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Sheboygan County with Specialization across Ozaukee and Washington Counties
Post Tenure Review – November 29, 2018

I. Major Programs:

Cover Crop Research in Grain Crop Systems

Situation:

While there has been an abundance of anecdotal information regarding the benefits of cover crops, there has been little University of Wisconsin research to evaluate the benefits of cover crops on: soil health, nutrient scavenging, nutrient recycling, erosion control, water quality and crop production benefits.

Response:

In an effort to provide research generated information regarding cover crops, on-farm small plot research was established in Sheboygan, Washington and Rock Counties. The initial work focused on Tillage Radish™ to evaluate the plant's ability to scavenge nutrients and thus supply those nutrients to the following year's crop. The research was also designed to evaluate if radish might replace the need for tillage on Eastern Wisconsin soils. A Team of UW-Extension county, regional and state faculty/staff came together to design and implement a research project addressing questions regarding the use of oilseed radish cover crops. Team members included: Mike Ballweg, Matt Ruark, Richard Proost, Jamie West and graduate student, Megan Chawner. The team initiated the study in the fall of 2011, establishing a cover crop of Tillage Radish.™ Field data collection concluded in the fall of 2014 with data analysis and document preparation continuing.

An additional cover crop research project was initiated in the fall of 2013 to study Berseem and Crimson Clovers and Barley as cover crops when compared to no cover crop.

The benefit of using legumes in crop rotations is well established. This study explores a cover crop system utilizing annual clovers in Eastern Wisconsin that takes advantage of shorter season crops (i.e. winter wheat, vegetable crops), to enhance rotational impacts, to provide nitrogen credits to the next year's crop, to grow additional biomass for improving soil health and/or to provide a late season forage crop.

This study addresses three questions: (1) What dry matter (DM) yields can be obtained from Berseem Clover (*Trifolium alexandrinum*), Crimson Clover (*Trifolium incarnatum*) and Barley (*Hordeum vulgare* L.) when planted following winter wheat in early to mid-August? (2) What nitrogen credit might be obtained from Berseem and Crimson clovers? (3) Do annual clovers provide a rotational benefit similar to what might be observed when corn follows alfalfa?

Planting cover crops after short season crops provides a great opportunity to capture the growing season's remaining precipitation and Growing Degree Days (GDDs) thus maximizing the land base use. Approximately 40% of annual precipitation and GDDs occur after August 1st in Wisconsin.

Outcomes:

Educational Programs and Presentations made in 2018

1. Cover Crop Strategies after Short Season Crops

Wisconsin Cover Crop Webinar Series, January 31, 2018

Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 80

<https://sheboygan.uwex.edu/files/2018/10/Cover-Crops-Strategies-After-Short-Season-Crops.pdf>

2. Cover Crops and Soil Health

Sheboygan River Progressive Farmers' Field Day, June, 2018 Eden, WI

Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 100

<https://sheboygan.uwex.edu/files/2018/10/Cover-Crops-and-Soil-Health.pdf>

3. Management Practices to Keep Nutrients in the Field and Out of the Tile Lines

Tile Drainage on Agricultural Lands, August, 2018, Waldo, WI

Mike Ballweg, UW-Extension Crops and Soil Agent/ attendance ~ 80

Educational Programs and Presentations made in 2017

1. Wisconsin Ag Agency Cover Crop Meeting

Madison - Expo Alliant Center, February, 2017

Cover Crops after Short Season Crops - Panel Discussion

Panel: Mike Ballweg (UW-Extension Sheboygan County), Kevin Shelley (UW Nutrient and Pest Management Program), Tonya Gratz (Green county LWCD)

Attendees included agency staff from Land and Water Conservation departments, DNR, NRCS and non-profit conservation groups. attendance ~ 135

2. 2017 Soil Health and Cover Crop Forum, March , 2017 Manitowoc, WI

Cover Crop Strategies: "When" and "How" to Plant Cover Crops.

Mike Ballweg, UW-Extension Crops and Soils Agent

Participants included: farmers, DNR, DATCP, UW-Extension Educators and Land Conservation Department staffs. attendance ~ 100

3. 2017 Wisconsin Cover Crop Conference: A Tour Examining the Role of Cover Crops in Soil Health and Water Quality. October, 2017 - Washington and Ozaukee Counties

Corn Yields Following Annual Clovers: Sheboygan County Research Results.

Mike Ballweg, UW-Extension Crops and Soils Agent / attendance ~ 80

4. Managing Nitrogen for Maximum Returns

Wednesday, August 16, 2017

Mike Ballweg, UW-Extension Crops and Soils Agent

Sheboygan County Forage Council Summer Meeting

Fly - By Acres, Sheboygan Falls, WI /attendance ~ 50

Teaching Evaluation

Below is the change in knowledge levels (before and after) when participants were asked about growing covering crops after winter wheat - 2017 Wisconsin Cover Crop Conference

	No knowledge	Slight knowledge	Some knowledge	Moderate knowledge	Highly knowledgeable
Before	22.22% 6	33.33% 9	25.93% 7	18.52% 5	0.00%
After	7.41% 2	22.22% 6	18.52% 5	37.04% 10	14.81% 4

Educational Programs and Presentations made in 2016

- 1. Wisconsin Ag Agency Cover Crop Meeting**, September, 2016, Madison, WI
Berseem and Crimson Clovers after Wheat in Sheboygan County
 Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 125
 Participants included: DNR, DATCP, UW-Extension Educators and Land Conservation Department staffs.
- 2. Managing Nutrients and Cover Crops**, Clean Farm Families – Ozaukee County
Berseem and Crimson Clovers after Wheat in Sheboygan County
 Mike Ballweg, UW-Extension Crops and Soils Agent/attendance ~ 50
 Attendees included: farmers, industry agronomists and agency partners.
- 3. Bio-Solids and Crop Management Opportunities to Improve Nutrient Management**
 December, 2016, Plymouth, WI
Cover Crops – An Opportunity to Improve Soil and Retain Nutrients
 Mike Ballweg, UW-Extension Crops and Soil Agent/ attendance ~ 35
 Attendees included: wastewater treatment operators, City of Plymouth officials, farmers and DNR staff
- 4. Soil Health and Cover Crop Forum**, March , 2016 Manitowoc, WI
Annual Clovers and Small Grains as Cover Crops
 Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 80
 Participants included: farmers, industry agronomists and agency partners.
- 5. Cover Crop Field Day Trek**, October, 2016, Oostburg, WI
Cover Crops after Small Grain Harvest, Red Cover Frost Seeding, and Interseeding Cover Crops
 Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 30
- 6. 2016 Soil, Water, & Nutrient Management Meeting.** Annual Clover Cover Crop research results generated in Sheboygan County was shared at 8 locations around the state. Research

results were presented by Matt Ruark. About 400 Industry agronomist and agency staff attended the 2016 Soil, Water and Nutrient Management meetings statewide.

7. National Corn Growers and The Nature Conservancy Field Day,
September, 2016, Plymouth, WI

Legumes as Clover Crops after Small Grains

Mike Ballweg, UW-Extension Crops and Soils Agent/ attendance ~ 20

8. Managing Tillage and Reducing Soil Compaction for Improved Soil Health,
August 2016, Waldo WI

Mike Ballweg, Crops and Soil Agent/ attendance ~ 100

UW-Extension, Gibbsville Implement and Sheboygan County Forage Council

9. Other Agronomic Programs

Agronomy Day - annual educational program, 1990 - present/ annual attendance ~ 125

Audience: Tri-County Farmers – Sheboygan, Ozaukee Washington Counties

Approximately 1100 people attended field days, workshops and seminars from 2015 – 2018 where Sheboygan County cover crop research data was shared and/or this educator discussed the benefits of cover crops and soil health. UW-Extension educational programs provided a platform for building cover crop agronomic capacity among NRCS and County Land and Water Conservation Department staffs. I would estimate that 70 -90 farmers had used cover crops for the first time during this time period.

Alfalfa Forage Production and Utilization

Situation:

Wheat is an important agronomic crop in Eastern Wisconsin and is often followed by a late summer seeding of alfalfa. In this situation, volunteer wheat becomes a weed and impacts alfalfa establishment and productivity, especially in no and reduced till fields. Previous research in Wisconsin has shown that volunteer wheat can reduce alfalfa density by up to 50%, resulting in shorter alfalfa stand life and reducing forage quality the following spring. Past research documented a well-timed application of sethoxydim (Poast Plus) during establishment in the fall when wheat is < 6 inches tall can alleviate this impact and provide excellent control. However, Glyphosate tolerant alfalfa technology may provide another effective herbicide option. Can the use of Glyphosate Resistant Alfalfa be a more effective technology for establishing late summer alfalfa after winter wheat than the more traditional herbicide programs?

Response:

To address these questions, a study was initiated in 2015 at three locations across Wisconsin to compare the effectiveness of Roundup (glyphosate), Raptor (imazamox), and Poast Plus (sethoxydim) in controlling volunteer wheat in alfalfa. Research sites were located in central, eastern and southwestern parts of the state. Roundup Ready alfalfa was seeded into fields where winter wheat was harvested earlier that summer. Roundup WeatherMAX at 22 fl oz/acre, Poast Plus at 2.25 pt/acre and Raptor at 4 fl oz/acre were compared to an untreated control at all three locations. Early applications were made when wheat was 4-6 inches tall, and alfalfa was at the 2-3 trifoliolate leaf stage; the later application was made 12-20 days later, when wheat was 6-12 inches tall.

Outcomes:

Results analyzed across all three locations confirm that volunteer winter wheat can negatively impact

late summer seedings of alfalfa. Applications of Roundup or Poast Plus to volunteer wheat that was 4-6 inches tall provided the best control in these experiments with minimal amounts of volunteer wheat remaining in the forage crop the next spring. Volunteer wheat does have value as forage, increasing the total forage biomass and milk yield per acre; however milk per ton of forage is decreased with the presence of volunteer wheat. The presence of volunteer wheat reduces the alfalfa stem density and long-term stand life of the alfalfa. Research data was shared in the following ways.

1. Management of Volunteer Winter Wheat in Summer Seeded Alfalfa

Presented at: North Central Weed Science Society Meetings - 2016

Des Moines, Iowa.

<https://sheboygan.uwex.edu/files/2018/11/Management-of-Volunteer-Winter-Wheat-in-Summer-Seeded-Alfalfa.pdf>

Co-Authors/Investigators

Chris Bloomingdale and Mark Renz, UW-Madison; Mike Ballweg, UW-Extension; Richard Proost, NPM

2. Management of Volunteer Winter Wheat in Summer Seeded Alfalfa -2016

Wisconsin Pest Management Updates Meetings. Research results shared at 7 locations around the state. Approximately 350 industry agronomists and educators attended the update meetings.

3. Managing Volunteer Wheat in Late Summer Seeded Alfalfa

Fact Sheet

Mark Renz and Chris Bloomingdale, UW-Madison; Richard Proost, NPM; Mike Ballweg, UW- Extension

Ongoing Forage Production and Utilizations Programs

- Annual Alfalfa Quality Monitoring Project
- Corn Silage Dry Down Days
- Annual Forage Council Educational programs
- Wisconsin Farmer to Farmer Hay List.

Commercial Horticulture/Green Industry Professional Development:

Situation:

The “Green Industry” has grown and continues to evolve with more “Green Industry” professionals, needing and requesting continuing educational opportunities to address emerging issues. Sheboygan County is both urban and rural, with a county population of about 115,000. Local horticultural businesses, public and private sector grounds keepers, and homeowners can benefit from a more skilled “Green Industry” workforce.

Response:

Develop UW-Extension educational programs to provide continuing education for “Green Industry” professionals.

Outcomes:

Commercial Horticulture Educational Programs: The **Landscape and Grounds Maintenance Short Course** continues to be a very successful educational program for those employed in commercial horticulture (Green Industry) in Eastern Wisconsin. Approximately 130 individuals have attended the Landscape and Ground Maintenance Short Course in Sheboygan County each of the past 5 years. Evaluations have been extremely positive with 98% rating the short course presentation as with excellent or good.

In an earlier evaluation, respondents gave high marks to the value of this UW-Extension short course compared to other educational offerings. Four in five participants said the value of this short course was higher or much higher than educational programs delivered by other providers.

II. Examples of Teamwork – Within UWEX and with External Partners

- ♦ Sheboygan County Farm Bureau , Ag Equipment and Roads, Karst Soils
- ♦ Sheboygan County Invasive Species Work Group
- ♦ The Sheboygan River Paired Sub Watershed Project. Partners included: UW-Extension, The Nature Conservancy, DNR, NRCS, Sheboygan County Planning and Resources.
- ♦ Sheboygan County Emergency Government and Agriculture Emergency Response Planning
- ♦ Wisconsin and Sheboygan County Emergency Preparedness
- ♦ Leadership for the Emerald Ash Borer (EAB) Sheboygan County Management Guide. Work group members include representatives from: DATCP, DNR, UWEX, County Planning and Resources, municipal foresters, and public works officials.
- ♦ Milwaukee River Watershed Conservation Partnership
- ♦ Milwaukee Metropolitan Sewerage District
- ♦ Sheboygan County Planning and Conservation Department
- ♦ Ozaukee and Washington County Land Conservation Departments
- ♦ Lakeshore Local Foods Network
- ♦ Wisconsin DNR Gypsy Moth Suppression Program for Sheboygan County
- ♦ Sheboygan County NRCS – NRCS Area Work Group
- ♦ USDA Farm Service Agency
- ♦ Sheboygan Sanitary District
- ♦ Sheboygan County Forage Council and Sheboygan County Master Gardener Volunteers
- ♦ Area farmer led groups to include: Sheboygan River Progressive Farmers (Sheboygan and Fond du Lac Counties), Cleans Farm Families (Ozaukee Co.) and Cedar Creek Farmers (Washington Co.)
- ♦ Sheboygan County Public Health Farm Employee and TB Screening Program.
- ♦ UW Nutrient and Pest Management Program
- ♦ Soil Science, Agronomy , Plant Pathology Departments, UW-Madison
- ♦ Michael Fields Agricultural Institute

III. Contributions to the Profession/University

- ♦ Chair -DALS Nominating Committee, 2014 - present
- ♦ University Committee , 2015 - present
- ♦ University Committee Vice-chair, 2016 -2017
- ♦ University Committee Chair, 2017 - present
- ♦ Program Teams: Grains, Forage, Nutrient Management, Horticulture

Applied Research

1. **Herbicide Resistant Waterhemp Survey, 2018**

Rodrigo Werle, Mike Ballweg

2. **White Mold Sporecaster Field Site Verification - Sheboygan County -2018**

Damon Smith, Mike Ballweg

3. **Wisconsin Aphanomyces Root Rot Survey - Sheboygan County - 2018**

Damon Smith, Mike Ballweg

4. **Berseem and Crimson Clover After Winter Wheat - 2014 -2017**
Mike Ballweg, Matt Ruark, Jamie West, Richard Proost
5. **Managing Volunteer Wheat in Late Sumer Seeded Alfalfa – 2016**
Mark Renz, Mike Ballweg, Richard Proost, Chris Bloomingdale,
NPM/UW-Extension/UW-Madison
6. **The use of Flue Gas Desulfurization (FGD) Gypsum to Increase Crop Yields, to Provide Beneficial Soil Characteristics, Reduce Phosphorus Solubility and Improve Soil Structure. 2015 -2016**
Francisco Arriaga, Mike Ballweg

IV. **Publications**

1. **Berseem and Crimson Clover After Winter Wheat**
Wisconsin Cover Crops Website – Research Results
<https://sheboygan.uwex.edu/files/2018/11/Berseem-and-Crimson-Clovers-After-Winter-Wheat.pdf>
2. Ruark, M.D., M.M. Chawner, M.J. Ballweg, R.T. Proost, F.J. Arriaga, and J.K. Stute.
Does Cover Crop Radish Supply Nitrogen to Corn? Agronomy Journal 2018 110: 4: 1513-1522 doi: 10.2134/agronj2017.06.0352

<https://sheboygan.uwex.edu/files/2018/10/Does-Cover-Crop-Radish-Supply-Nitrogen-to-Corn.pdf>
3. **Planting Oilseed Radish as a Cover Crop in Wisconsin – Fact Sheet (draft developed)**
Mike Ballweg - UW-Extension, Matt Ruark, UW-Madison Soil Science Department, Richard Proost, NPM

<https://sheboygan.uwex.edu/files/2018/11/Planting-oilseed-radish-as-Cover-Crops-in-Wisconsin-1.pdf>
4. **Managing Volunteer Wheat in late Sumer Seeded Alfalfa**
Mark Renz, Mike Ballweg, Richard Proost, Chris Bloomingdale,
NPM/UW-Extension/UW-Madison –Fact Sheet Publication
<https://sheboygan.uwex.edu/files/2018/10/Managing-Volunteer-Wheat-in-Late-Summer-Seeded-Alfalfa.pdf>
5. **Video: Relative Importance of P and K for Corn and Soybean in Wisconsin, Carrie Laboski, February 2, 2016.**
The video also references photos and data collected by Mike Ballweg in a potassium deficient soybean field here in Sheboygan County. You can find the video here:

<http://ipcm.wisc.edu/blog/2016/02/new-video-relative-importance-of-p-and-k-for-corn-and-soybean-in-wisconsin/>

6. Berseem and Crimson Clover After Wheat

Matt Ruark, Mike Ballweg, Jamie West, Richard Proost.

Separate manuscript currently being prepared for the **Journal of Agronomy**

7. Midwest Forage Association – Clippings Electronic Newsletter, Published Periodically

8. Midwest Cover Crop Decision Tool (Review Workgroup) – 2018

V. Administrative Responsibilities

- ♦ Ag Clean Sweep Grants in cooperation with Sheboygan County Planning Department
- ♦ Pesticide Applicator Training
- ♦ Wisconsin Farmer to Farmer Hay List
- ♦ Tri-County E-mail List. UW-Extension Sheboygan County provides leadership and on-going support for the Tri-County E-mail List for farmers and industry professionals in Sheboygan, Ozaukee and Washington counties.
- ♦ Sheboygan County UW-Extension Master Gardener Program
- ♦ UW-Extension University Committee/Faculty Senate

VI. Professional Development/Associations (past five years)

- ♦ Advanced Soil Health In-Service, Marshfield, WI, 2018
- ♦ Wisconsin Hemp Conference, Madison, WI, 2018
- ♦ Wisconsin Cover Crops Webinar Series, 2018
- ♦ Wisconsin Cover Crop Conference. Stevens Point, WI -2018
- ♦ Wisconsin Agribusiness Classic -Annually
- ♦ Soil and Water and Nutrient Management Meetings – Annually
- ♦ Midwest Forage Association Symposium –Annually
- ♦ Annual Agronomy Update Meetings –Annually
- ♦ Pest Management Up-Date Meetings – Annually
- ♦ Agronomy Field Days – Arlington, WI - Annually
- ♦ Wisconsin Turf grass Association Field Day – Annually
- ♦ ARNE Annual Conference
- ♦ International Annual American Society of Agronomy Meeting, Minneapolis, MN, 2015
- ♦ Emerald Ash Borer Educational and Research Up-dates
- ♦ Forage Teaching Technology In-Service – Periodically offered

Memberships

- ♦ The American Society of Agronomy, 2015 –present
- ♦ Midwest Forage Association, 2014 – present
- ♦ National & Wisconsin Association of County Agricultural Agents, 2014 - present
- ♦ Wisconsin Farm Bureau, 2014 – present.

VII. **Professional Improvement Plans for the Next Five Years**

**Professional Development Plan
Michael Ballweg
2019 – 2024**

Issues needing to be addressed will include: crop production, crop profitability, cover crops, soil health, water quality, and non-farmer education. Learning and using new technologies for delivering information and engaging learners will also be required and needed.

Professional Development Plans would include:

- 1) Continue to seek out additional ways to use technology to provide information and engage learners.
- 2) Continue to develop subject matter expertise around the use of cover crops, nutrient management, soil erosion and improved water quality.
- 3) Continue to develop and fine-tune facilitation skills.
- 4) Continue to participate in subject matter up-dates in the areas of agronomy, forages, horticultural issues, water quality and other emerging issues as they develop.
- 5) Continue to develop and refine leadership skills.
- 6) Attend when possible NACAA AM/PIC conferences.