Graduate Program Review – Response Form
Texas Tech University

Program Reviewed: Graduate Program of Plant and Soil Science, Texas Tech University

Onsite Review Dates: April 25th and 26th, 2016

Name of Reviewers:

Internal: (Please include Name, Title and Department)

External: (Please include Name, Title, Department, and Institution)

Manoj Shukla, Professor, Department of Plant and Environmental Sciences, New Mexico State University

I. Academic Unit Description and Strategic Plan

Please evaluate the following departmental factors by clicking and selecting the appropriate rating descriptor:

Vision, Mission and Goals: Very Good

Strategic Plan: Very Good

Please comment on the positive components and suggested areas of improvement.

The Plant and Soil Science (PSS) department at Texas Tech University is a large interdisciplinary department. The PSS department offers four graduate certificates (GCert), two Master of Science (MS) degrees (PSS and horticulture), and one Doctor of Philosophy (PhD) degree (five concentration areas). The PSS department has approximately 18 faculty full-time equivalents (FTEs), which works out to be about 30 individual faculty members. The faculty appointments range from full (75% TTU) to 25% TTU, while the remaining faculty have either a joint appointment with Texas A&M AgriLife or conduct summer teaching. Faculty (30) and instructors (about 6) are highly qualified to conduct research and teaching related to the overall mission of the department. Overall, the mission and vision of the PSS department are very good and adequately address the current and future needs of the state. The vision of the department to be one of the top 20 academic plant and soil science departments in the nation is realistic. The strategic plan of the PSS department is to increase undergraduate enrollment to 174 and graduate enrollment to 125 students. Over the past several years, the PSS department has made very good progress toward achieving these goals.

As far as the suggested areas of improvements are concerned, the PSS department should be more clear about their mission related to “increase knowledge about our environment.” With 87 graduate students, there are already about 3 graduate students per faculty member (or ~5 per FTE). If graduate numbers increase to 125 (as per the strategic plan), there will be almost
5 graduate students per faculty member (~7 per FTE). With the overall teaching, research, outreach, service, and grant writing loads of the faculty, this may adversely impact their productivity. However, the number of graduate students is directly linked to the amount of research funding generated by a department, and a large number of graduate students is an indication that faculty are highly successful in garnering external research grants. My suggestion to the faculty is to consider hiring postdocs, which could help them meet strategic goals more efficiently.

II. Program Curriculum

Please evaluate the following program curriculum factors for the masters and doctoral programs by clicking and selecting the appropriate rating descriptor:

Alignment of the program with stated program and institutional goals and purposes:
  Masters degree: Very Good
  Doctoral degree: Very Good

Curriculum development coordination and delivery:
  Masters degree: Very Good
  Doctoral degree: Needs Improvement

Program learning outcomes assessment:
  Masters degree: Very Good
  Doctoral degree: Very Good

Program curriculum compared to peer programs:
  Masters degree: Very Good
  Doctoral degree: Good

Please comment on the positive components and suggested areas of improvement.

The PSS department made some good strategic decisions by eliminating some MS degrees and combining others into a common PSS MS degree. The decision to maintain an MS in horticulture is consistent with the demand for the specialty and is also in accord with other peer institutions. The PSS department also aligned the MS degree program with the PhD and included five concentration areas. The department should be complimented for doing this because such an alignment better connects the specialties earned. I would also like to especially emphasis the “certificate” and the “distance degree” programs of the department. I am pleasantly surprised that 17.2% of the graduate students are currently enrolled in the distance education program. Both of these programs are highly valuable for a wide audience who need a course(s) or a degree to advance their career. Educational programs, in general, align very well with the department’s goals and vision. One way to assess the program learning outcomes is to look at the numbers of students graduated in the past three years. The PSS department has done a fair job by graduating 14 or more graduate students per year during the last three years.
The chart prepared by the graduate school showed that the number of students graduating with an MS in soil science is consistently low and ranged between 3 in 2011 to 1 in 2014. Simultaneously, no PhD degrees with a concentration in soil science were awarded during this period. Although similar trends can also be seen in other peer institutions, the PSS department needs to come up with a strategy to attract more students to the soil science concentration in their PhD program. There are only three faculty members listed as part of the Plant Protection Group. The PSS department needs to strengthen the FTEs for this concentration area, especially since it is one of the PhD-awarding concentration areas. During the meeting with graduate students, some concerns were raised on the adequacy of the number and frequency of classes for some concentration areas. Graduate students also complained about several courses that are not counted toward the degree and about courses not being up to the rigorous level of a graduate program. Some of these issues were also reported in previous reviews. Students also want a new course on professional writing. The PSS department is encouraged to talk to graduate students and get their feedback on curriculum strengths and shortcomings.

### III. Faculty Productivity

Please evaluate the following faculty productivity factors by clicking and selecting the appropriate rating descriptor:

- **Qualifications:** Excellent
- **Publications/Creative Works:** Excellent
- **Teaching Load:** Very Good
- **External Grants:** Excellent
- **Teaching Evaluations:** Very Good
- **Professional Service:** Excellent
- **Community Service:** Needs Improvement

Please comment on the positive components and suggested areas of improvement.

The joint appointment of PSS faculty with the Texas A&M system is a win-win for both institutions. The approximately 18 faculty FTEs available in the PSS department increase the total graduate faculty number to 30. Additionally, there are adjunct faculty members from the USDA–ARS Cropping Systems Research Laboratory, various industries, and a federal agency. The number of refereed publications published by PSS faculty in 2011 was 139, and they increased consistently to 274 in 2014. The number of graduate faculty involved in refereed publications also increased from 8 in 2011 to 22 in 2014. The refereed publications, posters, and abstracts with at least one graduate student also increased from 2011 to 2014. Other presentations, posters, and abstracts also increased for the same time period. Department faculty published 14 books/book chapters. All of these, point to a very high level of productivity considering the total number of department FTEs is only 18. During the period under evaluation, external grant funding for the department ranged from $4.1 to $6.1M per year, excluding the non ORS grants. In the current funding environment, this
simply is an excellent achievement and speaks volumes about the quality of faculty in the department. The five-year teaching evaluations summary indicates that the average ratings for course objectives and instructors were consistently above 4.4 out of 5. Ratings for courses/valuable learning experience were also consistently above 4. These high evaluations clearly demonstrate that the faculty are doing a very good job of teaching. The number of faculty serving as Editor or Editorial Board Member has also increased from 2 in 2011 to 16 in 2014. Faculty are serving on the editorial boards of several US-based international journals as well as foreign journals. PSS faculty are doing an excellent job of professional service and have earned recognition at national and international levels.

Books are important contributions from the faculty and should not be combined with book chapters. The number of technical and popular articles declined considerably in 2014 and needs improvement. During discussion with faculty, a suggestion was made that faculty merit should be evaluated for the total effort (TTU + AgriLife or USDA). Community service is listed by only four faculty members on their CVs, and this needs improvement.

IV. Students and Graduates
Please evaluate the following student- and graduate-related factors by clicking and selecting the appropriate rating descriptor:

*Time to degree:*
  - Masters degree: Needs Improvement
  - Doctoral degree: Needs Improvement

*Retention:*
  - Masters degree: Good
  - Doctoral degree: Good

*Graduate Rates:*
  - Masters degree: Needs Improvement
  - Doctoral degree: Needs Improvement

*Enrollment:*
  - Masters degree: Very Good
  - Doctoral degree: Very Good

*Demographics:*
  - Masters degree: Good
  - Doctoral degree: Good

*Number of Degrees Conferred Annually:*
  - Masters degree: Good
  - Doctoral degree: Needs Improvement
Support Services:
Masters degree: Very Good
Doctoral degree: Very Good

Job Placement:
Masters degree: Good
Doctoral degree: Good

Student/Faculty Ratio:
Masters degree: Very Good
Doctoral degree: Very Good

Please comment on the positive components and suggested areas of improvement.

The average time for MS students to graduate is 5 years. The average time for PhD students to graduate is consistently decreasing, from 13 years in 2010-11 to 9 years in 2013-14, with an average of about 10 years. This long average time to graduate could be influenced by the number of part-time students (>32%), who typically need more time to graduate. Since 2012, the total number of graduate students seems to have stabilized around 90. It is not easy to comment on the actual retention with the data provided to us, but it seems longer graduation times and new enrollments are offsetting the number of students leaving the program. The department also devotes considerable effort to screening students prior to their acceptance. In the case of a struggling student, the department follows a “dialogue initiation” process to help the student complete the degree. This clearly indicates that the department has a very strong support system in place for graduate students. The PSS department has made significant progress in awarding more graduate degrees since 2010. The number of degrees awarded in 2010 was only 3, but that increased to 16 in 2014. There are no data to conclusively assess job placement of graduate students. However, during discussion with faculty members and the department head as well as in the faculty comments section, it was indicated that full-time job placement is not a problem for graduates of the PSS department. Overall, the ratio of students to faculty at present is about 3.2 (96/30), which is very good.

The time to acquire both MS and PhD degrees needs improvement. I could not find the data on graduate student retention and therefore will not comment on it. The graduation rate of 16 per year for the last three years is good but it needs further improvement. The department needs to make sure that further increases in graduate enrollment do not increase the student-faculty ratio significantly. The PSS department should also pay attention to the student-faculty ratio within each concentration area and can use it as a criterion for enrolling new graduate students. During the interaction with graduate students, it was pointed out that there were some problems with the admission process. I suggest the PSS department come up with a one-page checklist for graduate students listing all the requirements for admission to the graduate program. Students also expressed concerns regarding the amount of face time and advice they receive on their proposed research from the chairs of their research committees.
V. Facilities and Resources
Please evaluate the following facilities and resources factors by clicking and selecting the appropriate rating descriptor:

Facilities: Good
Facility Support Resources: Very Good
Financial Resources: Good
Staff Resources: Good

Please comment on the positive components and suggested areas of improvement.

The department has several good facilities both on- and off-campus. The laboratories in the new Bayer Building are excellent and provide excellent bench- and workspaces for graduate students. The PSS department also has a fully functional research greenhouse and two research farms. The facilities are supported by research dollars as well as endowments, and provide valuable space for faculty to conduct cutting-edge research.

Greenhouse facilities should be upgraded and instrumented to at least record routine meteorological data needed to explain plant growth and stress physiology. The laboratory, greenhouse, and classrooms in other buildings also need improvement. During the discussion with students, it was pointed out that personal vehicles without the required parking permits are not allowed inside the campus. Thus it a challenge for them to bring soil and plant samples from the field to their lab using personal vehicles.

VI. Overall Ranking
Please provide an overall rating of the masters and doctoral degree programs by clicking and selecting the appropriate rating descriptor:

Overall Rating:
Masters degree: Very Good
Doctoral degree: Good

Please provide summative conclusions based on the overall review.

This review draws on the self-study document provided by the Department of Plant and Soil Science (Graduate Program Review, 2009-14). This report is also based on the feedback received from faculty, students, and industry representatives during the on-site visit to the Texas Tech University (TTU) campus during April 25-26, 2016, a tour of some of the research facilities including greenhouses and labs, and meetings with the department chair and department graduate program leader. There were three internal reviewers and two external reviewers present during these meetings.

Texas Tech University is not a land-grant university and therefore may not have several resources that are available in a land-grant system. However, Texas Tech University’s mission and goals are very similar to that of a land-grant university. The PSS department is doing an excellent job of teaching and research. The PSS department has excelled in increasing the graduate enrollment numbers, external grant funding, and peer-reviewed
publications, and has modernized the infrastructure and some of the laboratories and student
bench spaces. The department has sustained excellent partnerships with the Texas A&M
system through Texas AgriLife Research and Extension, as well as with USDA–ARS and
various industries. Interactions with faculty and students clearly showed that the PSS
department is an excellent place to work, and is a closely knit unit providing an excellent
environment for everyone to be successful. The department consists of some excellent
teaching and research faculty members who are on par with faculty at other peer institutions.
The department is vigilant and has made necessary changes and adjustments from time to
time to stay at the forefront of teaching and research. I have no hesitation to say that I am
impressed with the progress and achievements that the Department of Plant and Soil Science
has made so far. I rate the Department very highly.

Please proved summative recommendations based on the overall review.

Based upon the on-site visit, which off course was extremely useful, and the document
provided by the department/college, I have the following recommendations to address some
of the deficiencies in the department.
1. Maintain the existing student-faculty ratio in the future.
2. Offer more graduate-only courses.
3. Minimize the “piggybacked” courses.
4. Start a new course on professional writing.
5. Seek graduate students’ input in restructuring some of the courses.
6. Decrease the number of years required to graduate.
7. Revisit the concentration areas and increase faculty FTEs in the plant protection
concentration area, which has less than adequate faculty support.
8. Evaluate faculty merit based on the total effort (TTU + AgriLife or others).
9. Improve the admission process to the graduate programs.
10. Address short-term parking needs of the graduate students.
11. Invest more resources to modernize laboratories, greenhouses, and classrooms.