calendar - Pests in the Garden. Bozeman, MT: Montana State University Extension
3. Kerzicnik, L. M. (2018). Summer 2018 Newsletter for AMTOPP
4. Kerzicnik, L. M. (2018). Tarantulas in Montana. Plant Sciences Monthly Newsletter
5. Day, T. (2018). Day_2018_You can grow blackberries (December 2018 ed.). PSPP Newsletter.
6. Day, T. (2018). Day_2018_Mulching Your Plants for Winter (November 2018 ed.). PSPP Newsletter.
7. Day, T. (2018). Day_2018_Spooky Plants (October 2018 ed.). PSPP Newsletter
8. Day, T. (2018). Day_2018_Bees, Wasps and Yellow Jackets (September 2018 ed.). PSPP Newsletter.
9. Day, T. (2018). Day_2018_Water Efficiently this Year (June 2018 ed.). PSPP Newsletter.
10. Tharp, C. I. Paraquat Mitigation Measures Approved by EPA. Montana IPM Bulletin: Fall 2018 (vol. Fall 2018). Bozeman: Montana IPM Bulletin. http://www.pesticides.montana.edu/news/bulletins.html
11. Tharp, C. I. Agent Update for Fall 2018. PSEPInsider (vol. Fall 2018). Bozeman: PSEPInsider. 103 Animal Bioscience Building

Media

1. Tharp, C. I. Fumigation Trainings Offered Across Montana. MSU News. Bozeman: MSU NEWS. msunews.com
2. Tharp, C. I. Pest Management Tour Offered Across Northwestern MT. MSU News. Bozeman: MSU NEWS. MSU NEWS DOT COM

Montana Ag and Urban Alerts

1. Section 18 label for using Esplanade 200 SC (indaziflam) to control ventenata and medusahead 08/02/2018 / Jane Mangold

2. The Montana Pesticide Waste Disposal Program and 2018 Disposal Sites 07/10/2018 / Cecil Tharp
3. Cephalosporium stripe in winter wheat widespread 07/09/2018 / Mary Burrows
4. Agricultural Establishments should only use Expanded WPS Materials when Training Workers/Handlers. 07/03/2018 / Cecil Tharp
5. Disease update for cereals and pulses 06/21/2018 / Mary Burrows
6. Update to pulse fungicide table 06/20/2018 / Mary Burrows
7. Fungicide tables - wheat, pulses 06/19/2018 / Mary Burrows
8. Some abiotic damage on wheat prevalent in the state 06/19/2018 / Mary Burrows
9. Powdery mildew is widespread on wheat in the state 06/19/2018 / Mary Burrows
10. Herbicide Carryover in Pulse Crops 06/15/2018 / Lesley Orloff
11. Frost damage and some damage to anticipate in the coming week 06/14/2018 / Mary Burrows
12. Ascochyta on Pulse Crops 06/13/2018 / Eva Grimme
13. Time to Monitor Alfalfa for Weevil Damage 06/11/2018 / Kevin Wanner
14. Abiotic and biotic diseases of cereal grains 06/07/2018 / Mary Burrows
15. Seasonal Needle Drop 10/05/2018/Eva Grimme
16. Leaf Scorch 07/27/2018/Eva Grimme
17. Snow Molds in Lawns 03/27/2018 / Eva Grimme
18. Fire Blight - Symptoms and New Resources 5/15/2018/Eva Grimme
19. Elm Seed Bug 9/25/2018/Laurie Kerzicnik
20. Cat Faced Spiders 9/10/2018/Laurie Kerzicnik
21. Seed Bugs invading buildings/9/07/2018/Laurie Kerzicnik
22. Hobo Spiders 8/21/2018/laurie Kerzicnik
23. Social Wasps 7/31/2018/Laurie Kerzicnik
24. Aspen Blotch Leafminer 7/26/2018/laurie Kerzicnik
25. Solfugids 7/11/2018/Laurie Kerzicnik
26. Earwigs 6/29/2018/laurie Kerzicnik
27. White Satin Moth caterpillars 6/15/2019
28. Herbicide Injury to ornamental plants 6/12/2018/ Noelle Orloff
29. May/June Beetles_statewide 6/08/2018/Laurie Kerzicnik
30. Home-Invading Weevils_statewide 06/06/2018
31. Sculptered pine borer 5/03/2018/Laurie Kerzicnik/
32. 2018 Pesticide Education Program Train-the-Trainer Update 7/16/2018/Cecil Tharp
33. Pesticide Applicators should be aware of new WPS Requirements as of January 1st, 2018. (Pesticides) Cecil Tharp
34. 2019 Crop and Pest Management School 12/22/2018 / Kevin Wanner
35. EPA Mitigation Measures Approved by EPA 11/19/2018 / Cecil Tharp
36. Fumigant Trainings offered Across Montana. 08/17/2018 / Cecil Tharp
37. Labops Black Grass Bugs Damaging Pasture and Range Grasses 06/02/2018 / Ruth O'Neill
38. Pythium root rot active on many crops 05/21/2018 / Mary Burrows
39. Entomology IPM training opportunity for CCAs, county agents, other agricultural professionals 05/18/2018 / Mary Burrows
40. Winter-Killed Crested Wheatgrass and Yellow Alyssum 05/18/2018 / Lesley Orloff
41. Lentil Roll Timing 05/15/2018 / Eva Grimme
42. "Chickpea seeding date 05/14/2018 / Mary Burrows "
43. Decreasing Pesticide Impacts to Pollinators: Best Management Practices and FieldWatch 05/08/2018 / Cecil Tharp
44. NDSU crop pest report 05/03/2018 / Mary Burrows
45. Wheat fungicide table for 2018 04/20/2018 / Mary Burrows
46. Snow mold in winter wheat this spring 04/20/2018 / Mary Burrows
47. Online tools for cropping decisions. 04/13/2018 / Mary Burrows
48. Worker Protection Standard Trainings (WPS) across Montana 04/06/2018 / Cecil Tharp

49. Public comment period, risk assessment for four neonicotinoid insecticides 01/30/2018 / Ruth O'Neill
50. Bat Standards Course Offered by NWCOA 01/19/2018 / Cecil Tharp
51. Reoccurrence of new pest - pea weevil in Montana 01/16/2018 / Mary Burrows
52. New RMA statement for chickpea: organic grower's options 01/12/2018 / Mary Burrows
53. pine needle scale 10/18/2018/ Laurie Kerzicnik
54. Snow fleas 3/18/2018/ Laurie Kerzicnik
55. False Chinch bugs 9/25/2018/ Laurie Kerzicnik
56. Social Wasps 8/20/2019/ Laurie Kerzicnik
57. Codling Moth 5/22/2018/ Laurie Kerzicnik
58. Ticks are Out 5/1/2018/ Laurie Kerzicnik
59. Tuxedo Bugs 4/13/2018/ Laurie Kerzicnik
60. White Pine Weevil 3/19/2018/ Laurie Kerzicnik
61. Wasp Urban Ag Alert 3/29/2018/ Laurie Kerzicnik
62. Conifer Spiddle bug 3/29/2018
63. Dirt-colored seed bug /Laurie Kerzicnik
64. Leaf Curl Ash Aphid/Laurie Kerzicnik
65. Clover Mites/Laurie Kerzicnik