

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.

**Academic Program Review**  
Report Template  
University of Wyoming  
Office of Academic Affairs  
March 2016

(adapted from SDSU)

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](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

## Appendix B

### Department of Plant Sciences (Univ. Wyoming) – Funded Grants (2012 through 2016)

Each year is separated into one or more tables.

#### *Projects Launched in 2016*

Duration	Project Title	Faculty Name	Amount	Sponsor
2016 - 2016	Briess Variety/Fertilizer Trial	Eberle	\$	Briess Malting
2016 - 2017	Exploring Ag: Learning Opportunities for Under-Represented Populations (Planning Grant)	Heitholt	\$ 33,093	USDA-NIFA
2016 - 2017	Improved Roundup Formulations	Kniss	\$	Monsanto
2016 - 2021	Systems Analysis of Shade-Avoidance Responses as a Mechanism of Crop Yield Loss Due to Weeds	Kniss	\$ 500,000	USDA - NIFA
2016 - 2020	Evaluating Strategic Weed Management to Reduce Pesticide Use and Improve Effectiveness on F.E. Warren Air Force Base	Mealor	\$ 39,999	US Fish and Wildlife Service (US Dept. Interior)
2016 - 2021	Weed Control in Small Grains	Sbatella	\$	Syngenta
2016 - 2017	Improved Roundup Formulations	Sbatella	\$	Monsanto
2016 - 2017	Competitive Efficacy North Soy	Sbatella	\$	Monsanto
2016 - 2021	Weed Control in Small Grains	Sbatella	\$	Syngenta Crop Protection, LLC



**Projects Launched in 2015**

Duration	Project Title	Faculty Name	Amount	Sponsor
2015 - 2016	DRRP Subaward - Studying Grapevine Cellular and Physiological Response to Abiotic Stress	Dhekney	\$ 28,732	National Institutes of Health, DHHS
2015 – 2017	Engineering Alfalfa Weevil Resistance in Commercial Alfalfa Cultivars: A Valuable Tool for Integrated Pest Management of Alfalfa Weevil	Dhekney	\$ 20,000	Wyo. Dept. Agric.
2015 - 2017	Improving Grapevine Tolerance to Drought and Heat Stress Using Safe and Eco-friendly Technologies	Dhekney	\$ 100,000	Wyo. Dept. Agric.
2015 - 2017	Studying Grapevine Water Requirement and Irrigation Management Strategies in Wyoming Vineyards	Dhekney	\$ 23,000	Wyo. Dept. Agric.
2015 - 2017	Junior Master Gardner Program	Hilgert	\$ 12,000	Wyo. Dept. Agric.
2015 - 2017	Regional Assessment of Fenugreek for Producer's Propagation	Islam	\$	Wyo. Dept. Agric.
2015 - 2017	Evaluation of Birdsfoot Trefoil -- A Non-bloating Forage Legume -- in Wyoming	Islam	\$	Wyo. Dept. Agric.
2015 - 2016	Predicting Variation of Biological Insect Control in Alfalfa Hay and Seed Crops	Jabbour	\$ 29,919	Western IPM Center (UC-Davis)
2015 - 2016	Conservation Biological Control of Alfalfa Weevil in Wyoming	Jabbour	\$	Utah State Univ. - Western SARE
2015 - 2017	A modular curriculum to teach critical concepts in organic agriculture across regions	Jabbour	\$	USDA-NIFA
2015 - 2016	Dicamba Rotational Crop Safety	Kniss	\$	Monsanto
2015 - 2020	Weed Science Research Support	Kniss	\$	DuPont
2015 - 2020	Weed Science Research Support	Kniss	\$	DuPont
2015 - 2016	Statewide Mapping and Prioritization of Cheatgrass--Phase II	Mealor	\$	Wyo. Dept. Agric.
2015 - 2017	Evaluating the use of threshold concepts for improving habitat through cheatgrass management	Mealor	\$	Sublette County Weed and Pest District

**Grants 2015 continued**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2015 - 2018	Evaluating the Use of Threshold Concepts for Improving Habitat Through Cheatgrass Management	Mealor	\$	Wilbur-Ellis Co.
2015 - 2020	Research and Extension in Invasive Weed Management	Mealor	\$	Bayer Inc.
2015 - 2018	Best Cover Crop and Tillage Management Strategies for Dryland Winter Wheat Cropping Systems in Central High Plains	Norton	\$ 20,000	Wyo. Dept. Agric.
2015 - 2017	Technical and Economic Evaluation for On-farm Drying of Confection Sunflower and Grain Corn in the Big Horn Basin	Sbatella	\$	Wyo. Dept. Agric.

**Projects Launched in 2014**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2014 - 2016	Identification of Wheat Rust Resistance Genes in New Egyptian Wheat Cultivars Using Molecular Markers (Borlaug Fellowship-Egypt Plant Health)	Dhekney	\$ 31,900	Foreign Agric. Services, USDA
2014 - 2016	Alleviating Grapevine Cold Damage in Wyoming Vineyards	Dhekney	\$ 18,400	Wyo. Dept. Agric.
2014 - 2016	Local Food Production Project: High vs. Low Tunnels for Veggies and Herbs	Dhekney	\$	Wyo. Dept. Agric.
2014 - 2017	Biological approaches for mint genetic improvement	Dhekney	\$ 12,851	Higher Comm. Edu. Dev. Iraq
2014 - 2016	Briess Variety/Fertilizer Trial	Eberle	\$	Briess Malting
2014 - 2016	Participatory Breeding of Winter Hardy Vegetable Peas for Wyoming	Groose	\$	Wyo. Dept. Agric.
2014 - 2016	Strawberry Production Using Vertical Growing Systems	Hilgert	\$ 12,500	Wyo. Dept. Agric.
2014 - 2016	Economic and Environmental Sustainability of Irrigated Grass-Legume Mixtures	Islam	\$	Utah State Univ. Western SARE
2014 - 2016	APRG: Wyoming Production of Locally-Bred Winter Pea to Integrate Crop and Livestock Production in Wyoming	Islam	\$ 20,000	Wyo. Dept. Agric.
2014 - 2016	Evaluation of Quinoa as a Leafy Green Crop for Adaptation in Wyoming	Islam	\$ 20,000	Wyo. Dept. Agric.

**2014 Grants Continued**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2014 - 2016	Effect of Planting Time and Fertilizer Management on Quinoa Production in Wyoming	Islam	\$ 20,000	Wyo. Dept. Agric.
2014 - 2016	Reducing Direct Harvest Losses in Conservation Tillage Dry Bean Production	Kniss	\$ 15,400	Wyo. Dept. Agric.
2014 - 2018	Efficacy and Economics of Cultural and Mechanical Weed Control Practices for Herbicide-Resistant Weed Management	Kniss	\$ 500,000	USDA-NIFA
2014 - 2015	Best Management Practices in Roundup Ready Sugarbeets	Kniss	\$	Monsanto
2014 - 2016	Rotation Crop Response to Dicamba	Kniss	\$ 4,800	Monsanto
2014 - 2016	Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 25,000	Wyo. Governor's Office
2014 - 2015	Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 15,400	Wyo. Dept. Agric.
2014 - 2016	WYG&F: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 5,000	Wyo. Game and Fish
2014 - 2016	WY State Parks: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 5,000	WY State Parks & Historic Sites
2014 - 2016	WYDOT: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 10,000	WY Dept of Transportation
2014 - 2019	Weed Science Research and Extension	Mealor	\$	Wyo. Weed and Pest Council
2014 - 2016	OSLI: Wyoming Invasive Grass Initiative: Statewide Cheatgrass Distribution and Prioritization	Mealor	\$ 5,000	Wyo. Office of State Lands and Investments
2014 - 2015	Sugar Beet Variety Trial	Sbatella	\$	Astec, Inc.
2014 - 2018	MillerCoors Barley Variety Trial	Sbatella	\$	Miller Coors, LLC
2014 - 2018	2015 Growing Season - Barley Variety Trial	Sbatella	\$	Miller Coors, LLC
2014 - 2016	Warrant in Alfalfa	Sbatella	\$ 4,800	Monsanto

**Grants 2014 continued**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2014 - 2019	Production Characteristics of Varieties of Conventional Sugar Beets	Sbatella	\$	Betaseed, Inc.
2014 - 2016	Germain's Seed Technology Trial	Sbatella	\$ 6,000	Germain's Seed Technology
2014 - 2018	Production Characteristics of Confection Sunflowers	Sharma and Garcia y Garcia	\$	SunOpta

**Projects Launched in 2013**

Duration	Project Title	Faculty Name	Amount	Sponsor
2013 - 2014	Chemical Management of Algae	Herbert	\$	PlanktOMICS LLC
2013 - 2015	Agronomic and Economic Evaluation of Organic and Conventional Soil Fertility Management in High Tunnels	Islam	\$	Wyo. Dept. Agric.
2013 - 2015	Establishment of Mints as Specialty Crops for Wyoming	Jeliazkov	\$	Wyo. Dept. Agric.
2013 - 2017	Herbicides for Use in Wyoming	Kniss	\$	Arysta LifeScience North America
2013 - 2015	Wyoming Cheatgrass Management Prioritization	Mealor	\$	Wyo. Weed and Pest Council
2013 - 2015	Integrated Research on Nut Tree and Mushroom Production at High Altitude Growing Conditions	Norton		Wyo. Dept. Agric.
2013 - 2014	Faculty for the Future Fellowship: The Effects of Different Conservation Agriculture Practices on Sustainable Food Production in Eastern Kenya and Western Uganda	Norton		Schlumberger Foundation
2013 - 2016	Corn Tolerance to Water and Heat Stress	Sbatella and Garcia y Garcia	\$	Dow AgroSciences
2013 - 2015	Corn Variety Trials	Sbatella	\$	J.R. Simplot
2013 - 2015	Sugar Beet Variety Trial	Sbatella	\$	Syngenta Crop Protection
2013 - 2016	Radish Variety Trial	Sbatella	\$	Rijk Zwann Production V.V
2013 -2016	Effect of Phosphorus Rate and Formulation on Sugarbeet Yield	Sbatella	\$	Western Sugar Coop.
2013 - 2018	Field Tests of Generic and New Generation Chemistries for Potato Pest Suppression, Bacterial Ringrot Symptom Expression in Various Potato Cultivars	Stump	\$ 6,000	Colorado Potato
2013 - 2016	Effect of Phosphorus Rate and Formulation on Sugarbeet Yield	Sbatella	\$	Western Sugar Cooperative

**Grants 2013 continued**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2013 - 2018	Formulation and adjuvant research	Kniss	\$	Winfield Solutions, LLC
2013 - 2018	Improving the Sustainability of Dry Bean Production	Kniss	\$	Various Sponsors
2013 - 2015	Corn Variety Trials	Sbatella	\$	J.R. Simplot
2013 - 2017	BASF Herbicides for Weed Control in Dry Beans	Sbatella	\$	BASF Corporation
2013 - 2017	Bayer Products for Weed Control in Barley	Sbatella	\$	Bayer, Inc.
2013 - 2018	Pest Management for the Crops of the High Plains	Stump	\$ 6,000	BASF Corporation
2013 - 2018	Field Tests of New Generation Pesticides for Disease Management	Stump	\$ 28,650	Bayer Corporation
2013 - 2018	Field Tests of Efficacy and Crop Safety of New and Established Chemistries for Pest Management	Stump	\$ 9,000	DuPont

**Projects Launched in 2012**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2012 - 2015	Screening Grape Cultivars for Adaptability to Edaphic and Climatic Factors in Wyoming	Dhekney	\$ 50,000	Wyo. Dept. Agric.
2012 - 2018	Roundup Ready Alfalfa Testing	Islam	\$	Forage Genetics International
2012 - 2017	Forage Yield and Seed Yield Potential of Novel Tall Fescue under Irrigated Conditions in the Big Horn Basin of Wyoming	Islam	\$	Wyo. Crop Improvement Assn.
2012 - 2016	Weed Biology, Ecology, and Management in Sugarbeet	Kniss	\$	Western Sugar Cooperative
2012 - 2017	Agronomic Crop Research	Kniss	\$	Syngenta Crop Protection
2012 - 2017	Weed Science Research in Agronomic Crops	Kniss	\$	BASF Corporation
2012 - 2017	Agronomic Crop Research	Kniss	\$	Syngenta Crop Protection
2012 - 2017	Weed Science Research in Agronomic Crops	Kniss	\$	BASF Corporation
2012 - 2017	Weed Management Research and Education	Kniss	\$	Monsanto
2012 - 2017	Weed Science Research & Education Program	Kniss	\$	Bayer Corporation



**Grants 2012 continued**

<b>Duration</b>	<b>Project Title</b>	<b>Faculty Name</b>	<b>Amount</b>	<b>Sponsor</b>
2012 - 2014	Faculty for the Future Fellowship: The Effects of Different Conservation Agriculture Practices on Sustainable Food Production in Eastern Kenya and Western Uganda	Norton	\$	Schlumberger Foundation
2012 - 2017	DuPont Products for Weed Control in Barley	Sbatella	\$	DuPont
2012 - 2017	Radish Variety Trial	Sbatella	\$	Harris Moran Seed Company
2012 - 2017	Crop Pest Management in the High Plains Region	Stump	\$	Syngenta Crop Protection, LLC
2012 - 2017	Plant Disease Research in Potato and Sugar Beet	Stump	\$	Gowan Company, LLC
2012 - 2017	Sugar Beet Pest Management in the High Plains Region	Stump	\$	Western Sugar Cooperative
2012 - 2017	Great Plains Diagnostic Network-Wyoming Component	Stump	\$	Kansas State Univ.

## **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

Adjesiwor, A.T. and **Islam, M.A.** 2016. Rising nitrogen fertilizer prices and projected increase in maize ethanol production: the future of forage production and the potential of legumes in forage production systems. *Grassland Sci. (in press)*.

Tracy, B.F., Albrecht, K., Flores, J., Hall, M., **Islam, M.A.**, Jones G., Lamp, W., MacAdam, J.W., Skinner, H., Teutsch, C. 2016. Evaluation of alfalfa-tall fescue mixtures across multiple environments. *Crop Science* 56:2026–2034. doi: 10.2135/cropsci2015.09.0553

Barney J.N., L.L. Smith L.L., and **D. R. Tekiela.** 2016. Weed risk assessments can be useful, but have limitations. *Invasive Plant Sci. Manag. (in press)*.

**Dhekney, S.A.**, Li, Z.T., Grant, T.N.L., and Gray, D.J. 2016. Somatic embryogenesis and genetic modification of *Vitis*. In Germana M.A. and Lambardi M. (eds). *In vitro embryogenesis in higher plants. Methods in Molecular Biology.* 1359: 263-277.

**Dhekney S.A.** 2016. Grapes. In: Caballero, B., Finglas, P., and Toldrá, F. (eds.) *The Encyclopedia of Food and Health.* vol. 3, pp. 261-265. Oxford Academic Press.

**Dhekney, S.A.**, Kandel, R., Bergey, DR., Asanakunov, B., Li, Z.T., and Gray, D.J. 2016. Development of novel plant phenotypes using plant pigment-associated genes. *Proceedings of the International Plant Propagators Society*, 65: 169-173.

**Dhekney, S.A.**, Kandel, R., Bergey, D.R., Sitther, V., Soorinathasundaram, K., and Litz, R.E. *Advances in papaya biotechnology. Biocatalysis and Agricultural Biotechnology*, 5: 133-142.

Douglass C.H., Nissen S.J., Meiman P.J., and **Kniss A.R.** 2016. Impacts of imazapyr and triclopyr soil residues on the growth of several restoration species. *Rangeland Ecol. Manag.* 69(3):199-205.

Kandel, R., Dutt, M., Gray, D.J., Li, Z.T., Bergey, D.R., Sitther, V., and **Dhekney, S.A.** 2016. Evaluation of a grapevine-derived reporter gene system for precision breeding of *Vitis*. *Plant Cell Tissue and Organ Culture*, 124: 599-609.

Kandel, R., Dutt, M., Grosser, J.W., Gray, D.J., Li, Z.T., Sitther, V., Bergey, D.R., and **Dhekney, S.A.** 2016. Evaluation of plant-based reporter systems for improvement of cold-hardy grapevine cultivars. *Acta Horticulturae*, 1115: 57-62.

*2016 Publications Continued*

**Eberle C.A.**, Forcella F., Gesch R., Weyers S., Peterson D., Eklund J. Oilseed echium: sowing date, flowering dynamics, pollinator visitation, and seed yield. PLoS ONE 9: e113556.

Gray, D.J., Li, Z.T., Grant, N.L., Dean, D.A., Trigano, R.N and **Dhekney, S.A.** 2016. The application of precision breeding (PB) for crop improvement is consistent with the plant life cycle: The utility of PB for grapevine. Acta Horticulturae, 1115: 49-56.

Gray, D.J., Li, Z.T., Grant, T.N.L., Trigiano, R.N., Bergey, D.R., and **Dhekney, S.A.** 2016. La sélection végétale de précision pour la mise au point de nouveaux cépages. Une nouvelle technologie génétique d'amélioration des plantes, entièrement en accord avec le cycle de vie de la vigne. Invited Review in Revue des Oenologues, 158: 13-16.

Greet B.J., **Mealor B.A.**, and **Kniss A.R.** 2016. Response of Delphinium occidentale and associated vegetation to aminocyclopyrachlor. Rangeland Ecology & Management. *Accepted*. <http://dx.doi.org/10.1016/j.rama.2016.06.004>.

Hewajulige, I., and **Dhekney, S.A.** 2016. Papaya. In: Caballero, B., Finglas, P., and Toldrá, F. (eds.) *The Encyclopedia of Food and Health* vol. 3, pp. 261-265. Oxford Academic Press.

**Islam, M.A.** and Adjesiwor, A.T. 2016. Forage Crops and Their Photosynthesis. In: Handbook of Photosynthesis, 3rd Edition (M. Pessaraki, Ed.). pp. 465-474. CRC Press, Taylor & Francis Publishing Company, Florida.

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## 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 PLNT4180.

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. \*

REWM 5000. Range Resource Management 3 ch.

REWM 5050. Range Forage Quality. 3 ch.

REWM 5300. Grass Taxonomy. 3 ch.

REWM 5520. Ecology and Management of Grasslands

REWM 5580. Rangeland Restoration Ecology. 3 ch.

RNEW 5130. Applied Remote Sensing for Agricultural Management. 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 established 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 7<sup>th</sup> year if graduate production is not scaling to the required thresholds for the degree level.