

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION
REVIEW OF ACADEMIC DEGREE PROGRAM
OKLAHOMA STATE UNIVERSITY
MULTIDISCIPLINARY PLANT SCIENCE PH.D. PROGRAM
ACADEMIC YEARS 1999/00 – 04/05

March 2005

OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION

2004 - 2005
ACADEMIC PROGRAM REVIEW

BACCALAUREATE, MASTERS & DOCTORAL DEGREES

OKLAHOMA STATE UNIVERSITY

Multidisciplinary Plant Science Ph.D. Program

Title of unit or degree program reviewed (Level III)

With options (Level IV) in:

Cellular & Molecular; Ecological;

Organismal

Plant Science

Degree designation as on diploma (Level II)

Ph.D.

Formal degree abbreviation (Level I)

Degree-granting academic unit

Graduate College

(Name)

801

(Cost Center)

CIP code **260301**

HEGIS code **0402**

Instructional Program code **033**

Name of department head **Charles G. Tauer (Program Coordinator)**

(person who oversees degree program listed above)

Program holds specialized accreditation from **No Accreditation**

Name and title of contact person **Charles G. Tauer**

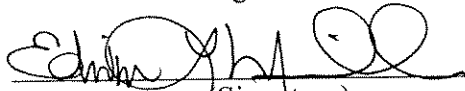
(Name)

Professor

(Title)

Date of Institutional Governing Board Review: _____

President


(Signature)

Date:

2/24/2005

OKLAHOMA STATE UNIVERSITY
ACADEMIC PROGRAM REVIEW
EXECUTIVE SUMMARY

DEPARTMENT OF DEGREE PROGRAM: Multidisciplinary Plant Science Ph.D.

The multidisciplinary Plant Science Ph.D. program was established in 1996 after two years of study and discussion between plant science faculties in the Colleges of Agricultural Sciences & Natural Resources and Arts & Sciences. The department of Botany generously agreed to allow their Ph.D. program to be utilized in the development of a multidisciplinary program, which would serve the entire University.

Among the most pressing and timely challenges to modern plant science is determining how plants function in both natural and modified ecosystems. We are at the dawn of a biobased economy in which plants will not only have the traditional roles of supplying food, feed, and fiber, but will be used to supply industrial chemicals, fuels, lubricants, and pharmaceuticals. This will offer tremendous opportunities for economic development in Oklahoma. The State is blessed with abundant natural resources and climatic zones to produce a wide range of plants with economic importance. Realizing the need for an integrated approach to plant science research, faculty in the departments of Biochemistry and Molecular Biology, Botany, Entomology & Plant Pathology, Forestry, Horticulture & Landscape Architecture, Microbiology & Molecular Genetics, and Plant & Soil Sciences formulated this program. The Plant Science Ph.D. program provides the opportunity for exceptional students to undertake coursework and research tailored to their individual career goals. In this program, students experience the many facets of plant science, which affords them the flexibility to seek employment in a variety of settings. With their advisory committee's guidance, students develop a program in one of three specialization areas: Cellular & Molecular, Organismal, and Ecological. Although students develop a specialization area, they are expected to establish a sound foundation across the disciplines of plant science.

During the review period, the Plant Science faculty have graduated 12 Ph.D. students. The research by these students has, to date, resulted in 44 publications. Eighteen faculty from across the seven cooperating departments currently have or had students in the Plant Science Ph.D. program during the review period. The number of students in the program has grown from 10 to 17 per year. All 12 graduates have obtained employment in the plant science area.

To date, the Plant Science Ph.D. program has been conceived of, established, and conducted on an entirely voluntary basis by interested and dedicated faculty. The program is now large enough, and the institutional reviews and requirements considerable enough, to make it difficult to continue on a voluntary basis. The greatest challenge for this program will be to generate institutional support, which is needed to allow the program to continue to grow. Some minimal level of support is necessary to ensure that the Plant Science Ph.D. program can recruit, process, and evaluate students, meet University outcomes assessment goals, meet Graduate College plan of study and graduation check requirements, and provide continuity for requirements such as this Academic Program Review.

Dean 
(Signature)

Date 2/24/2005

OVERVIEW

OVERVIEW

A. Description of the Departmental/Program Review Process

The multidisciplinary Plant Science Ph.D. program includes Biochemistry & Molecular Biology, Botany, Entomology & Plant Pathology, Forestry, Horticulture & Landscape Architecture, Microbiology & Molecular Genetics, and Plant & Soil Sciences. The program is coordinated by a committee comprised of one faculty member from each of those departments. This committee is chaired by a Program Coordinator elected by the committee. The Coordinator and the committee serve voluntarily. This Program Review was compiled by the Program Coordinator with input as requested from the committee, as well as faculty active in the program. Significant assistance was provided by a Department of Forestry staff member, who volunteered to help, with the approval of the Head, Department of Forestry.

Because of the multidisciplinary nature of this program and its unfunded status, considerable input as to what components of the review should be addressed was provided by Dr. Gail Gates.

B. Recommendations from Previous Program Reviews

A major concern of the program has been the total lack of institutional support. This concern remains, and coordination and management continue to be voluntary. The recommendation to develop a sense of camaraderie among students of the program, spaced across seven departments, has been in part met by the initiation of a bio-net seminar series. The bio-net group closely cooperates with the Plant Science Ph.D. program and has outside funding to do so. The recommended 0.10 FTE secretarial help has not been provided; however, the bio-net group is again helping out, providing assistance with maintaining a web page, with recruiting, and processing applications. The program continues to have no scholarship or research assistantship funding.

CRITERION I

Program Centrality

CRITERION I – Program Centrality

A. Goals & Objectives of Degree Programs

The goal of the Plant Science Ph.D. program is to provide a multidisciplinary academic environment for outstanding students to pursue a Ph.D. in Plant Science. Plant Science Ph.D. students are generally full-time traditional graduate students who reside in Stillwater and who have recently completed an M.S. degree. Occasionally these students will skip the M.S. degree. The curriculum is designed to ensure all students have a solid background in all aspects of plant science, yet it has the flexibility for each program of study to be customized to the student's career goals. The Plant Science Ph.D. is a research-based degree. It requires that a student conduct research worthy of at least one and preferably two or more refereed journal articles during or upon completion of their degree. It is the responsibility of the student's advisory committee to insure progress is being made toward these goals and those realistic expectations are maintained.

It is expected that students graduating from this program will be employed in some area of plant science research and development, with academia or industry. This is generally the case.

B. Linkage of the Program to Institution's Mission

Oklahoma State University is a modern comprehensive land grant university that serves the State, national, and international communities by providing its students with exceptional academic experiences, by conducting scholarly research and other creative activities that advance fundamental knowledge, and by disseminating knowledge to the people of Oklahoma and throughout the world.

The multidisciplinary Plant Science Ph.D program is linked to the following roles of the University's mission:

- to advance the knowledge and leadership development of students seeking a doctoral degree in the plant science area
- to enrich the lives of students in the program
- to develop fundamental knowledge through research, scholarship, and other creative activities to enhance/stimulate economic development
- to disseminate knowledge through publications, presentations, and other forms of outreach for stimulation and enhancement of economic development

Oklahoma State University meets its mission and role through strategically selected programs of instruction, research, and public service. Areas of emphasis, which relate to the Plant Science Ph.D. program, are outlined below:

- Provide graduate programs in the basic and applied plant sciences
- Enrichment of programs which accelerate the development of students
- Provide basic and applied research in areas critical to the State, nation, and for which extramural support can be obtained
- Develop alliances and partnerships with government, business, and industry that serve to enhance the economic development of Oklahoma

CRITERION II

Program Curriculum and Structure

CRITERION II – Program Curriculum and Structure

A. Program Structure

1. Degree Options & Objectives

Degree Option (Level IV)	Objectives
Cellular & Molecular	Use of cellular and molecular biology to understand and manipulate plants
Organismal	Study of whole-plant physiology, genetics, anatomy, and taxonomy
Ecological	Role of plants in natural and modified ecosystems

2. Description of Required Courses

The Plant Science Ph.D. program at Oklahoma State University provides the opportunity for exceptional students to undertake coursework and research tailored to their individual career goals. In this program, students can experience the many facets of plant science, which affords them the flexibility to seek employment in a variety of settings. With their advisory committee's guidance, students develop a program in one of three specialization areas: Cellular & Molecular, Organismal, and Ecological. Although students will develop a specialization area, they are expected to develop a sound foundation across the disciplines of plant science. For example, a student specializing in the Cellular and Molecular area will also be required to have a basic understanding of Organismal and Ecological plant sciences. Degree requirements sheets are not applicable, and therefore not attached.

3. Summary of Course Requirements

a. Doctoral degree:

(1) Total number of hours required for degree

- **90 hours (60 hours if student has previously earned a Master of Science)**

(2) Number of hours in:

1) degree program core: **11-14 hours**

2) discipline specialty: **9 hours**

3) discipline support courses: **Discretion of Advisory Committee**

4) discipline-related course work: **Discretion of Advisory Committee**

5) electives: **Discretion of Advisory Committee**

6) thesis/dissertation: **Minimum of 10 hours, no maximum limit**

B. Distance Education

N/A – The Plant Science Ph.D. program does not offer any courses of its own.

C. Articulation Agreement

N/A

D. Multidisciplinary Programs

The Plant Science Ph.D. program includes all interested faculty from seven cooperating departments across two colleges. The departments included are Biochemistry & Molecular Biology, Botany, Entomology & Plant Pathology, Forestry, Horticulture & Landscape Architecture, Microbiology & Molecular Genetics, and Plant & Soil Sciences. The Plant Science Ph.D. program provides the opportunity for exceptional students to undertake coursework and research tailored to their individual career goals. Even faculty from departments with their own specialty area Ph.D. program occasionally use the Plant Science Ph.D. program because of its flexibility in both breadth and depth of focus. In this program, students experience the many facets of plant science, which affords them the flexibility to seek employment in a variety of settings. With their advisory committee's guidance, students develop a program in one of three specialization areas: Cellular & Molecular, Organismal, and Ecological. Faculty from all cooperating departments will serve on the advisory committees, depending on the student's needs and interest. Although students develop a specialization area, they are expected to establish a sound foundation across the disciplines of plant science.

The Plant Science Ph.D. program is managed by an Advisory Committee consisting of appointed faculty members from each of the seven departments participating in the degree program. The Program Coordinator is a non-voting member of the Advisory Committee and is elected to a three-year term by the Advisory Committee. The Program Coordinator is responsible for acceptance of students in to the program, monitoring student performance, and graduation checks.

Current Members of the Advisory Committee:

1. Dr. Chuck Tauer, Forestry, Program Coordinator
2. Dr. Jeff Anderson, Horticulture & Landscape Architecture
3. Dr. Michael Anderson, Plant & Soil Sciences
4. Dr. Ming Yang, Botany
5. Dr. Jacqueline Fletcher, Entomology & Plant Pathology
6. Dr. Steve Hallgren, Forestry
7. Dr. Andrew Mort, Biochemistry & Molecular Biology
8. Dr. Robert Burnap, Microbiology & Molecular Genetics

CRITERION III
Program Resources

CRITERION III – Program Resources

A. New Facilities and Major Equipment

N/A – The Plant Science Ph.D. program has no budget.

B. Academic and Administrative Efficiencies

N/A – The Coordinator and Advisory Committee of the Plant Science Ph.D. program all serve voluntarily.

C. External Funding

N/A – All funding is obtained by cooperating faculty through their respective departments.
Appendix A not applicable.

CRITERION IV

Productivity

CRITERION IV – Productivity

A. Number of Majors (Headcount), Student Credit Hours, and Average Time to Graduation

Enrollment has held fairly steady over the last five years, ranging from 17 to 20 students, except for a drop in 2004, to 12. This drop represents a number of students graduating (5), coupled with a decrease in the number of new students. This decrease is due to a reduced number of assistantships available in the cooperating departments, as well as a drop in international student enrollment following the 9/11 incident. Fall 2005 enrollment is back up to 16 students.

The program averaged three graduates per year from 2000 to 2004. These students generated on average 72 student credit hours each, and required an average four years to graduate. The minimum number of hours required beyond the M.S. degree is 60, and four years to complete a Ph.D. is a very reasonable time period.

B. Faculty Ratio and Class Size

N/A – The program has no faculty solely associated with it.

C. 5 Year Average Number of Degrees Conferred and Majors

The Plant Science Ph.D. program averaged three graduates per year from 2000/01 to 2003/04. Enrollment in the program averaged 17 students. Both the number of graduates and the number of students in the program comfortably exceeds the minimum productivity standards of the Oklahoma State Regents for Higher Education.

OSRHE PROGRAM REVIEW
 CRITERION IV - PROGRAM PRODUCTIVITY
 NUMBER OF MAJORS IN EACH PROGRAM FOR PAST FIVE FALL SEMESTERS

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----- PROGRAM_NAME=033 PLANT SCIENCE - PHD -----

	FALL				
	FALL 2000	FALL 2001	FALL 2002	FALL 2003	FALL 2004
	N	N	N	N	N
DEGREE					
BOTANY ; GR PHD PLS BOT	.	1	1	1	3
FORESTRY ; GR PHD PLS FTRS	.	.	2	2	1
GRADUATE COLLEGE ; GR PHD PLS	15	15	11	12	1
HORT & LANDSCAPE ARCH ; GR PHD PLS HORT	1
MICROBIOLOGY & MOL GEN ; GR PHD PLS MICR	.	.	2	2	3
PLANT & SOIL SCIENCES ; GR PHD PLS PASS	1	2	4	2	4
A11	17	18	20	19	12

OSHRE PROGRAM REVIEW
 CRITERION IV - PROGRAM PRODUCTIVITY
 FIVE YEAR HISTORY OF DEGREES AWARDED

----- PROGRAM_NAME=033 PLANT SCIENCE - PHD -----

		YEAR			
		2000- 2001	2001- 2002	2002- 2003	2003- 2004
		N	N	N	N
DEGREE	TERM				
GRADUATE COLLEGE ; GR PHD PLS	SUMMER		1		
	FALL		1	1	4
	SPRING	2	1	1	1
	A11	2	3	2	5
A11	TERM				
	SUMMER		1		
	FALL		1	1	4
	SPRING	2	1	1	1
	A11	2	3	2	5

CRITERION V

Quality

CRITERION V - Quality

A. Program Faculty Qualifications

Name	Faculty Status Regular/Adjunct	Faculty FTE In Program*	Degrees Earned		Related Work Experience (Years)
			Highest	Highest in Teaching Area	
			Type	Type	
Anderson, Jeff	Regular	-0-	Ph.D.	Ph.D.	19
Anderson, Michael	Regular	-0-	Ph.D.	Ph.D.	15
Bell, Greg	Regular	-0-	Ph.D.	Ph.D.	7
Bender, Carol	Regular	-0-	Ph.D.	Ph.D.	19
Burnap, Robert	Regular	-0-	Ph.D.	Ph.D.	14
Caddel, John	Regular	-0-	Ph.D.	Ph.D.	28
Carver, Brett	Regular	-0-	Ph.D.	Ph.D.	20
Cole, Janet	Regular	-0-	Ph.D.	Ph.D.	17
Conway, Ken	Regular	-0-	Ph.D.	Ph.D.	27
Damicone, John	Regular	-0-	Ph.D.	Ph.D.	15
Dillwith, Jack	Regular	-0-	Ph.D.	Ph.D.	19
Duthie, James	Regular	-0-	Ph.D.	Ph.D.	13
Engle, Dave	Regular	-0-	Ph.D.	Ph.D.	23
Essenberg, Margaret	Regular	-0-	Ph.D.	Ph.D.	28
Fletcher, Jacque	Regular	-0-	Ph.D.	Ph.D.	23
Fuhlendorf, Sam	Regular	-0-	Ph.D.	Ph.D.	7
Hallgren, Steve	Regular	-0-	Ph.D.	Ph.D.	19
Henley, William	Regular	-0-	Ph.D.	Ph.D.	13
Hennessey, Tom	Regular	-0-	Ph.D.	Ph.D.	28
Huang, Yinghua	Adjunct	-0-	Ph.D.	Ph.D.	14
Hunger, Bob	Regular	-0-	Ph.D.	Ph.D.	23
Johnson, Becky	Regular	-0-	Ph.D.	Ph.D.	31
Longtine, Mark	Regular	-0-	Ph.D.	Ph.D.	6
Lynch, Tom	Regular	-0-	Ph.D.	Ph.D.	23
Mahalingam, Ramamurthy	Regular	-0-	Ph.D.	Ph.D.	1
Maness, Niels	Regular	-0-	Ph.D.	Ph.D.	14

A. Program Faculty Qualifications, Continued

Name	Faculty Status Regular/Adjunct	Faculty FTE In Program*	Degrees Earned		Related Work Experience (Years)
			Highest	Highest in Teaching Area	
			Type	Type	
Marek, Stephen	Regular	-0-	Ph.D.	Ph.D.	2
Martin, Bjorn	Regular	-0-	Ph.D.	Ph.D.	16
Martin, Dennis	Regular	-0-	Ph.D.	Ph.D.	14
McAlister, Suzanne	Adjunct	-0-	Ph.D.	Ph.D.	3
Meinke, David	Regular	-0-	Ph.D.	Ph.D.	23
Melcher, Ulrich	Regular	-0-	Ph.D.	Ph.D.	30
Melouk, Hassan	Adjunct	-0-	Ph.D.	Ph.D.	29
Mort, Andrew	Regular	-0-	Ph.D.	Ph.D.	24
Palmer, Michael	Regular	-0-	Ph.D.	Ph.D.	16
Pierce, Marlee	Regular	-0-	Ph.D.	Ph.D.	24
Porter, David	Adjunct	-0-	Ph.D.	Ph.D.	15
Prade, Rolf	Regular	-0-	Ph.D.	Ph.D.	11
Rikin, Arnon	Regular	-0-	Ph.D.	Ph.D.	17
Scheets, Kay	Adjunct	-0-	Ph.D.	Ph.D.	17
Schoenknecht, Gerald	Regular	-0-	Ph.D.	Ph.D.	4
Smith, Michael	Regular	-0-	Ph.D.	Ph.D.	28
Taliaferro, Charles	Regular	-0-	Ph.D.	Ph.D.	30
Tauer, Chuck	Regular	-0-	Ph.D.	Ph.D.	29
Tyrl, Ronald	Regular	-0-	Ph.D.	Ph.D.	33
Verchot, Jeanmarie	Regular	-0-	Ph.D.	Ph.D.	7
Yang, Ming	Regular	-0-	Ph.D.	Ph.D.	3

* Faculty FTEs are assigned in their academic departments, not the Plant Science Ph.D. program

B. Evidence of Regional/National Reputation and Ranking

There are few if any similar multidisciplinary programs for regional or national comparison, and no such ranking is available. However, the fact that all of the program's graduates since 2000 have, to our knowledge, found relevant employment speaks to the reputation of this University, and the relevance of the Plant Science Ph.D. program.

C. Scholarly Activity

Since all participating faculty report scholarly activity to their respective departments, Dr. Gates suggested this item is best addressed by a listing of the scholarly activity (publications) of students in the Plant Science Ph.D. program (see Appendix B).

D. Assessment of Student Achievement of Expected Learning Outcomes for Each Degree Program

Multiple criteria are used to assess student performance. These include: 1) job placement upon completing their degree, 2) participation at professional meetings, and 3) refereed publications generated from their dissertation research. Of the 12 graduates during this period, ten have presented their research at professional meetings, nine have published one or more articles, and the other three are planning to do so. They have all found employment as research associates, post doctorals, or faculty in the plant sciences.

To date, these outcomes have been assessed informally. Formal outcomes assessment of the program has been left to the department in which the student's advisor resides. Unfortunately, to date, the Plant Science Ph.D. Program Coordinator has not gotten feedback from the Department Heads.

E. Overview of Results from Program Outcomes Assessment

The program has not had a formal outcomes assessment plan to date because of the multidisciplinary nature of the program, and the fact that the Program Coordinator and Advisory Committee all serve voluntarily. It has become clear that this will have to change.

F. Feedback from Program Alumni/Documented Achievements of Program Graduates

We have no formal means of obtaining feedback from our alumni.

G. Other Program Evaluations

There have been no outside reviews.

CRITERION VI

Program Demand/Need

CRITERION VI – Program Demand/Need

A. Occupation Manpower Demand

N/A

B. Societal Needs for Program

The “Occupational Outlook Handbook” of the U.S. Department of Labor and the Bureau of Labor Statistics indicates that biological scientist positions are expected to grow as fast as the average job growth. Competition at the Ph.D. level is expected to increase to the year 2012 for Ph.D. graduates, but we believe our multidisciplinary training will give our graduates an edge.

Plant scientists with Ph.D.s in the areas of biotechnology, molecular biology, and genomics are currently in high demand. We are beginning to see the dawn of a new biobased economy in which plants will not only have the traditional role of supplying food, feed, and fiber, but will be used to supply industrial chemicals, fuels, lubricants, and pharmaceuticals. This will offer tremendous opportunities for economic development in Oklahoma. The State is blessed with abundant natural resources and climatic zones to produce a wide range of plants with economic value.

There is also increased interest and demand for the conservation and sustainable management of our plant resources. Due to public interest in maintaining, or preferably improving environmental quality, both the public and private sectors are expected to increase funding to support plant science research in the future.

C. Graduate Student Applications and Enrollment Changes

We have a more than adequate number of applications. Acceptances are based on the availability of funding support for the applicants. We have had satisfactory numbers of acceptances and new enrollments. In the last several years, however, with limited and reduced budgets, the number of new enrollments has dipped. We do have three new students in 2005, and believe our numbers will maintain or increase slightly, which is probably an appropriate enrollment level for this program. Since this program has no funding of its own and relies solely on participating departments, planning to increase enrollment is difficult.

Plant Science

GRADUATE STUDENT APPLICATIONS AND ENROLLMENT CHANGES

	Enrolled			Applications			Acceptances			New Enrollments from Applications Accepted			Graduations (Summer, Fall, Spring totals shown)		
	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004
GR PHD PLS															
Domestic	9	9	5	2	3	1	2	2	1	1	1	1	0	0	5
	0	(4)		1	(2)		0	(1)		0	0		0		5
International	11	10	7	16	15	9	5	2	2	1	1	0	3	2	0
	(1)	(3)		(1)	(6)		(3)	0		0	(1)		(1)	(2)	
Totals	20	19	12	18	18	10	7	4	3	2	2	1	3	2	5
	(1)	(7)		0	(8)		(3)	(1)		0	(1)		(1)	3	

CRITERION VII
Program Duplication

CRITERION VII – Program Duplication

A. Identify Other Degree Programs at OSU with Similar Titles or Functions

The multidisciplinary Plant Science Ph.D. program was established in 1996 after two years of study and discussion between plant sciences faculties in the Colleges of Agricultural Sciences & Natural Resources and Arts & Sciences.

Faculty of the seven departments involved in these discussions (Biochemistry & Molecular Biology, Botany, Entomology & Plant Pathology, Forestry, Horticulture & Landscape Architecture, Microbiology & Molecular Genetics, and Plant & Soil Sciences) all felt a need for a new Ph.D. program in the plant sciences. The Plant Science Ph.D. program, as it has been devised, provides the opportunity for exceptional students to undertake coursework and research tailored to their individual career goals. In this program, students experience the many facets of plant science, which affords them the flexibility to seek employment in a variety of settings. With their advisory committee's guidance, students develop a program in one of three specialization areas: Cellular & Molecular, Organismal, and Ecological. Although students will develop a specialization area, they are expected to develop a sound foundation across the disciplines of plant science.

At the time this program was designed, there was a consensus that the Plant Science Ph.D. program met the needs of a growing new type of student, and that this program was unique in the University.

Other programs which could be most similar in function would be other Ph.D. programs in the seven cooperating departments. These programs will be addressed in Section B.

B. For Similar Programs, Describe How Each Degree Program Fulfills Unique Student Needs

The departments of Botany, Forestry, and Horticulture & Landscape Architecture do not offer separate Ph.D. programs. These departments rely on the Plant Science Ph.D. program for their students, although they do occasionally utilize the interdisciplinary Environmental Sciences Ph.D. or the department of Plant & Soil Sciences Crop Science Ph.D. The choice of program to use is based on which best serves the student.

The department of Entomology & Plant Pathology offers Ph.D. degrees in Entomology and Plant Pathology, which most department faculty use most of the time. Occasionally a faculty member in their department uses the Plant Science Ph.D. program, when it best serves the student's needs. Such instances occur when the student's major emphasis is centered on plants, i.e. the host, rather than the insect or pathogen. This same approach and reasoning is utilized by the departments of Microbiology & Molecular Genetics and Biochemistry.

The department of Plant & Soil Sciences offers the Ph.D. in both Crop Science and Soil Science. The Soil Science Ph.D. is obviously not in conflict. The Crop Science Ph.D. differs from the Plant Science Ph.D. in its rigidity and focus. The Crop Science Ph.D. has an extensive and rigid set of course requirements focused on crop production science. The Plant Science Ph.D. allows exceptional students to tailor the program to their needs, allowing focus on the cellular and molecular-, organismal- or ecological-level of plant study, while ensuring a sound foundation across the disciplines of plant science. These two programs, Crop Science and Plant Science, are complimentary, and Plant & Soil Sciences faculty utilize both Ph.D. programs to ensure the student's needs are best served.

**SUMMARY
and
RECOMMENDATIONS**

SUMMARY AND RECOMMENDATIONS

A. Strengths

The strength of the multidisciplinary Plant Science Ph.D. program is that it allows graduate students to develop a unique program of study to match their career goals. It builds upon the faculty and research infrastructure within seven academic departments and two colleges at Oklahoma State University.

B. Concerns

The major concern regarding this program is lack of institutional support. It has no budget. The Graduate College allocates \$1,500 per year for in-state tuition waivers. A baseline budget is needed for operation and maintenance of the program. There is no one to even act on the goals and recommendations provided below.

C. Recommendations for Action

1. To work with Department Heads of the cooperating departments and with University Assessment to develop and carry out a simple outcomes assessment plan.
2. Allocate 0.10 FTE senior secretary to maintain this program to handle recruiting and applications, and 0.20 FTE faculty position to manage the program and conduct outcomes assessments to ensure continued success of the program.

D. Five-Year Goals for the Program

1. Identify institutional support for the program
2. Attempt to find scholarship and assistantship funds independent of affiliated academic programs
3. Obtain at least a 0.10 FTE senior secretary to manage daily operations for the program

Appendix B
Record of Significant Scholarly, Artistic and/or Creative Work

Name and Type of Scholarly, Artistic and/or Creative Work	Program Student	Year Completed (1999-2005)
Bernardo, A. , G-H. Bai and A.C. Guenzi. 2001. Identification of differentially expressed sequence tags for scab resistance in wheat using bulk segregant analysis and suppression subtractive hybridization. In: Proceedings of 2001 National Fusarium Head Blight Forum. December 8-10, Cincinnati, OH.	Bernardo, Amy	2001
Bernardo, A. , G-H. Bai, and A.C. Guenzi. 2003. Microarray analysis of gene expression in wheat infected with <i>Fusarium graminearum</i> . Plant & Animal Genomes XI Conf., San Diego, CA, p. 762.	Bernardo, Amy	2003
Caldo R.A. , M.P. Anderson, and R.M. Hunger. 2001. Changes in Gene Expression in Response to Leaf Rust (<i>Puccinia triticina</i>) Infection in Wheat (<i>Triticum aestivum</i>) 2001 International Society of Molecular Plant Microbe Interactions, Madison WI.	Caldo, Rico	2001
Caldo, R.A. , M.P. Anderson, and R.M. Hunger. 2001. Dissecting Wheat-Leaf Rust Interactions with gene expression profiling. Phytochemical Society of North America Annual Meeting, Oklahoma City.	Caldo, Rico	2001
Caldo, R.A. , M.P. Anderson, and R.M. Hunger. 2001. Changes in gene expression in response to leaf rust infection. Hard Winter Wheat Workers Workshop, Kansas City MO.	Caldo, Rico	2001
Caldo, R.A. 2002. Changes in gene expression by wheat in response to infection by <i>Puccinia triticina</i> , causal fungus of wheat leaf rust. Thesis, Oklahoma State University, Stillwater, Oklahoma 74078.	Caldo, Rico	2002
Chen, Jiwang , C.G. Tauer and Y. Huang. 2000. Molecular markers found to detect hybridization between shortleaf and loblolly pine. In: the Eleventh Annual Graduate Student Research Symposium, Oklahoma State University, March 29-31, Stillwater, OK.	Chen, Jiwang	2000
Chen, Jiwang , C.G. Tauer and Y. Huang. 2001. trnL-trnF intergenic region polymorphism reveals chloroplast paternal inheritance among three <i>Pinus</i> species. In: The 12th Annual Graduate Student Research Symposium, Oklahoma State University, March 7-9, Stillwater, OK.	Chen, Jiwang	2001

Name and Type of Scholarly, Artistic and/or Creative Work
Chen, Jiwang , C.G. Tauer and Y. Huang. 2001. Using trnL-trnF intergenic spacer polymorphisms to examine inheritance of pine hybrids. In: The 26th Biennial Southern Forest Tree Improvement Conference, June 26-29, Georgia.
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Program Student
Chen, Jiwang
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Clark, Stacy
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Elavarthi, Sathya
Elavarthi, Sathya Melmaiee, Kalpalatha
Itaya, Asuka
Itaya, Asuka
Itaya, Asuka
Melmaiee, Kalpalatha
Melmaiee, Kalpalatha Elavarthi, Sathya
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Samuels, Timmy
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Thompson, Steven
Wang, Xinkun
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