

Schutter Diagnostic Lab Report, 2013

Impacts of the Schutter Diagnostic Lab

- Performed over 1830 diagnoses on 1630 disease, insect and plant identification samples.
- Estimated economic impact per client was \$523, with an estimated total impact of \$900,000 to SDL clients on 3.6 million acres.
- One client stated the impact was in the '100s of thousands.' One wheat grower did not spray a fungicide and saved \$700k with no perceived yield loss due to disease.
- Failures of Priaxor fungicide were noted on Ascochyta blight of chickpea in 2013. An isolate from a grower in northern Montana was subsequently found resistant to Headline, a component of Priaxor. Advice from MSU Extension Plant Pathologist Mary Burrows to spray the crop with Proline saved the chickpea crop for several growers.
- In Dr. Kerzicnik's first week on the job, she identified a sap beetle, *Brachypeplus basalis* submitted by a curious commercial beekeeper. This beetle has been identified 3 times in the US, always associated with bees. The implications of this finding are unknown, but educational efforts will be conducted in cooperation with APHIS-PPQ and the Montana Department of Agriculture.
- Twenty nine plant identification samples were submitted to determine if they were toxic to livestock (cattle, horses and a mule) five of which were toxic, enabling producers to prevent further illnesses.
- Ten plant identification samples were submitted to determine if they were edible to humans, four of which were toxic, thereby preventing the potential consumers from becoming very ill.
- Medusahead (*Tainiatherum caput-medusae*) and garlic mustard (*Alliaria petiolata*) were identified, both first records in Montana of highly invasive weeds. Identification enabled early detection and rapid response, preventing further spread of these new invaders, which have cost other states millions in control costs or lost livestock forage production.
- Diagnosis was used to settle a legal issue between neighbors.
- Many clients reported avoiding pesticide treatments to landscapes and crops or were able to save important landscape trees worth several thousand dollars.
- 88% of clients rated services as "highly valuable"
- 81% of clients felt they made better management decisions due to clinic services.
- Research performed by an undergraduate has been submitted for publication and resulted in the recommendation that pulse growers use Stamina seed treatment as part of an integrated management strategy for Ascochyta blight in pea and lentil.
- Undergraduate who trained for 3 years in lab became an inspector with the state department of agriculture after graduation.
- Graduate student published two first reports of diseases in Montana, one of concern to the expansion of garlic cultivation in Montana and the other a powdery mildew on a widely grown ornamental, caragana.

Quotes from clients:

"I use the clinic to identify potential weeds so that I can provide management recommendations to clientele. The economic value is hard to estimate because I do not know the clientele follow-up management, costs, effectiveness, etc."

"We submitted unidentified plants to determine the viability of pursuing a grant project for Aquatic Invasive Plant Species. There was potential for this information to result in a comprehensive grant program for our region."

"Our best resource for unbiased results. So many clients are compelled to use specific services related to results given in yard and landscape challenges. Nice to offer clients an answer from professionals not associated with a lawn or yard service, then leave it up to them if they want to tackle the issue themselves or hire someone."

"Definitely will use the lab services again!"

2013 Plant Disease and Insect ID Summary

Diagnostic Staff:

Linnea Skoglund, Plant Disease Diagnostician
 Hilary Parkinson, Plant Identification Diagnostician
 for herbicide injury
 Toby Day, Horticulture Specialist
 Laurie Kerzicnik, Insect Diagnostician (October)
 Ed Barge, Graduate Student Intern (summer)

Montana Department of Agriculture:

Cam Lay and Ian Foley, Entomologists

Extension Specialists:

Dr. Mary Burrows, Plant Pathologist, field crops
 except row crops
 Dr. Barry Jacobsen, Plant Pathologist, row crops
 (sugar beets, potatoes, dry beans)
 Dr. Kevin Wanner, Entomologist, field crops

Cooperators:

Dr. Bill Grey, foundation seed and Dr. Nina Zidack –
 potatoes
 Dr. Cathy Cripps, Mushroom ID

In 2013, we made 1283 diagnoses or identifications on 1,090 disease and insect samples (Table 1). We received samples from, CA (1), ID (2), and WA (1). The insect diagnostician position was filled in October by Dr. Laurie Kerzicnik. Insects (about 135 specimens) were sent to the Montana Department of Agriculture for identification and recommendations. Plant damage and the remainder of the insects were identified by Toby Day and Linnea Skoglund and Mr. Day provided control recommendations.

Table 1. Numbers of disease and insect samples and diagnoses and IDs received in 2012.

	# samples	# diag/IDs
Disease	768	892
Insects	322	391
Total	1090	1283

County Extension Agents or Extension Specialists submitted 66% of samples and 34% were submitted directly to the diagnostic lab by commercial operators or individuals. Noncommercial clients (primarily homeowners) outnumbered commercial clients (producers, consultants, landscape

2013 IMPACTS

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Identified Alfalfa downy mildew and Goss's wilt of corn, which have not been seen in Montana for 30 years.

In Dr. Kerzicnik's first week on the job, she identified a sap beetle, *Brachyepplus basalis* submitted by a curious commercial beekeeper. This beetle has been identified 3 times in the US, always associated with bees. The implications of this finding are unknown, but educational efforts will be conducted in cooperation with APHIS-PPQ and the Montana Department of Agriculture.

Research performed by an undergraduate has been submitted for publication and resulted in the recommendation that pulse growers use Stamina seed treatment as part of an integrated management strategy for Ascochyta blight in pea and lentil.

Failures of Priaxor fungicide were noted on Ascochyta blight of chickpea in 2013. An isolate from a grower in northern Montana was subsequently found resistant to Headline, a component of Priaxor. Advice from MSU Extension Plant Pathologist Mary Burrows to spray the crop with Proline saved the remainder of the chickpea crop.

Diagnosis of disease on tree delivery led to refund for a Gallatin County nursery.

ID of spider as a non-threatening species gave psychological relief to park employees.

Saved homeowner's raspberry crop without pesticide use.

New MT records for the beetles *Amlycerus robinieae* (a.k.a honey locust buchrid) & *Callosobruchus chinensis* a.k.a bean weevil) to help track the spread of invasive pests and allow for accurate control measures

Quotes about our services:

"Peace of mind is invaluable!"

"Saving the lives of family members (with a correct mushroom ID) is definitely priceless!"

"Our best resource for unbiased results."

professionals) 67% to 33%. Homeowners accounted for approximately 48% of all samples.

Disease and insect samples were submitted by 50 Montana counties (Table 2). Gallatin County submitted three times as many samples as any other county (221), but significantly less than in 2012 (318). This is likely a result of our providing training and education to the new ag agent in 2012-2013.

Table 2. Disease and insect identifications by county in 2013.

Gallatin	221	Judith Basin	22	Daniels	9	Powell	4
Hill	78	Carbon	22	Roosevelt	9	Sanders	4
Yellowstone	74	Lewis and Clark	18	Garfield	9	Fallon	4
Ravalli	68	Sweet Grass	18	Rosebud	9	Richland	3
Liberty	46	Beaverhead	17	Broadwater	7	Sheridan	3
Cascade	44	Missoula	17	Glacier	7	Blaine	3
Pondera	41	Big Horn	15	Wibaux	7	Jefferson	3
Lake	41	Fergus	13	Musselshell	6	Phillips	3
Park	36	Stillwater	12	Lincoln	5	Carter	2
Chouteau	32	Dawson	11	Prairie	5	Custer	2
Toole	31	Madison	10	Meagher	5	Wheatland	1
Flathead	28	Valley	10	Silver Bow	5		
Teton	26	McCone	10	Powder River	5		

Turf and ornamentals (T&O) made up 37% and 33% of disease and insect samples, respectively (Fig. 1). This is consistent with 2012. Small grains (primarily wheat) accounted for 25% of disease samples and 2% of insect samples. Most of these insect samples go directly to Dr. Kevin Wanner; therefore, this does not represent the importance of insects on small grains. Thirty-eight percent of insect samples were for identification of insects, mites and spiders (bugs-in-bottles). There were 33 spiders submitted. The remaining disease and insect samples were distributed among field crops, vegetables, fruits and mushrooms.

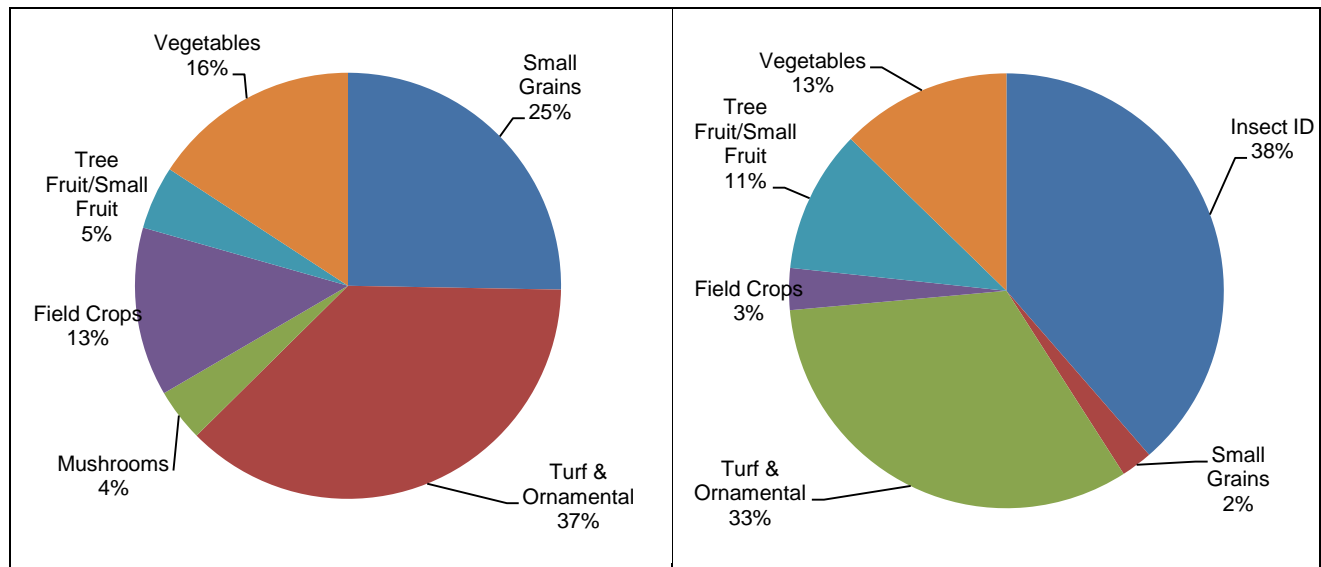


Figure 1. Distribution of disease samples (left) and insect samples (right) by host category.

Forty seven percent of T&O samples were diagnosed as abiotic, 28% were insects and 21% were diseases (Fig 2). The most common biotic problems were spider mites, eriophyid mites, aphids, *Cytospora* canker, and rusts.

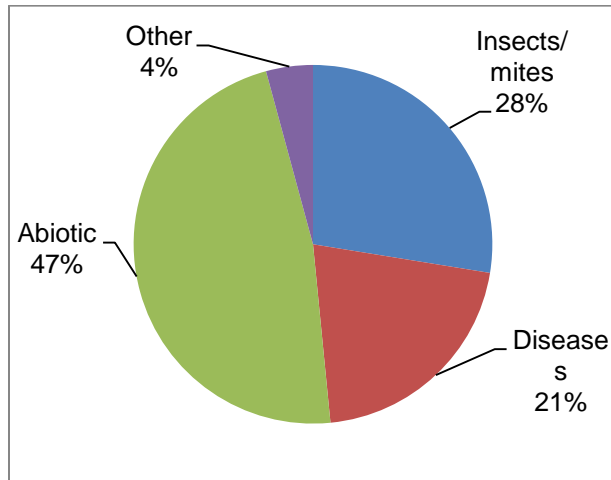


Figure 2. Distribution of diagnoses for Turf and Ornamental samples.

Forty one percent of small grains, field and forage crops diagnoses were abiotic. Root diseases were identified 22% of the time. Alfalfa downy mildew was identified in alfalfa samples from Broadwater and Phillips Counties for the first time in several years. *Ascochyta* blight was widespread, especially on chickpeas where a strobilurin and SDHI fungicide blend (Priaxor) did not appear to control the disease. We are currently monitoring for fungicide resistance to the strobilurin, triazole, and SDHI classes of chemistry in *Ascochyta*/*Mycosphaerella* isolates collected in MT, ND, and WA from pea, lentil, and chickpea with a grant from the Montana Specialty Crops Research Initiative.

For the insect samples submitted, over 18% were beetles that were mostly domestic/household. Mites from trees and household clover mites comprised another 18% of the samples. There were several aphid samples from trees. Scale samples were submitted from pine and spruce trees. Additionally, a few bed bugs, moths, and dog ticks were submitted. Of the spider samples submitted, most were the hobo spider, *Eratigena agrestis*, or were submitted for concern of whether or not they were hobo spiders.

Other Activities

We tested 274 samples of lentil, pea, and chickpea seed for *Ascochyta* blight fungi in 2013. We processed 146 samples from Jan – May (2012 harvest) and 128 samples from July – Dec (2013 harvest). These results are crucial to grower decision making on planting, seed treatments, and preventative foliar fungicide applications to manage their risk.

Ninety four *Ascochyta* isolates collected from peas and lentils harvested in 2012 and submitted for seed testing in 2012/2013 were tested for sensitivity to Headline, a strobilurin fungicide. None of the isolates showed significant resistance to the fungicide. Isolates were deposited at NDSU. Isolates are being collected from seed harvested in 2013, tested for fungicide sensitivity and deposited at NDSU. Thus far, one isolate from chickpea has been found to be resistant to Headline and the grower has been notified. A fungicide failure was noted in this field during 2013.

A research project by undergraduate Laurie Neuman was submitted for publication in Plant Disease Management Reports with Ms. Neuman included as a co-author. This research project resulted in the recommendation that the fungicide seed treatment Stamina performs as well as, or better than, the industry standard Mertect at controlling Ascochyta blight of pea and lentil. Growers have been receptive to this information as Stamina is generally more available and easier to apply to seed on-farm than Mertect.

We assisted the Montana Department of Agriculture CAPS surveys by processing 125 samples for Plum Pox Virus (a federally regulated virus of fruit trees) monitoring.

We coordinated the Great Plains Diagnostic Network Webinar Series on topics including new diseases such as Impatiens downy mildew, the complex subject of viruses on brambles, and general information on mites – bad to beneficial. There were 8 presentations in January to March, attended by over 315 people. A complete list and recordings of the seminars can be found at www.gpdn.org.

There are 719 subscribers to the AgAlert system, an increase of 100 from 2012. Each AgAlert is downloaded by 200-550 individuals. These are often used as the basis of newsletter articles, radio spots, and shared with subscriber's social network. There are 197 subscribers to the Urban IPM News & Notes.

We presented a workshop on insect pests in urban landscapes to 70 landscape professionals. Prior to the workshop, the guest speaker, Dr. Whitney Cranshaw of Colorado State University, presented a talk to the public at MOR.

We trained one graduate student intern in plant disease diagnosis.

We began the National Plant Diagnostic Network STAR-D Accreditation process.

Diagnosticians participated in the following:

- Extension booth at the Bozeman Farmers' market
- Science Olympiad State Finals – Entomology test
- Science Fair – Morningstar Elementary School

Certifications

Dr. Skoglund completed the Plum Pox virus ELISA proficiency test and continued as a USDA/APHIS PPQ certified diagnostician for PPV.

Publications

Burrows, M., L. Neuman, L. Skoglund. 2013. Evaluation of seed treatment fungicides for management of Ascochyta blight in lentil, 2012. Plant Disease Management Reports. (submitted)

Lonergan, E., and Skoglund, L. G. 2013. First report of *Embellisia allii* causing skin blotch and bulb canker on garlic in Montana. Online. Plant Health Progress doi:10.1094/PHP-2013-0924-01-BR.

Lonergan, E., and Skoglund, L. G. 2013. First report of powdery mildew (*Microsphaera palczewskii*) on Siberian peashrub (*Caragana arborescens*) in Montana. Online. Plant Health Progress doi:10.1094/PHP-2013-0327-01-BR.

2013 Plant Identification Summary

Diagnostic Staff:

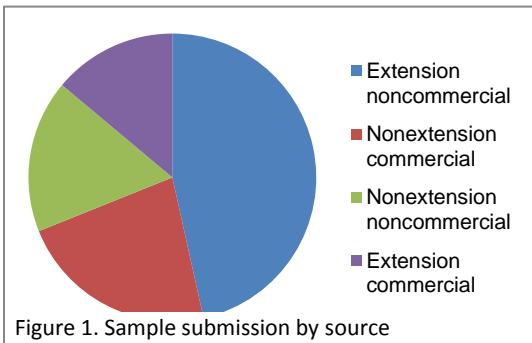
Hilary Parkinson- Plant Identification
Diagnostician and Research Associate

Extension Specialists:

Dr. Fabian Menalled - Small grain crops;
Dr. Jane Mangold - Rangeland

In 2013, 547 samples were submitted to the Schutter Diagnostic Lab for plant identification, a 17% increase compared to 2012 submissions. Sample submissions were highest June through August, peaking in July with 110 plants total. Of the 547 plant submitted for identification, 84 had never been submitted to the Plant Diagnostic Information System database before. Forty-seven Montana counties (83.9%) submitted samples for identification (Table 1). The highest submissions were from Gallatin and Ravalli counties.

The highest number of samples came from homeowners (31%), farmers (11%) and researchers or specialists (8%). The remainder was from a variety of sources or source was not listed. Among the four types of submissions sources (Figure 1), the most common was extension, noncommercial. Sixty percent of the samples were from extension agents. Commercial samples, whether extension or not, accounted for 36% of the samples.



In addition to plant identification submissions, 60 samples were examined to assess potential herbicide injury, an 18% decrease compared to a record high number in 2012 when unfavorable weather conditions may have made plants more vulnerable to herbicide damage. Of the 60 samples submitted to assess herbicide injury, 18 showed symptoms consistent with PGR herbicides, a decrease from 22 submitted in 2012 and 25 submitted in 2011.

2013 Impacts

Identified medusahead (*Tainiatherum caput-medusae*) in Sanders County, and garlic mustard (*Alliaria petiolata*) in Daniels County, both first records in Montana of highly invasive weeds. Identification enabled early detection and rapid response, preventing further spread of these new invaders, which have cost other states millions in control costs or lost livestock forage production.

Eight plant identification workshops and numerous publications have increased awareness of the plant identification diagnostician position: sample submissions increased by 17%.

An attendee of a grass identification workshop submitted medusahead to the lab one month later; his participation in the workshop may have improved his ability to recognize an unusual grass

Comments from clients

"The service is fabulous. Avoided unnecessary application of herbicide and increased my confidence in detecting issues that need further evaluation".

"We use the lab all the time for weed and disease diagnosis. It helps us stay on top of potential problems in our research fields before they become an issue."

"The invasive weed was identified and suggestions were made for controlling it. The herbicide recommended worked! Nothing we've tried before worked."

"Weed identified within 24 hours! Wow!"

"I am now aware that replacement soil can contain herbicide residue and will check for that before I use any other soil."

"This service is invaluable and much needed in the community."

Samples came from 12 counties with Gallatin (4) and Hill (3) submitting the most. When samples suspected of herbicide injury come in, detailed reports are written to help educate the clients how to recognize symptoms based on the herbicide's mode of action.

Table 1. Plant Identification Totals by County in 2013

Gallatin	132	Toole	9	Sanders	4
Ravalli	41	Fergus	8	Cascade	3
Stillwater	25	Wibaux	8	Fallon	3
Yellowstone	23	Carbon	7	Glacier	3
Beaverhead	22	Wheatland	7	Petroleum	3
Hill	20	Lake	6	Prairie	3
Chouteau	19	Liberty	6	Teton	3
Jefferson	17	Daniels	5	Big Horn	2
Park	15	Musselshell	5	Custer	2
Lincoln	13	Phillips	5	Garfield	2
Sweet Grass	13	Roosevelt	5	McCone	2
Pondera	12	Silver Bow	5	Missoula	2
Flathead	10	Valley	5	Powder River	2
Dawson	9	Blaine	4	Granite	1
Judith Basin	9	Lewis & Clark	4	Meagher	1
Madison	9	Rosebud	4		

When samples with plant growth regulator herbicides come in, detailed reports with links to Montana extension publications are provided, describing the importance of verifying that manure or compost is not contaminated by plant growth regulator herbicides and how to conduct a bioassay. These efforts may have contributed to the decline in herbicide related samples.

Twenty-four of the submissions were state-listed noxious weeds (Table 2). Two plants were first ever state records: the invasive annual grass medusahead, *Taeniatherum caput-medusae*, which is a state listed noxious weed in many western states; and the invasive annual forb garlic mustard (*Alliaria petiolata*), which is a state listed noxious weed in many states in the Midwest and eastern half of the U.S. Twenty-nine plants were submitted to determine if they were toxic to livestock, five of which were. Ten were submitted by clients who planned to eat the plant, but wanted to verify it was safe. Four of those plants would have made the consumers very ill. Nine of the submissions were new county records and were added to the MSU herbarium. These records help track how plants are moving across the state and their ability to tolerate different climate regimes and habitats.

Table 2. State-listed noxious weed species submitted in 2013. Italics and bold indicate new county records.

Plant	County	Status
Bohemian Knotweed	Carbon (1), Judith Basin (1), Wibaux (1)	1B
Canada thistle	Gallatin (1), Madison (1), Yellowstone (1)	2B
Cheatgrass	Ravalli (1), Stillwater (1)	3
Field bindweed	Gallatin (1)	2B
Flowering Rush	Lake (1)	1B
Garlic mustard	Daniels (1)	*
Hoary alyssum	Daniels (1), Galatin (2), Lincoln (1)	2B
Houndstongue	Gallatin (2), Stillwater (1), Sweet Grass (2)	2B
Medusahead	Sanders (1)	*
Purple loosestrife	Sweetgrass (1)	1B
Spotted knapweed	Flathead (1)	2B
Sulfur cinquefoil	Gallatin (1)	2B
Whitetop	Judith Basin (1)	2B
*Not on the MT state list, but listed and highly invasive in other states.		

Twenty-three samples were aquatic plants. This is about half the numbers of aquatic samples received in 2012 and well below the record of 80 aquatic samples submitted in 2011. *Chara* or stonewort (a nonvascular plant) was the most commonly submitted. Native watermilfoils (*Myriophyllum* sp.), mare's tail (*Hippuris vulgaris*) and Canadian waterweed (*Elodea canadensis*) were also commonly submitted to verify they weren't the exotic Eurasian watermilfoil (*Myriophyllum spicatum*), or the exotic curlyleaf pondweed (*Potamogeton crispus*).

Numerous workshops and outreach efforts were undertaken in 2013 to increase awareness of new plant invaders and to educate people on how to identify noxious weeds. The plant identification diagnostician presented eight workshops on plant identification in 2013, presenting material to more than 285 people for a total of 388 contact hours. The three on-line courses created in the fall of 2012 on plant anatomy and plant identification were viewed by more than 100 people in 2013. Forty-three people took Plant Anatomy; 31 took Identification of Priority 1A-2A Species and 26 took Identification of Priority 2B and 3 Species. Licensed users received one private applicator credit and two commercial applicator credits for each course passed.

Additionally, two publications were created in 2013. The "Weed Seedling Identification Guide for Montana and the Northern Great Plains" is a 160 page booklet with color photos designed to help farmers and ranchers identify weed seedlings (Parkinson, Mangold, Menalled, EB0215). "Plant Identification Basics" covers essential plant anatomy terminology to assist with speedy and accurate plant identification (Mangold and Parkinson, MT201304AG). Both publications can be accessed on line at <http://store.msuextension.org/>. In collaboration with Missoula County, an on-line aquatic plant dichotomous key has been created and will be available in the spring of 2014. Additionally, the plant identification diagnostician assisted with production of the Monthly Weed Posts, <http://www.msuextension.org/invasiveplantsMangold/extensionsub.html> which cover identification, biology and ecology of state and county-listed weeds or new invaders.

Looking ahead, goals for 2014 are to (1) acquire grant funding to create an app from the "Weed Seedling Identification Guide for Montana and the Northern Great Plains", after numerous requests from users; (2) create a Montguide to help readers identify exotic thistles and differentiate from the numerous native thistles; (3) continue to offer workshops and training programs in coordination with Extension specialists, agents and weed coordinators to help Montana residents to identify plants, especially Montana noxious weeds or new invaders.

Publications

Parkinson, H., J. Mangold and F. Menalled. 2013. Weed Seedling Identification Guide for Montana and the Northern Great Plains. (EB0125). Montana State University Extension, Bozeman, MT.