

OSU Crop Science Graduate Program Review Report, May 2015

Review Committee: Carolyn Aldwin, OSU; Bill Brewer, Oregon Potato Commission; Stacy Semevolos, OSU; Jimmy Henning, University of Kentucky.

1. Overall Recommendations

Expand
Maintain
Restructure XX
Reduce
Suspend
Discontinue
Other:

2. Summary of Findings and Recommendations

Executive Summary

The graduate education program in Crop Science at Oregon State University is a nationally respected, effective preparer of graduate students for employment in science and industry. Alumni of the program find jobs in their chosen field of work and characterize their Crop Science preparation at OSU as important for their current positions. Despite low numbers of on-campus faculty engaged in graduate education, students have been provided a diverse and positive graduate experience and make very timely progress towards graduation.

The overall OSU Crop Science program is highly respected by industry, who provide significant and ongoing monetary support for research, especially from the major Commissions (Wheat, Potato). The faculty and administration of the unit and the college need to better engage off-campus faculty and centers in graduate education, increase curricular diversity especially in the Crops area, diversify funding support for graduate student education, and set unit priorities for infrastructure repair/replacement and faculty and staff hiring, and maximally leverage the value of technology for graduate education and unit functionality.

Nonetheless, the graduate program of Crop Science is facing some serious challenges, such as a high proportion of graduate faculty near retirement, long-term decline in faculty numbers devoted to graduate education, a low proportion of total faculty contributing to graduate education, lack of clear understand and adoption of program-wide learning objectives, declining support for graduate student support, uncertainty regarding the coming university budget model, and an aging campus infrastructure.

Therefore, it is highly recommended that the Soil and Crop Science faculty coordinate with the Department Head, in developing a departmental Strategic Plan that lays the foundation for competitive and highly-ranked joint teaching and research programs. Both the Crop Science and Soil Science Graduate Program Review committees were unanimous in their recommendation for both programs to seriously consider a joint strategic planning initiative, as the level of success of departmental planning will largely impact the vitality and quality of both Graduate Programs. Thus, we recommend restructuring the graduate programs into one program, with perhaps two tracks. This would allow for better integration across disciplines, a pooling of resources, and joint strategies for having more sustainable graduate student support.

Findings

- a. Graduates are finding jobs in their field, and are well satisfied with the preparation they received from their graduate student experience at OSU.
- b. Present graduate students are pleased with their graduate experience, appreciate the broad, diverse experiences provided, and appreciate exposure to wide variety of programs in CS and related units. Students felt that faculty cared a great deal about doing a good job with graduate education, but could use regular training on timelines and deadlines for student progress. Students reported appropriate time to graduation, and noted that faculty were very concerned about present and future funding.
- c. Infrastructure was identified by faculty as a limiting factor for graduate education, specifically the quality of the greenhouse space, climate control in the CS building, power supply questions and safety of staff in the event of an earthquake. Students specifically commented on the need to improve quality of classrooms, and the lack of space in greenhouses. Greenhouse support staff should be commended on their innovative workarounds for summertime temperature moderation and the condition and functionality of the space.
- d. Technology shortcomings, specifically in distance learning/video conferencing capacity and reliability as well as technical support have resulted in failed or curtailed meetings and/or classes.
- e. Graduate students noted challenges with reimbursement of travel expenses that caused financial hardships.
- f. Crop Science faculty providing graduate education are limited in number, limiting the scope of the curricular offerings, especially in Crop Science.
- g. Advisors have supplemented the limited crops offerings with multiple courses from other units, such as Soil Science, Horticulture, Food Science etc.
- h. Budget changes for graduate student support and tuition remission policies have created much concern among CS graduate faculty. Uncertainties about the future university budget model exacerbate this situation. Policies as currently understood are felt to favor those programs able to get grants that pay tuition and/or graduate students over those that do not (such as commission grants).
- i. Off campus faculty at research and extension centers are disconnected from graduate education but are valued for their applied research.

- j. The comparative metrics provided regarding CS productivity were judged to underestimate the unit by the inclusion of several off-campus faculty, particularly those with county-level extension responsibilities.
- k. Stakeholder support was judged to be significant, especially from major commissions (wheat, potato).
- l. Departmental faculty have high H-factors, and as such are judged to be productive. However, many are nearing retirement age, especially among the graduate faculty interviewed.
- m. The department lacks a comprehensive strategic plan that would identify priorities for facility improvement/repair/replacement as well as future hiring plans for faculty and staff.
- n. The department has a decentralized model of graduate student recruitment compared to Soil Science. Every graduate student interviewed indicated that personal contact with a prospective advisor or OSU faculty was very important in their decision to attend OSU.
- o. Learning objectives identified in the self-study were numerous and ambitious. Faculty interviewed had little knowledge or understanding of the learning objectives.

Recommendations

Strategic Planning	<p>There is need for strategic planning within the program and department to develop priorities for facility improvement/repair/replacement, programs and future staffing plans for faculty and staff. It is imperative that a strategic plan be in place for hiring of new faculty to replace planned retirements. It is unclear how full support of commodities (Table 1, SS p. 6) is possible given the reduced number of faculty.</p> <p>Address the learning outcomes (SS pp. 15-16) in a planning exercise. Consider shortening the list, and making sure faculty know the outcomes and are adequately supported so they can reasonably be expected to meet these goals.</p>
Student Recruitment	<p>We recommend a more formal recruitment process with a cohort model, to increase the number and quality of students, including diversity. The booth at the national meeting appears to have been helpful in encouraging more applicants, and more of these types of efforts are needed.</p> <p>It would be helpful to have more complete records in tracking diversity issues. Attention should be paid to possible bias in acceptance of female applicants. Unfortunately the gender data were not broken down by type of program; it would be interesting to determine if there is a greater imbalance in the doctoral as compared to the master's program.</p> <p>More formal recruitment and better financial support would result in a stronger applicant pool, more selective acceptance rates, and better matriculation rates, especially among the doctoral students.</p>
Funding and Support	<p>More stable GTA funding sources need to be developed.</p>

	<p>Create new funding opportunities for tuition and stipends through diversification of funding mechanisms. Some suggestions follow:</p> <ul style="list-style-type: none"> • further fostering industry sponsorships or endowed fellowships, • development of training grants (tuition remission provided), • work with OSU Foundation and Graduate School to develop endowed fellowships, • option for gifts or estate planning to be directed, • Teaching e-campus courses to increase funding, • Departmental prioritization of a few GTAs for recurring funding, • Increase granting support of graduate students by providing staff support (e.g. grant writer/editor) for existing, functional teams of faculty. <p>Industry should lead the discussion with the OSU Foundation to develop sustainable funding targeting towards the graduate program. The Department Head, in consultation with key graduate faculty, should develop a strategy to be presented to individual commodity groups for their participation.</p> <p>Incent and support existing teams of faculty in their pursuit of grants, such as by hiring short term grant-writers.</p> <p>Enhance connection to and with faculty at off campus stations, and even other institutions (Washington State) for more robust and competitive grant applications.</p> <p>Securing future funding for this program in the future will depend on everyone, not just administration. From the President of the University to the Deans to the Department Heads and Faculty along with Industry, all are needed to actively work towards the funding of the program. This means each individual participant will be required to look outside of their comfort zone to keep programs funded.</p>
Quality of Program	<p>On-campus Crops faculty are to be commended for providing rich experiences for graduate students (based on interviews), for good graduation rates, and for engaging multiple outside departments for additional coursework.</p> <p>Off-campus faculty should be engaged to strategically add stand alone courses to the Crops curriculum and to reduce the burden of graduate education felt by on-campus faculty.</p> <p>Consider development of non-traditional, short-duration courses at off campus centers or even Extension offices, making use of the special expertise at these locations.</p> <p>Consider taking efforts to have faculty lead cross-discipline discussions or courses developed along high profile issues in agriculture.</p>

	<p>Consider partnering with other institutions to provide additional courses via technology</p> <p>Remove faculty not actively mentoring graduate students from the list of graduate faculty, including retired faculty, and reassess metrics for better comparison. Revise the list of graduate faculty to those who should be considered as fully engaged on a regular basis with the graduate program and with expectation of output in the form of student contact hours, publications, grants and awards. For further confidence in the validity of the comparative metrics, please confirm that aspirational institutions make similar distinctions.</p> <p>Increasing the opportunity for scholarly interactions should be a goal of the program. Perhaps the Crop and Soil Sciences students could particularly jointly within Soil Sciences existing structure.</p> <p>Recommended that Graduate Faculty have regular training on best practices for mentoring graduate students, with emphasis on timelines, deadlines and submissions and links to more information.</p> <p>Self-recommendations regarding the creation of a coordinating group of faculty for the crop science graduate program should be taken with full knowledge and consensus of those affected.</p>
Infrastructure	<p>Current campus crops program infrastructure seems to be meeting minimum standards, but the Crops Building needs several improvements to support program excellence, including:</p> <ol style="list-style-type: none"> 1. Climate control 2. Backup power supply 3. Ability to deliver large or heavy equipment to upper floors. <p>Modernize existing greenhouses and consider expanding space available for graduate education.</p> <p>Reduce time to reimbursement for graduate students or provide alternatives for payment of travel expenses if possible.</p> <p>Only two of the experiment stations have the ability to house students. The OSU faculty should pursue alternative solutions for short term housing for students by asking local industry to provide funding for hotel rooms or by housing them in their personal homes. Efforts to encourage graduate student involvement off-campus should also address the financial constraints related to reimbursement of travel expenses (see the student comments section).</p> <p>Improve reliability, access and support of distance learning technology.</p>

Community Engagement	<p>This area could be strengthened. Suggest that local industry be tapped to help train graduate students especially about how industry partners with university in areas of:</p> <ol style="list-style-type: none"> 1. How industry organizations work. 2. How grants programs work. 3. How USDA receives funding for available grants. 4. How industry advocacy secures grant funding in US Congress and State Legislatures. <p>The department chair and/or graduate program director should facilitate interaction with industry annually, and train students to provide meaningful and timely information for stakeholders. The importance of good grant writing skills along with timely reporting will help secure additional grants for the future. Communication skills need to be more than having the ability to deliver a powerpoint presentation at a workshop. All graduates going into the private or public sector need the ability to communicate with industry as well as academia.</p>
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3. Detailed Findings

Introduction

The Crops Science Review team (listed below) met with the administration, faculty, staff and graduate students on Thursday, May 21, 2015 for the purpose of the regular, decennial review of the Crop Science Graduate Program. The review team was provided with the Crop Science self-study (SS) and additional data (Appendices A-?) as background information for the process.

According to OSU Guidelines for Review of Graduate Programs, the purpose of the review is:

1. To provide recommendations concerning the future of the program including its structure and scope of activities.

The Crop Science Self Study document offered these additional goals for the review:

1. Develop strategies for improving facilities and equipment necessary for high-quality research work;
2. Develop strategies for staffing all components of crop science research and instruction;
3. Develop strategies for improving cross discipline/commodity/program area communication; and
4. Develop strategies for increasing stakeholder support for the research, teaching, and outreach conducted by our faculty.

Crop Science Review Panel

Employer: Bill Brewer (brewer@oregonspuds.com)

External Faculty: Jimmy Henning (jimmy.henning@uky.edu)

Internal Reviewer #1: Carolyn Aldwin (carolyn.aldwin@oregonstate.edu)

Internal Reviewer #2: Stacy Semevolos (Stacy.semevolos@oregonstate.edu)

Agenda Crop Science Graduate Program 10-Year Review

Wednesday, May 20, 2015

6:00 pm to 8:00 pm

Dinner with Review Team- Brenda McComb, Dean of Graduate School will pick up external reviewers from hotel lobby at 5:45pm to transport to dinner at Big River. Internal Reviewers meet at Big River.

Thursday, May 21, 2015

8:00 am to 9:00 am Meet with Program Review Director-David Hannaway (Crops 119) David Hannaway will meet external reviewers at the hotel lobby at 7:30am to escort you to campus, internal reviewers will meet at Crop Science Building 119

9:00 am to 10:00 am Meet with College Deans-(Crops 119)

10:00 am to 10:30 am Break

10:30 am to 12:00 pm Meet with Crop Science graduate program faculty (Crops 119)

12:00 pm to 1:30 pm Lunch meeting with graduate students (Crops 119)

1:30 pm to 2:30 pm Facilities Tour

2:30 pm to 3:30 pm Meet with CSS Department Head & Staff (Crops 119)

3:30 pm to 5:00 pm Executive Session (Crops 119) (please note this is an update from the agenda emailed previously)

5:00 pm to 5:30 pm Program Review Director exit report (Crops 119)

5:30 pm to 6:00 pm Exit Report to Crop Science graduate program faculty (Crops 119)

Detailed Findings and Recommendations of the Crop Science Review Team

Inputs	Finding	Recommendation or Comments
The mission of the program and its	Department mission statement addresses 3-fold land grant university	There is need for strategic planning within the program and department to

<p>relationship and alignment with the mission of the academic college(s), Graduate School and University</p>	<p>mission through research, teaching, and extension, outreach and engagement, and diversity mandates. These mandates seek to develop new crop varieties, management practices in agricultural environments, provide students with experiential learning, permit people to improve their lives, homes, and communities, promote diversity of ideas, people, and cultures.</p> <p>The university mission also emphasizes academic excellence in the three signature areas: advancing the science of sustainable Earth ecosystems; improving human health and wellness; and promoting economic growth and social progress. The Crop Science program mission aligns well with these signature areas, providing an intersection of all three areas.</p>	<p>develop priorities for facility improvement/repair/replacement as well as future hiring plans for faculty and staff. Diversity of students needs to be tracked (domestic diversity).</p>
<p>Recruitment and enrollment trends of students</p>	<p>In general, there has been an increase in applicants over the past few years, ranging from a low of 5 in 2005 to a high of 18 in 2010; in the most recent year (2013) there were 17 applicants. The gender diversity of the applicant pool has also increased; in 2013, there were 9 male applicants and 8 female.</p> <p>The number of international applicants has increased in the second half of the review decade, although the number of ethnic minority applicants appears quite low. There is considerable missing data concerning ethnic diversity; it would appear that only two Hispanics and two Asians applied during the 10 year period, but only about half of the applicants reported being white.</p> <p>There may be some slight evidence of gender differences in acceptance; overall, 47% of male applicants were accepted, compared to 38% of women. Of those, 70% of the accepted men</p>	<p>We recommend a more formal recruitment process with a cohort model, to increase the number and quality of students, including diversity. The booth at the national meeting appears to have been helpful in encouraging more applicants, and more of these types of efforts are needed.</p> <p>It would be helpful to have more complete records in tracking diversity issues. Attention should be paid to possible bias in acceptance of female applicants. Unfortunately the gender data were not broken down by type of program; it would be interesting to determine if there is a greater imbalance in the doctoral as compared to the master's program.</p>

	matriculated, compared to 64% of women.	
Admissions selectivity and other indications of selecting high quality students	<p>Acceptance rates are fairly high (41%), probably reflecting the fact that much recruitment takes place primarily through informal channels when grants are funded. However, the more formal recruitment that is taking place at the national meeting is to be commended, which may be why applications are up.</p> <p>In general, matriculation rates -- that is, the students who come after being accepted -- are higher in the master's students (80%) than in the doctoral students (50%). GRE scores tend to be higher in the students accepted, but the scores of the matriculated students in general reflect those of the general applicant pool, which are just average.</p>	More formal recruitment and better financial support would result in a stronger applicant pool, more selective acceptance rates, and better matriculation rates, especially among the doctoral students.
Level of financial support of students compared to peers	<p>Roughly 40-80% (average around 50%) have received >0.2 FTE all 3 years over the past 10 years. We did not see comparable statistics to other programs at OSU or other institutions. The Crop Science program has no department merit based assistantships and relies entirely on grant supported assistantships. Future college support of tuition for graduate students in Crop Sciences will be a significant issue, and the estimated number of graduate students will likely decrease from 53 to 35 (10 year average). Financial support for graduate students in the future needs diversification and creativity to provide tuition and stipends in order to continue to grow the student numbers.</p>	<p>Create new funding opportunities for tuition and stipends through diversification of funding mechanisms. Some suggestions follow:</p> <ul style="list-style-type: none"> • further fostering industry sponsorships or endowed fellowships, • development of training grants (tuition remission provided), • work with OSU Foundation and Graduate School to develop endowed fellowships, • option for gifts or estate planning to be directed, • Teaching e-campus courses to increase funding, • Departmental prioritization of a few GTAs for recurring funding, • Increase granting support of graduate students by providing staff support (e.g.

		grant writer/editor) for existing, functional teams of faculty.
Curriculum strength	<p>Crops curriculum was good but limited in options (App. D); single courses in areas where other states would have multiple (e. g. weed science). In contrast, Plant Breeding and Genetics curriculum is much more comprehensive. The Crop Science program does a very good job of engaging faculty in other Departments for a more diverse, comprehensive total offering of coursework (Table 3, SS p. 14).</p> <p>Learning objectives for the graduate program were very comprehensive, very aspirational and quite possibly too numerous (SS pp. 14-16). Few faculty interviewed demonstrated knowledge of them.</p>	<p>On-campus Crops faculty are to be commended for providing rich experiences for graduate students (based on interviews), and for engaging multiple outside departments for additional coursework.</p> <p>Off-campus faculty should be engaged to strategically add stand-alone courses to the Crops curriculum and to reduce the burden of graduate education felt by on-campus faculty.</p> <p>Consider development of non-traditional, short-duration courses at off campus centers or even Extension offices, making use of the special expertise at these locations. Improve reliability of distance learning technology.</p> <p>Consider partnering with other institutions to provide additional courses via technology.</p> <p>Address the learning outcomes (SS pp. 14-16) in a planning exercise. Consider shortening the list, and making sure faculty know the outcomes and are adequately supported so they can reasonably be expected to meet these goals.</p>
Quality of personnel and adequacy to achieve goals	<p>Crops faculty are of high quality (4th in nation for H-factor, are highly experienced (average tenure at OSU >23 yr.) with nearly all having terminal degrees in the field.</p> <p>Quantity of faculty is of concern, with numbers down to 47% of 1990 levels.</p>	<p>Engage off campus faculty to a larger degree to provide more courses and to reduce the burden of graduate education felt by on campus faculty.</p> <p>It is imperative that a strategic plan be in place for hiring of new faculty to replace planned or expected retirements.</p>

Level and quality of infrastructure	<p>Classroom condition was identified as limiting by students as well as quantity of greenhouse space.</p> <p>Faculty identified the outdated and limited capabilities of greenhouses and the lack of growth chamber space.</p> <p>Greenhouse maintenance staff should be commended on innovative adaptations for temperature moderation and for the general condition and neatness of the facility itself.</p> <p>Internet/video conferencing technology was limiting because of unreliability, access and limited timely support.</p>	<p>Current campus crops program infrastructure seems to be meeting minimum standards, but the Crops Building needs several improvements to support program excellence, including:</p> <ol style="list-style-type: none"> 1. Climate control 2. Backup power supply 3. Ability to deliver large or heavy equipment to upper floors. <p>Greenhouses need to be modernized and possibly expanded.</p> <p>Improve reliability, access and support of distance learning technology.</p>
Quality of organizational support	<p>The primary sources of support for the program is the college and industry. It was unclear as to where the program stood in the ranking of the priorities for the college, and the amount of support to expect in the future was unclear. Of particular concern is the new model for funding GTAs, which may result in a loss of support for the program.</p> <p>Industry support for some aspects of the program appears strong, but whether this is true for the entire program is unknown.</p>	<p>Strategic planning is needed from the program, the college, and industry to determine what aspects of the program and department will be supported in the future, and what plans for growth or cuts backs are needed.</p>
Productivity		
4- and 8-year graduation rates for MS and Ph.D students	<p>Graduation rates not included in program review document. Data provided by the Graduate School indicates a 70% 4 year graduation rate for Master's degrees and 74% 8 year graduation rate for PhD degrees in Crop Sciences.</p>	<p>Graduation rates are good for the program. Students tend to complete their degree programs within a reasonable timeframe.</p>
Publications or evidence of other scholarly work by students and faculty	<p>Although some journals are listed in the program review document, no specific numbers are provided regarding publications by graduate students. Citations of thesis are provided. Faculty publications and</p>	<p>Remove faculty not actively mentoring graduate students from the list of graduate faculty, including retired faculty, and reassess metrics for better comparison.</p>

	<p>grant productivity are assessed by Academic Analytics, showing metrics below comparable peers in similar disciplines. However, extension and experiment station faculty included in analysis may lower overall index. Some categories above the national median including number of faculty members with a grant, total number of grants, number of faculty with an article and number of faculty members with a citation. Departmental faculty have high H-factors, and as such are judged to be productive. However, many are nearing retirement age, especially among the graduate faculty interviewed.</p>	
Student satisfaction with their education and mentoring experiences	<p>In general, high student satisfaction with Crop Sciences graduate program. Survey of current and matriculated students show good to very good scores. Most students happy with major professors and mentoring experience. Diversity of faculty and interdisciplinary research are perceived strengths. One minor criticism is amount of out-of-pocket expenses incurred while traveling to experiment stations and length of time to reimbursement.</p>	<p>Reduce time to reimbursement for graduate students or provide alternatives for payment of travel expenses if possible.</p> <p>Faculty are to be commended for the satisfaction expressed by the graduate students.</p>
Viability of scholarly community within which students can interact	<p>On campus faculty are active in graduate program and accessible to graduate students. Students have opportunity to present research in seminars. Students pleased with social interactions provided by department through potlucks, barbeques, etc. No organized graduate student body in program, unlike Soil Sciences graduate students.</p>	<p>Increasing the opportunity for scholarly interactions should be a goal of the program. Perhaps the Crop and Soil Sciences students could particularly jointly within Soil Sciences existing structure.</p>
Outcomes and Impacts		
Placement and success of graduates	<p>Based on a survey of recent graduates, placement and success was very good. Response was low, but all 10 respondents (out of 58) were employed, and 70% had jobs prior to</p>	

	<p>graduating. All responding said their jobs were directly related to their education. (See p. 29 of SS)</p>	
<p>Satisfaction of students and graduates with their education and their post-graduation employment success</p>	<p>Very good to excellent based on student survey (n=30) and student interviews (n=6). Students surveyed were rated their satisfaction as 4.1 on a 5 scale (5 being Excellent) for 30 statements relating to their satisfaction of their graduate education experience. During the review, the six students interviewed expressed high degrees of satisfaction with their experience, with their major professors (one exception), with the breadth of their experience, liked the diversity of crops and the integration within Crop Science and with other units (e.g. Soils, Food Science, Fermentation Science). The students felt that faculty as a whole cared a lot about doing a good job with graduate students. They were very positive about the events held to bring them together.</p> <p>Student Concerns: the need for improved classrooms (squeaky desks), the need to adopt more student-friendly travel reimbursement policies, the need to work out technology difficulties before class and the need to do a better job of making them aware of timelines, deadlines, submissions, etc.</p>	<p>Recommended that Graduate Faculty have regular training on best practices for mentoring graduate students, with emphasis on timelines, deadlines and submissions and links to more information.</p>
<p>Profession or national rankings/ratings</p>	<p>Data provided show a mixed message regarding OSU Crop Science Graduate Program (SS pp. 30-31, appendices), being below their aspirational and land grant comparators based on per-faculty type measures of publications, grants and awards. The review team agrees with the statement in the SS that the values for Crop Science are skewed downward by the high numbers of faculty with Graduate status, but who would not be realistically expected to contribute</p>	<p>Revise the list of graduate faculty to those who should be considered as fully engaged on a regular basis with the graduate program and with expectation of output in the form of student contact hours, publications, grants and awards. For further confidence in the validity of the comparative metrics, please confirm that aspirational institutions make similar distinctions.</p>

	<p>actively to these metrics (e.g. county-level Extension faculty).</p> <p>In contrast, in 2014 the College ranked 15th in QS World's Academic Survey (up from 28th in 2013); 5th in Employer Survey (up from 6th in 2013); 23rd in Citations (up from 39th in 2013; and tied for 4th in H-index, a measure of productivity and impact of published work.</p>	
Community engagement activities	<p>Examples of community engagement activities were not provided in the self-study document. Breadth and quality of community engagement could easily be inferred by the high number of faculty at off campus centers, the scope of work and commodities supported, and from the apparently impressive level of funding from Commissions, specifically potato and wheat.</p>	<p>This area could be strengthened. Suggest that local industry be tapped to help train graduate students especially about how industry partners with university in areas of:</p> <ol style="list-style-type: none"> 1. How industry organizations work. 2. How grants programs work. 3. How USDA receives funding for available grants. 4. How industry advocacy secures grant funding in US Congress and State Legislatures.
<p align="center">Additional Review Team Comments to Self-Recommendations from Crop Science Self Study Report</p>		
Crop Science Self-Recommendations	Review Team Comments	Recommendations
Develop and engage a diverse group of stakeholders in an annual assessment protocol. At the graduate- and undergraduate-level, the Crop Science program would benefit from review and reflection on	<p>Having a diverse group of stakeholders review annual protocols is a good idea, but this should take place within a context of a strategic plan. Knowing what the goals are would be helpful in determining whether the goals are actually being met.</p>	<p>The department chair or program director should facilitate Interaction with industry annually, and help the graduate education process prepare graduates to provide meaningful and timely information for stakeholders. The importance of good grant writing skills along with timely reporting will help secure additional grants for the future. Communication skills need to be more than having the ability to</p>

the annual assessment document.		deliver a PowerPoint presentation at a workshop. All graduates going into the private or public sector need the ability to communicate with industry as well as academia.
Create a working coordinating group of faculty for the Crop Science graduate program would provide more structured coordination of the graduate program than the current distributed program does.		Actions on creating a coordinating group of faculty for the crop science graduate program should be taken with full knowledge and consensus of those affected.
Prepare our graduates to consider issues so as to inform policy makers of the science behind these issues.	Students self-reported that they felt they had received a broad-based, cross discipline educational experience. The faculty are still organized along traditional commodity lines, which does not inherently lead to issue oriented education of students.	Consider taking efforts to have faculty lead cross-discipline discussions or courses developed along high profile issues in agriculture.
Consider the value of a core of courses common to all Crop Science programs of study.	This would improve cohort consistency, integration, and cross-disciplinary discussion and perhaps collaboration.	
Resolve the barriers to increase the number of stand-alone graduate courses.	Agree.	
Identify a new funding model for graduate students and incentivize faculty to train graduate students.	<p>Actions relating to funding should take into account that the university and college budget models are still evolving.</p> <p>Agree that faculty should be encouraged to train graduate students for the future viability and sustainability of the program.</p>	<p>Explore new or non-traditional methods of funding graduate students and programs.</p> <p>Engage in discussions with traditional funders such as Commissions to develop plans to provide additional graduate scholarships for the crops program. These could include yearly grants as well as endowments.</p> <p>Incent and support existing teams of faculty in their pursuit of grants, such as by hiring short term grant-writers.</p>

		Enhance connection to and with faculty at off campus stations, and even other institutions (Washington State) for more robust and competitive grant applications.
Require clear direction from the University for priorities. At this time, and by University policy, faculty are variously pulled to invest their efforts in online teaching or securing research funding. The faculty see this as an advocacy role for the department head. JCH, Bill	Faculty should acknowledge that University funding models and therefore priorities are still in a state of flux. Granted the department head should be an advocate for faculty, but faculty must help by providing some prioritization of needs. Commissions and external stakeholders also are powerful advocates for faculty and programs.	<p>All research funding has been undergoing changes. Securing funding for this program in the future will depend on everyone to be involved, not just administration. From the President of the University to the Deans to the Department Heads and Faculty along with Industry, all are required to participate in order to be well funded. This means each individual participant will be required to look outside of their comfort zone to keep programs funded.</p> <p>Expand the prioritization process to include facilities, programs, and future staffing. It is unclear how full support of commodities (Table 1, SS p. 6) is possible given the reduced number of faculty.</p>
Another conflict is the University's encouragement for hands-on learning in the absence of provision for teaching support. This results in the mis-application of research funds for teaching support.	There is disagreement of between the administration and the faculty over the appropriateness of requiring GTA service in the absence of funding. The administration believed that this is simply part of their training and thus is an acceptable practice, while the faculty feel that this comes at the cost of GRA funding.	More stable GTA funding sources need to be developed.
Provide housing at the experiment stations.	This is being done at two stations.	It appears only two of the experiment stations have the ability to house students. The Hermiston station is 5 hours away and the Ontario station 9 hours from the OSU Campus. The OSU faculty should pursue alternative solutions such as, requesting local industry to provide short term housing for students either by funding hotel rooms or by housing them in their personal homes.

		Efforts to encourage graduate student involvement off-campus should also address the financial constraints related to reimbursement of travel expenses (see the student comments section).
Strategize with the OSU Foundation to develop sustainable funding targeted exclusively for the graduate program.		Industry should lead the discussion with the OSU Foundation to develop sustainable funding targeting towards the graduate program. The Department Head, in consultation with key graduate faculty, should develop a strategy to be presented to individual commodity groups for their participation.

Conclusion

The graduate education program in Crop Science at Oregon State University is a nationally respected, effective preparer of graduate students for employment in science and industry. Alumni of the program find jobs in their chosen field of work and characterize their Crop Science preparation at OSU as important for their current positions. Despite low numbers of on-campus faculty engaged in graduate education, students have been provided a diverse and positive graduate experience and make very timely progress towards graduation.

The overall OSU Crop Science program is highly respected by industry, who provide significant and ongoing monetary support for research, especially from the major Commissions (Wheat, Potato). The faculty and administration of the unit and the college need to better engage off-campus faculty and centers in graduate education, increase curricular diversity especially in the Crops area, diversify funding support for graduate student education, and set unit priorities for infrastructure repair/replacement and faculty and staff hiring, and maximally leverage the value of technology for graduate education and unit functionality.

Nonetheless, the graduate program of Crop Science is facing some serious challenges, such as a high proportion of graduate faculty near retirement, long-term decline in faculty numbers devoted to graduate education, a low proportion of total faculty contributing to graduate education, lack of clear understand and adoption of program-wide learning objectives, declining support for graduate student support, uncertainty regarding the coming university budget model, and an aging campus infrastructure.

Therefore, it is highly recommended that the Soil and Crop Science faculty coordinate with the Department Head, in developing a departmental Strategic Plan that lays the foundation for competitive and highly-ranked joint teaching and research programs. Both the Crop Science and Soil Science Graduate Program Review committees were unanimous in their recommendation for both programs to seriously consider a joint strategic planning initiative, as the level of success of departmental planning

will largely impact the vitality and quality of both Graduate Programs. Thus, we recommend restructuring the graduate programs into one program, with perhaps two tracks. This would allow for better integration across disciplines, a pooling of resources, and joint strategies for having more sustainable graduate student support.