Date: September 14, 2016

To: Academic Affairs

From: Frank Galey, Dean, College of Agriculture and Natural Resources

Re: Agronomy MS Graduate Program Review

I would recommend this program be retained at the University of Wyoming with the following comments.

- This program is above the minimum cut-off of 15 graduates over a 5 year period at 22.
- Agronomy provides an important feeder program for a very successful PhD program in Plant Sciences and the department is encouraged to explore the use of this program as a pipeline to the PhD program.
- Agronomy MS students are an important part of the workforce at our Research and Extension Centers, providing science-based answers to producers questions. These students are dispersed throughout the state in the various centers.
- This program is well funded by industry and producers.
- The department may wish to continue to investigate modernizing this program as it morphs its undergraduate programs to a more agroecology focus.

Thank you and please let me know if you wish to discuss this further.
Deans and Directors who administer an authorized major or course of study approved by action of the Board of Trustees will be responsible for conducting program reviews. Four key elements should be addressed in each academic program review: (1) Program Demand, (2) Program Quality, (3) Mission Centrality, and (4) Cost.

For each program that is reviewed, a recommendation will be made by the Academic Dean to the Vice President of Academic Affairs.

**Instructions:** Please provide the following information:

**Title of Program/Specialization:** Agronomy

**Indicate whether undergraduate or graduate program/specialization:** M.S. - grad

**Department and College:** Plant Sciences, College of Agriculture

**Department Head Name and contact information (phone, email):**

  Jim Heitholt, 307-766-3104, Jim.Heitholt@uwyo.edu

**Part 1 – Program Review**

**Instructions:** Please answer each of the following questions. Items listed under each question have been provided to help guide your response. If an item is not applicable, simply indicate “N/A”.

1. **Program Demand***:
   (Note: If degrees granted exceeds cutoff, delay review until next round.)
   Please note, the number of degrees granted exceeds the cutoff (see below in red) but we’ve been asked to prepare document anyway.
   a. Number of graduates over 5-year period (AYs 2012 – 2016): 22
   b. Enrollment in major/specialization over 5-year period: Currently, 7 as of July 2016

   * Cutoffs for “Low Demand” Designation -- Degrees Granted
   - Bachelor’s Programs: Average – 5 per year; 5-year total: 25
   - Master’s Programs: Average – 3 per year; 5-year total: 15
   - Ph.D. Programs: Average – 1 per year; 5-year total: 5

   (See APPENDIX A for the types of programs that will be excluded from review.)

2. **Program Quality: Is the program of high quality?**
   a. Program accreditation N/A
      i. For programs currently accredited include:
         1. Name of accrediting body/organization
2. Date most recently accredited
3. Next reaccreditation date
4. List recommendations from most recent visit and progress to date.

ii. For programs seeking accreditation include:
   1. Name of accrediting body/organization
   2. Timeline for seeking accreditation

iii. For all other programs include:
   1. Date of most recent Academic Program Review (APR)
   2. List of recommendations from the most recent APR and progress to date.

(Note: For first-time reviews, include N/A in response.)

b. Credentials of faculty

   i. Include a list of all faculty by name, highest degree and discipline of highest degree. Please see attached (Appendix A).

   ii. Also, include a breakdown by gender and ethnicity.
      Seven male, four female; seven white, three Asian, one Hispanic

   iii. Grants awarded to academic personnel: Previous 5 years
      Please see attached (Appendix B).

   iv. Grants submitted by academic personnel: Previous 5 years
      Please see attached (Appendix C). May not be available before Sept 2016.

   v. Publications/presentations by academic personnel, Previous 5 years.
      Please see attached (Appendix D).

   vi. National/international awards

c. Program reputation

   i. If program is ranked, include rank and by what organization. N/A
   ii. Include a brief description of any other indicators of program reputation such as demand (e.g. waiting lists or over enrollment) for admission into program, employer data/feedback, etc. N/A

d. Curriculum of major or specialization

   i. Include a list of courses by prefix, number, title required in the major or specialization (do not include general education course unless required as part of the major requirements.)
      Please see attached (Appendix E).

e. Distance delivery of program/major

   i. Note if the program is offered online and/or at one of the off-campus attendance centers (e.g., UW-Casper) N/A
f. Quality of Assessment Plan/data
   i. Include a brief description of the program assessment plan and how the data are used to inform decisions related to program quality and student learning. The M.S. in Agronomy is evaluated primarily through the quality of theses. The students’ graduate committees provide feedback on strength of each thesis, an assessment report is generated after each defense seminar, and each student’s job prospects are noted. As summary of the student learning outcomes assessment for the 2015 M.S. Agronomy program is available upon request.

   g. Strategic Plan
   i. Include a brief description of any plans for the program or specialization that appear in the college/department strategic plan (i.e., facilities upgrades, curriculum changes, on-line or off-campus delivery, enrichment learning opportunities, etc.).
      Plans developed during 2014 and 2015 included strengthening the faculty by adding expertise in Cropping Systems (Dr. Carrie Eberle) and Irrigation Management (Dr. Vivek Sharma). With Dr. Brian Mealor accepting the directorship at Sheridan REC, we were able to add additional expertise to our invasive plant ecology (Dr. Dan Tekiela) team. The department still lacks faculty expertise in forage and row crop improvement (i.e., conventional plant breeding) although Dr. Sadanand Dhekney provides expertise to the department’s genetics and biotechnology projects.

   h. Other: none

3. Mission Centrality: Does the program advance the mission of UW including institutional strategy?
   a. Describe how the program supports the mission, vision and strategic goals of UW.
      Using the University of Wyoming Strategic Plan Draft (2015-2020) found at http://www.uwyo.edu/acadaffairs/plans/14-20/up4_draft.pdf
      The M.S. Agronomy is consistent with the UW vision that emphasizes the importance for us “to explore, create, and share knowledge in areas that are meaningful to our constituencies and at a level of accomplishment that garners international recognition for excellence” and with fostering a “culture that advances the intellectual, ethical, and leadership capacities of our students and employees, with a degree of effectiveness that is exemplary among public universities.” Additionally, the M.S. Agronomy is consistent with the stated UW mission:
      “The University of Wyoming aspires to be one of the nation’s finest public land-grant research universities. We serve as a statewide resource for accessible and affordable higher education of the highest quality; rigorous scholarship; technology transfer; economic and community development; and responsible stewardship of our cultural, historical, and natural resources.”
      The M.S. in Agronomy produces graduates that are prepared to make crop production more sustainable and/or improve the quality of life for our nation’s citizens through
plants. The M.S. graduates engage in employment with commercial companies involved in row-crop or forage agriculture, horticultural firms, the public sector (USDA or higher education), or pursue a Ph.D. in a plant-science related area.

b. Describe how the program contributes to other programs across campus (i.e., general education courses, minor or support courses, interdisciplinary program, etc.).

The curriculum and research that comprise the M.S. Agronomy program, as well as the faculty that lead this program, supports students studying not only agronomy and horticulture but also botany, range management, animal science, and agricultural economics.

c. Include placement data for graduates and indicate if graduates are working in the field or not.

Grad A (CaCo) – pursuing a Ph.D. at UW
Grad B (AA) – pursuing a Ph.D. at UW
Grad C (CB) – finishing M.S., will pursue Ph.D. at Univ. Nebraska in September
Grad D (AS) – will teach as adjunct at Northwest Community College Powell
Grad E (MB/MP) – will work on Organic Production curriculum at UW
Grad F (HS) – pursuing a Ph.D. in soil physics at Washington State Univ.
Grad G (JM) – working at Goshen County (WY) Weed and Pest
Grad H (CalCar) – working as extension educator Goshen Co., WY
Grad I (JW) – working on a private ranch in Idaho
Grad J (TG) – working as landscape manager, Laramie, WY
Grad K (CS) – working as greenhouse manager, Laramie REC
Grad L (TS) – working as USDA agricultural loan officer
Grad M (LC) – expected to finish M.S. in 2016
Grad N (PA) – pursuing on Ph.D. at Univ. Florida
Grad O (VJ) – pursuing a Ph.D. at Univ. Minnesota
Grad P (BW) – working as greenhouse manager in Loveland, CO
Grad Q (CN) – working as USDA-Forest Service Range Conservationist
Grad R (WR) – working as Natural Resource Specialist
Grad S (SP) – pursuing a Ph.D. at Michigan State Univ.

d. Describe the uniqueness or duplication of this program across the UW.

The M.S. in Agronomy program has no close rivals within UW. The closest related programs might be M.S. in Botany, Rangeland Ecology, and Soil Science but graduates of those programs do not prepare students for the careers with commercial seed companies, crop protection companies, row-crop production, or the horticultural industry.

e. Other:

4. Cost: Is the program financially viable?
   a. Ratio of student credit hours per FTE
For AY 2010, Plant Sciences had 203 grad credit hours and for AY 2014, Plant Sciences had 370 grad credit hours. For AY 2014, Plants Sciences had ten faculty FTE but total weighted teaching appointments were at 25%. Thus, Plant Sciences has 2.5 FTE teaching appointments and a grad-credit-hour-to-faculty-FTE Ratio for AY 2014 was approximately 37 per full faculty FTE and 148 per weighted faculty FTE.

b. Direct instructional expenditures:
   i. Per student credit hour
   ii. Per total degrees awarded
   iii. Non-personnel expenditures per total academic FTE

We don’t have the data to make these calculations.

c. Course enrollment
   i. Number of classes falling under University minimums
   ii. Lower-division courses falling under University minimums

Very few courses have fallen under the University minimum.

d. Other instructional cost drivers, such as:
   i. Section fill rates - varies
   ii. Course completion rates – n/a
   iii. Curricular complexity – n/a
   iv. Faculty course load – varies depending on appointment

e. Research expenditures per tenured/tenure-track FTE (and other academic personnel, where appropriate)

We don’t have the data to make these calculations.

f. Compare your data to national benchmarks (Delaware data) n/a

g. Other:
Appendix A

Department of Plant Sciences Faculty

Sadanand Dhekney, Ph.D. Horticulture
Carrie Eberle, Ph.D. Plant Science
Jim Heitholt, Ph.D. Crop Science
Chris Hilgert, M.S. Horticulture
Anowar Islam, Ph.D. Agronomy
Randa Jabbour, Ph.D. Ecology
Andrew Kniss, Ph.D. Agronomy
Brian Mealor, Ph.D. Rangeland Ecology and Watershed Management
Urszula Norton, Ph.D. Biogeochemistry
Karen Panter, Ph.D. Horticulture
Gustavo Sbatella, Ph.D. Agronomy
Vivek Sharma, Ph.D. Biological Systems Engineering
Bill Stump, Ph.D. Weed Science
Dan Tekiela, Ph.D. Invasion Ecology
### Projects Launched in 2016

<table>
<thead>
<tr>
<th>Duration</th>
<th>Project Title</th>
<th>Faculty Name</th>
<th>Amount</th>
<th>Sponsor</th>
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<tbody>
<tr>
<td>2016 - 2016</td>
<td>Briess Variety/Fertilizer Trial</td>
<td>Eberle</td>
<td>$</td>
<td>Briess Malting</td>
</tr>
<tr>
<td>2016 - 2017</td>
<td>Exploring Ag: Learning Opportunities for Under-Represented Populations (Planning Grant)</td>
<td>Heitholt</td>
<td>$33,093</td>
<td>USDA-NIFA</td>
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<tr>
<td>2016 - 2017</td>
<td>Improved Roundup Formulations</td>
<td>Kniss</td>
<td>$</td>
<td>Monsanto</td>
</tr>
<tr>
<td>2016 - 2021</td>
<td>Systems Analysis of Shade-Avoidance Responses as a Mechanism of Crop Yield Loss Due to Weeds</td>
<td>Kniss</td>
<td>$500,000</td>
<td>USDA - NIFA</td>
</tr>
<tr>
<td>2016 - 2021</td>
<td>Weed Control in Small Grains</td>
<td>Sbatella</td>
<td>$</td>
<td>Syngenta</td>
</tr>
<tr>
<td>2016 - 2017</td>
<td>Improved Roundup Formulations</td>
<td>Sbatella</td>
<td>$</td>
<td>Monsanto</td>
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<tr>
<td>2016 - 2017</td>
<td>Competitive Efficacy North Soy</td>
<td>Sbatella</td>
<td>$</td>
<td>Monsanto</td>
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<tr>
<td>2016 - 2021</td>
<td>Weed Control in Small Grains</td>
<td>Sbatella</td>
<td>$</td>
<td>Syngenta Crop Protection, LLC</td>
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<tr>
<td>Duration</td>
<td>Project Title</td>
<td>Faculty Name</td>
<td>Amount</td>
<td>Sponsor</td>
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<tr>
<td>2015-2016</td>
<td>DRRP Subaward - Studying Grapevine Cellular and Physiological Response to Abiotic Stress</td>
<td>Dhekney</td>
<td>$28,732</td>
<td>National Institutes of Health, DHHS</td>
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<td>2015-2016</td>
<td>Predicting Variation of Biological Insect Control in Alfalfa Hay and Seed Crops</td>
<td>Jabbour</td>
<td>$29,919</td>
<td>Western IPM Center (UC-Davis)</td>
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<td>2015-2016</td>
<td>Conservation Biological Control of Alfalfa Weevil in Wyoming</td>
<td>Jabbour</td>
<td>$</td>
<td>Utah State Univ. - Western SARE</td>
</tr>
<tr>
<td>2015-2017</td>
<td>A modular curriculum to teach critical concepts in organic agriculture across regions</td>
<td>Jabbour</td>
<td>$</td>
<td>USDA-NIFA</td>
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<td>2015-2016</td>
<td>Dicamba Rotational Crop Safety</td>
<td>Kniss</td>
<td>$</td>
<td>Monsanto</td>
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<tr>
<td>2015-2020</td>
<td>Weed Science Research Support</td>
<td>Kniss</td>
<td>$</td>
<td>DuPont</td>
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<tr>
<td>2015-2020</td>
<td>Weed Science Research Support</td>
<td>Kniss</td>
<td>$</td>
<td>DuPont</td>
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<td>2015-2017</td>
<td>Evaluating the use of threshold concepts for improving habitat through cheatgrass management</td>
<td>Mealor</td>
<td>$</td>
<td>Sublette County Weed and Pest District</td>
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## Grants 2015 continued

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<tr>
<td>2015 - 2020</td>
<td>Research and Extension in Invasive Weed Management</td>
<td>Mealor</td>
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<td>Bayer Inc.</td>
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## Projects Launched in 2014

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<tr>
<td>2014 - 2016</td>
<td>Identification of Wheat Rust Resistance Genes in New Egyptian Wheat Cultivars Using Molecular Markers (Borlaug Fellowship-Egypt Plant Health)</td>
<td>Dhekney</td>
<td>$31,900</td>
<td>Foreign Agric. Services, USDA</td>
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<td>2014 - 2016</td>
<td>Briess Variety/Fertilizer Trial</td>
<td>Eberle</td>
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<td>2014 - 2016</td>
<td>Economic and Environmental Sustainability of Irrigated Grass-Legume Mixtures</td>
<td>Islam</td>
<td>$</td>
<td>Utah State Univ. Western SARE</td>
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<tr>
<td>Duration</td>
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<td>Amount</td>
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<td>2014 - 2018</td>
<td>Efficacy and Economics of Cultural and Mechanical Weed Control Practices for Herbicide-Resistant Weed Management</td>
<td>Kniss</td>
<td>$500,000</td>
<td>USDA-NIFA</td>
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<td>2014 - 2016</td>
<td>Rotation Crop Response to Dicamba</td>
<td>Kniss</td>
<td>$4,800</td>
<td>Monsanto</td>
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<td>2014 - 2016</td>
<td>Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization</td>
<td>Mealor</td>
<td>$25,000</td>
<td>Wyo. Governor’s Office</td>
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<td>2014 - 2016</td>
<td>WYG&amp;F: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization</td>
<td>Mealor</td>
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<td>Wyo. Game and Fish</td>
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<td>2014 - 2016</td>
<td>WY State Parks: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization</td>
<td>Mealor</td>
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<td>WY State Parks &amp; Historic Sites</td>
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<td>2014 - 2016</td>
<td>WYDOT: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization</td>
<td>Mealor</td>
<td>$10,000</td>
<td>WY Dept of Transportation</td>
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<td>2014 - 2015</td>
<td>Sugar Beet Variety Trial</td>
<td>Sbatella</td>
<td>$</td>
<td>Astec, Inc.</td>
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<td>2014 - 2018</td>
<td>MillerCoors Barley Variety Trial</td>
<td>Sbatella</td>
<td>$</td>
<td>Miller Coors, LLC</td>
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<td>2014 - 2018</td>
<td>2015 Growing Season - Barley Variety Trial</td>
<td>Sbatella</td>
<td>$</td>
<td>Miller Coors, LLC</td>
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<td>2014 - 2016</td>
<td>Warrant in Alfalfa</td>
<td>Sbatella</td>
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<td>Germains Seed Technology Trial</td>
<td>Sbatella</td>
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<td>2014 - 2018</td>
<td>Production Characteristics of Confection Sunflowers</td>
<td>Sharma and Garcia y Garcia</td>
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### Projects Launched in 2013

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<td>2013 - 2014</td>
<td>Chemical Management of Algae</td>
<td>Herbert</td>
<td>$</td>
<td>PlanktOMICS LLC</td>
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<td>2013 - 2017</td>
<td>Herbicides for Use in Wyoming</td>
<td>Kniss</td>
<td>$</td>
<td>Arysta LifeScience North America</td>
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<td>2013 - 2014</td>
<td>Faculty for the Future Fellowship: The Effects of Different Conservation Agriculture Practices on Sustainable Food Production in Eastern Kenya and Western Uganda</td>
<td>Norton</td>
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<td>Schlumberger Foundation</td>
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<td>2013 - 2016</td>
<td>Corn Tolerance to Water and Heat Stress</td>
<td>Sbatella and Garcia y Garcia</td>
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<td>Dow AgroSciences</td>
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<td>2013 - 2015</td>
<td>Corn Variety Trials</td>
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<td>J.R. Simplot</td>
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<td>2013 - 2015</td>
<td>Sugar Beet Variety Trial</td>
<td>Sbatella</td>
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<td>Radish Variety Trial</td>
<td>Sbatella</td>
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<td>Rijk Zwann Production V.V</td>
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<td>2013 - 2016</td>
<td>Effect of Phosphorus Rate and Formulation on Sugarbeet Yield</td>
<td>Sbatella</td>
<td>$</td>
<td>Western Sugar Coop.</td>
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<td>2013 - 2016</td>
<td>Field Tests of Generic and New Generation Chemistries for Potato Pest Suppression, Bacterial Ringrot Symptom Expression in Various Potato Cultivars</td>
<td>Stump</td>
<td>$ 6,000</td>
<td>Colorado Potato</td>
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<td>2013 - 2016</td>
<td>Effect of Phosphorus Rate and Formulation on Sugarbeet Yield</td>
<td>Sbatella</td>
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## Grants 2013 continued

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<td>2013 - 2018</td>
<td>Formulation and adjuvant research</td>
<td>Kniss</td>
<td>$</td>
<td>Winfield Solutions, LLC</td>
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<td>2013 - 2018</td>
<td>Improving the Sustainability of Dry Bean Production</td>
<td>Kniss</td>
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<td>2013 - 2015</td>
<td>Corn Variety Trials</td>
<td>Sbatella</td>
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<td>J.R. Simplot</td>
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<td>2013 - 2017</td>
<td>BASF Herbicides for Weed Control in Dry Beans</td>
<td>Sbatella</td>
<td>$</td>
<td>BASF Corporation</td>
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<td>2013 - 2017</td>
<td>Bayer Products for Weed Control in Barley</td>
<td>Sbatella</td>
<td>$</td>
<td>Bayer, Inc.</td>
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<td>2013 - 2018</td>
<td>Pest Management for the Crops of the High Plains</td>
<td>Stump</td>
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<td>BASF Corporation</td>
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<td>2013 - 2018</td>
<td>Field Tests of Efficacy and Crop Safety of New and Established Chemistries for Pest Management</td>
<td>Stump</td>
<td>$ 9,000</td>
<td>DuPont</td>
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### Projects Launched in 2012

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<td>2012 - 2015</td>
<td>Screening Grape Cultivars for Adaptability to Edaphic and Climatic Factors in Wyoming</td>
<td>Dhekney</td>
<td>$ 50,000</td>
<td>Wyo. Dept. Agric.</td>
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<td>2012 - 2018</td>
<td>Roundup Ready Alfalfa Testing</td>
<td>Islam</td>
<td>$</td>
<td>Forage Genetics International</td>
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<td>2012 - 2016</td>
<td>Weed Biology, Ecology, and Management in Sugarbeet</td>
<td>Kniss</td>
<td>$</td>
<td>Western Sugar Cooperative</td>
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<td>2012 - 2017</td>
<td>Agronomic Crop Research</td>
<td>Kniss</td>
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<td>Syngenta Crop Protection</td>
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<td>2012 - 2017</td>
<td>Weed Science Research in Agronomic Crops</td>
<td>Kniss</td>
<td>$</td>
<td>BASF Corporation</td>
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<td>2012 - 2017</td>
<td>Agronomic Crop Research</td>
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<td>2012 - 2017</td>
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<td>2012 - 2017</td>
<td>Weed Management Research and Education</td>
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<td>Monsanto</td>
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<td>2012 - 2017</td>
<td>Weed Science Research &amp; Education Program</td>
<td>Kniss</td>
<td>$</td>
<td>Bayer Corporation</td>
</tr>
<tr>
<td>Duration</td>
<td>Project Title</td>
<td>Faculty Name</td>
<td>Amount</td>
<td>Sponsor</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------------------------------------------------------------</td>
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<td>----------------------------------------------</td>
</tr>
<tr>
<td>2012 - 2014</td>
<td>Faculty for the Future Fellowship: The Effects of Different Conservation Agriculture Practices on Sustainable Food Production in Eastern Kenya and Western Uganda</td>
<td>Norton</td>
<td>$</td>
<td>Schlumberger Foundation</td>
</tr>
<tr>
<td>2012 - 2017</td>
<td>DuPont Products for Weed Control in Barley</td>
<td>Sbatella</td>
<td>$</td>
<td>DuPont</td>
</tr>
<tr>
<td>2012 - 2017</td>
<td>Radish Variety Trial</td>
<td>Sbatella</td>
<td>$</td>
<td>Harris Moran Seed Company</td>
</tr>
<tr>
<td>2012 - 2017</td>
<td>Crop Pest Management in the High Plains Region</td>
<td>Stump</td>
<td>$</td>
<td>Syngenta Crop Protection, LLC</td>
</tr>
<tr>
<td>2012 - 2017</td>
<td>Plant Disease Research in Potato and Sugar Beet</td>
<td>Stump</td>
<td>$</td>
<td>Gowan Company, LLC</td>
</tr>
<tr>
<td>2012 - 2017</td>
<td>Sugar Beet Pest Management in the High Plains Region</td>
<td>Stump</td>
<td>$</td>
<td>Western Sugar Cooperative</td>
</tr>
</tbody>
</table>
Appendix C (unfunded grants not yet available)
Appendix D

Refereed Publications - Department of Plant Sciences Faculty: 2012 – 2016

Please note: Each year on one or more separate pages

2016 Publications


2016 Publications Continued


2015 Publications


Birthisel, S.K., E.R. Gallandt, R. Jabbour, and F.A. Drummond. 2015. Habitat and time are more important predictors of weed seed predation than space on a diversified vegetable farm in Maine, USA. Weed Sci. 63:916-627.


**Kniss, A.R.** and C.W. Coburn. 2015. Quantitative evaluation of the environmental impact quotient (EIQ) for comparing herbicides. PLOS ONE. 10.1371/journal.pone.0131200


**Sharma, V.,** S. Irmak, A. Kilic, V. Sharma, J. E. Gilley, G. E. Meyer, S. Z. Knezevic, and D. Marx. 2015. Quantification and mapping of surface residue cover and tillage practices for maize and soybean in South Central Nebraska-U.S.A. using Landsat imagery. Accepted to Transactions of the ASABE. Ref No. ASABE-NRES-11489-201.


2015 Publications Continued


2014 Publications


Irmak, S., and V. Sharma. 2014. Large scale and long-term trends and magnitude in irrigated and rainfed maize and soybean water productivity: Grain yield, evapotranspiration, frequencies, crop water use efficiency, and yield production functions. Trans. ASABE 58(1): 103-120.


2013 Publications


2012 Publications


Appendix E

Course Options for the MS Agronomy

Master of Science in Agronomy Plan A (thesis) requires 26 hours of coursework numbered 4000 or above, 4 hours of thesis research, a research proposal, original research, and oral defense of the thesis. The student’s coursework is selected to fit the student’s individual needs by mutual consultation among the student, his/her major professor and graduate committee. Nearly all courses are electives so that student receive training that matches their particular research emphasis. Courses with an asterisk (*) are required.

AECL 5400. Invasive Plant Ecology. 3 ch.
ENTO 5300. Applied Insect Ecology. 3 ch.
PLNT 5000. Plant Disease Control. 3 ch. Dual listed with PLNT 4000.
PLNT 5020. Sustainable Agriculture. 3 ch. Dual listed with PLNT 4020.
PLNT 5050. Plant Biotechnology. 3 ch. Dual listed with PLNT 4050.
PLNT 5070. Weed Science and Technology. 4 ch. Dual listed with PLNT 4070.
PLNT 5120. Organic Food Production. 3 ch. Dual listed with PLNT 4120.
PLNT 5180. Greenhouse Crop Production. 4 ch. Dual listed with PLNT 4180.
PLNT 5190. Herbs, Spices and Medicinal Plants. 3 ch. Dual listed with PLNT 4190.
PLNT 5200. Greenhouse Design and Management. 4 ch.
PLNT 5380. Crop and Weed Ecology. 4 ch.
PLNT 5500. Clinical Plant Pathology. 2 ch.
PLNT 5600. Research in Crops. 1-4 ch.
PLNT 5700. Forage Crop Science. 3 ch. Dual listed with PLNT 4700.
PLNT 5720. Plant Disease Problems. 1-3 ch. Dual listed with PLNT 4790.
PLNT 5820. Graduate Seminar. 1 ch. *
PLNT 5920. Continuing Registration: On Campus. 1-2 ch.
PLNT 5940. Continuing Registration: Off Campus. 1-2 ch.
PLNT 5960. Thesis Research. 1-12 ch. *
REW M 5000. Range Resource Management 3 ch.
REW M 5050. Range Forage Quality. 3 ch.
REW M 5300. Grass Taxonomy. 3 ch.
REW M 5520. Ecology and Management of Grasslands
REW M 5580. Rangeland Restoration Ecology. 3 ch.
RNEW 5730. Plant Physiological Ecology. 4 ch.
SOIL 5140. Soil Microbiology. 4 ch.
SOIL 5160. Soil Fertility and Fertilizers. 3 ch.
STAT 5080. Statistical Methods for Agricultural and Natural Resource Sciences. 3 ch.
Part II - Recommendations

Instructions: After the review is completed, the Dean in consultation with the Department Head will select one of the following recommendations. In the justification, address each of the items associated with the recommendation.

1) Retain Due to Critical Need
   a) A college may recommend that a degree program be retained due to its ability to fulfill a critical workforce need or shortage area for the state.

   b) Justification for retaining due to critical need must include:
      i) Explanation of why the program is important to the University/State/region
      ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
      iii) Preliminary outcomes of steps taken.

2) Retain with Further Review Required
   a) A college may request that a program be retained for further review for those degree programs that serve a specific function central to the mission of the college or university.

   b) Justification for retain due to further review must include:
      i) Explanation for how the program is central to the university’s mission and the benefit to the system;
      ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
      iii) Preliminary outcomes of steps taken.

3) Consolidate with Another Program within College
   a) A college may request that a program be consolidated with a similar program on campus that achieves similar degree requirements.

   b) Justification to consolidate with another program on campus must include:
      i) Explanation for how the degree requirements for the two programs warrant consolidation;
      ii) Evidence that the consolidation will meet graduate production thresholds, or specific steps to increase enrollment to meet production thresholds;
      iii) Preliminary outcomes of steps taken.

4) Consolidate with Program(s) between Colleges/campuses (e.g., UW/C)
   a) Two or more colleges may request that similar degree programs be consolidated to maintain equivalent degree programs.

   b) Justification for retaining due to cross-college consolidation must include:
      i) Explanation for how the consolidated programs will collaborate (e.g., sharing of required courses, shared faculty, etc.) to maintain graduate production thresholds;
ii) Evidence that multi-college collaboration will meet graduate production thresholds, or specific steps to increase enrollment if merging programs fails to meet production thresholds;
iii) Preliminary outcomes of collaboration between colleges.

5) **Terminate**

a) A college may request that a program be terminated due to limited graduate production, lack of student interest, shifts in a given field of study, or continued declines in major enrollments.

b) If the exigency for termination results from the program productivity review process then a brief justification to terminate a program should be included. Such a justification must include:

i) Explanation for the decline in graduate production in the degree program;

ii) Intended timeframe for submitting a program termination request to the Board of Trustees for their consideration;

iii) Expected timeline to meet teach-out requirements established through the regional accrediting body.
APPENDIX A

“Low Productivity” Programs Excluded from Review Process

1) **Major Program Modifications**
   a) Degree programs that have undergone recent program modifications that adversely impact graduate production for a college.
   b) Modifications traditionally include programs that have undergone recent name changes during the reporting window that result in two equivalent degree programs.

2) **Program/Major Specializations**
   a) Degree programs that have one or more specializations which reduce the total number of graduates.
   b) The exclusion may apply only for those specializations where the combination results in graduate production that meets the establish threshold for the degree.

3) **Terminated Programs**
   a) Degree programs that have been inactivated during the reporting period, but still depict graduates that fall below the established thresholds.
   b) Terminated programs will remain on the Program Productivity Report until inactive programs have completely cycled through the established reporting period.

4) **New Programs**
   a) Degree programs that have been activated within the past 7 years resulting in limited graduate production due to program implementation.
   b) Institutional review may be requested prior to the 7th year if graduate production is not scaling to the required thresholds for the degree level.