



ANNUAL REPORT: June 1, 2011 – May 31, 2012
(i.e., Summer 2011, AY 2011-2012)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: William A. Powell

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
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SUMMER:

FALL:

EFB307	Principles of Genetics	3	179	
EFB307	Genetics Lab	1	172	9
BTC132	Orientation Seminar:BTC	1	20	

SPRING:

BTC497	Res Desgn & Prof Dev	1	18	
BTC425	Plant Biotechnology	3	16	1
EFB625	Plant Biotechnology	3	3	1

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning. EFB courses currently listed with service-learning components include: 416/6/1, 486, 518, 521, 532, 446/646.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
BTC420	Internships in Biotechnology	12	4
BTC498	Research Problems/Biotech	10	4
EFB899	Masters Thesis Research	7	2
EFB999	Dissertation Research	2	4

3. Continuing Education and Extension (short courses, workshops, etc.)

4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
EFB 132	EFB Freshman Seminar: American chestnut research	2

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor __15__ and unofficial advisor __61__ (as coordinator of Biotechnology major)___

B. Graduate Students: (Name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

MAJOR PROFESSOR

1. Amelia Bo Zhang, PhD, started August 2006

Graduated May 2012, Dissertation: Bo Zhang, Transgenic American Chestnut (*Castanea Dentata*) Expressing Oxalate Oxidase Developed Through *Agrobacterium*-mediated Co-transformation Shows Reduced *Cryphonectria Parasitica* Necrosis, 131 pages, 5 tables, 21 figures, 2012.

2. Katherine D'Amico, MS, started August 2008

Graduated May 2012, Thesis: K. M. D'Amico. Assessing Ectomycorrhizal Associations on Chestnut: Comparing Transgenic, Wild-type, a Conventionally-Bred Hybrid, and Related Fagaceae species, 109 pages, 12 tables, 15 figures, 2012

3. Kristen Russell Steward, MPS, started August 2010

Left the MPS program in the Fall 2011 for personal reasons. Plans to return Fall 2012.

CO-MAJOR PROFESSOR

1. Allison Oakes, PhD, (with Dr. Maynard), started May 2009

MEMBER, STEERING COMMITTEE (other than those listed above)

1. Christina Quinn, MS, started F2007

Graduated Dec. 2011, C. Quinn. Profiling and Functional Characterization of microRNAs in Loblolly Pine (*Pinus taeda*) Pollen Germination (see Dr. Fernando for full reference)

2. Arnold Salazar, Ph.D., started 2007?

3. Marian Orlousky, MPS, started 2009

4. Jeremy Dicenza, MS, started 2011

5. Samuel Tourtellot, MS, started 2009?

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

1. Som Mukherjee (Dissertation Examiner)

2. Daniela Manushevich (Chair of PhD examination)

III. RESEARCH COMPLETED OR UNDERWAY

A. Departmental Research (unsupported, boot-legged; title - % time spent)

Continuing research to develop DED and Elm Yellows resistant American elm. Currently unfunded. Approximately 1% of time.

B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)

1. **New.** USDA-Biotechnology Risk Assessment Grant program (BRAG), Evaluating Environmental Impacts Of Maturing Transgenic American Chestnut Trees Relative To Chestnut Trees Produced By Conventional Breeding. \$500,000 (9/1/12-8/31/14). PI with co-PIs, Dr. Maynard, Dr. Parry, Dr. Briggs, Dr. Nowak, and Dr Tschaplinski (ORNL)
2. **New.** The New York Chapter of The American Chestnut Foundation. Supplemental grant for technician support for Chestnut research. \$20,000 (1/1/11-12/31/12). PI with Dr. Maynard as co-PI.
3. Forest Health Initiative. Supplemental funding to develop an early blight resistance-screening assay for American chestnut. \$105,000 (7/1/10 – 6/30/12). PI with Dr. Maynard as Co-PI.
4. ArborGen LLC. Transformation of American chestnut with genes encoding transcription factors. \$20,000 (1/1/11-12/31/12) PI with Dr. Maynard as Co-PI. Another year of 10 years of support beginning in 2002 totaling \$500,000.
5. The American Chestnut Foundation. Travel grant to China to collect DNA and RNA samples from Asian chestnut species. \$16,600. PI with graduate student Amelia Bo Zhang as co-PI.
6. Forest Health Initiative. First and second-generation transgenic American chestnut trees. \$900,000 (8/1/09 – 7/31/12). PI with Dr. Maynard as Co-PI. Currently supporting 2 MS students. This is our part of a multi-institutional grant totaling \$5.2 million. Opportunity to renew an additional three years if progress is sufficient.
7. Forest Health Initiative. Supplemental funding to examine early flowering genes in transgenic American chestnut. \$83,000 (6/1/10 – 5/31/12). PI with Dr. Maynard as Co-PI.
8. Consortium on Plant Biotechnology Research (CPBR). Collaborative research: Developing blight resistance in transgenic American chestnut for agroforestry and restoration. \$67,000 (5/1/10-12/31/12) PI with Dr. Maynard as co-PI. Will support one Ph.D. student
9. The New York Chapter of The American Chestnut Foundation. Testing Transgenic Events for Gene Copy Number, Gene Expression, and Blight Resistance. \$100,000 (5/08-12/31/12). PI with Dr. Maynard as co-PI. Supports summer graduate student in my lab and a technician.
10. The New York Chapter of The American Chestnut Foundation. Regenerating Transformation Events into Whole Plants and Expansion of Field Trials. \$300,000 (5/08-12/31/12). Co-PI with Dr. Maynard, PI. This is in addition to the grant above. It will support a technician in Dr. Maynard's lab, a summer graduate student in my lab, and hourly undergraduate students for field research.

2. Research Proposals pending (include information as in B.1., above).

Forest Health Initiative (renewal). First and second-generation transgenic American chestnut trees. \$500,000 (10/1/12 – 9/30/14). PI with Dr. Maynard as Co-PI

3. Research Proposals submitted, but rejected (include information as in B.1, above)

Pennsylvania State University/Horticultural Research Institute (HRI), Development of Elm Trees Resistant to Elm Yellows. \$15,026. Co-PI with Dr. Maynard and Cristina Rosa (PSU)

IV. PUBLICATIONS (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- **do not list manuscripts in preparation**).

A. Refereed Publications

Baier, K.M., C.A. Maynard, and **W.A. Powell**. 2012. Early flowering in Chestnut species induced under high intensity, high dose light in growth chambers. *Journal of The American Chestnut Foundation* (in Press)

Oakes, A.D, N.A. Kazcmar, C.A. Maynard, **W.A. Powell**. 2012. Vegetative Propagation of American Elm (*Ulmus Americana*) Varieties from Softwood Cuttings. *J. Environ. Hort.* 30(2):73–76

Barakat, A., M. Staton, C. Cheng, J. Park, N. B. M. Yassin, S. Ficklin, C. Yeh, F. Hebard, K. Baier, **W. Powell**, S. C. Schuster, N. Wheeler, A. Abbott, J. E Carlson and R. Sederoff. 2012. Chestnut resistance to the blight disease: insights from transcriptome analysis. *BMC Plant Biology* 2012, 12:38

Zhang, B., A. Newhouse, L. McGuigan, C. Maynard, and **W. Powell**. 2011. Agrobacterium- mediated co-transformation of American chestnut (*Castanea dentata*) somatic embryos with a wheat oxalate oxidase gene. (Extended abstract for the IUFRO meeting in 2011) *BioMed Central (BMC) Proceedings* 2011, 5(Suppl 7):O43

D' Aminco, T. Horton, C. Maynard, and **W. Powell**. 2011. Assessing ectomycorrhizal associations and ransgene expression in transgenic *Castanea dentata*. (Extended abstract for the IUFRO meeting in 2011) *BioMed Central (BMC) Proceedings* 2011, 5(Suppl 7):O54

Submitted:

Zhang, B., A. Oakes, C. Maynard, and **W. Powell** (in review). Enhancing Agrobacterium- mediated co-transformation of American chestnut (*Castanea dentata*) somatic embryos. *In Vitro Cellular and Developmental Biology-Plant*.

Zhang, B., A. Oakes, A. Newhouse, K. Baier, C. Maynard, and **W. Powell** (in review). Transgenic American chestnut (*Castanea dentata*) expressing oxalate oxidase shows reduced *Cryphonectria parasitica* necrosis. *Transgenic Research*.

Five more manuscripts are in preparation.

B. Non-refereed Publications

Many “news” articles and interviews coving the historic NY Botanical garden planting (April 18th) of transgenic American chestnut trees:

Interview on local PBS TV [Reith #102 5/15/12](#)

26:46

Air Date 05/15/12

http://www.syracuse.com/news/index.ssf/2012/04/esf_professors_send_improved_a.html

<http://sfr.psu.edu/public/chestnut/newsletters/newyork-news/transgenic-american-chestnut-planting-in-nyc>

http://www.upi.com/Science_News/2012/04/16/Planting-hopes-to-save-chestnut-trees/UPI-21241334605742/

<http://www.sciencedaily.com/releases/2012/04/120412141816.htm>

<http://www.mnn.com/earth-matters/wilderness-resources/stories/iconic-chestnut-tree-poised-for-comeback>

<http://www.ouramazingplanet.com/2766-chestnut-tree-comeback.html>

<http://www.dailyorange.com/news/esf-rooting-out-fungus-professors-work-to-save-traditional-chestnut-tree-from-deadly-disease-1.2856903#.T7qFou24JII>

<http://www.nydailynews.com/new-york/bronx/twenty-year-effort-bring-back-mighty-chestnut-tree-wiped-blight-blooms-botanical-garden-article-1.1064307>

http://www.syracuse.com/news/index.ssf/2012/04/esf_professors_send_improved_a.html

http://www.msnbc.msn.com/id/47062599/ns/technology_and_science-science/t/iconic-chestnut-trees-poised-possible-comeback/#.T7qHke24JII

New article in Northern Woodlands (in press)

And press in Germany:

<http://www.spektrum.de/alias/gentechnik/die-rueckkehr-des-koenigs/1149183>

It has also been copied by our (rather big) media partners Zeit and Handelsblatt:

<http://www.zeit.de/wissen/umwelt/2012-04/usa-kastanien-gentechnik> (most popular article at the science section for most of the day)

<http://www.handelsblatt.com/technologie/forschung-medizin/forschung-innovation/gruene-genforschung-gentechnik-soll-amerikas-koenig-retten/6523348.html>

And in Australia, New Scientist Magazine (in press)

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

Update on American chestnut research. 6/2/11. Forest Health Initiative annual meeting, Washington DC.

Two oral presentations given by graduate students Amelia Bo Zhang and Katie D'Amico at the annual IUFRO meeting in Brazil, June 27-July 1, 2011. Titles: "Enhancing Agrobacterium- mediated co-transformation of American chestnut

(*Castanea dentata*) somatic embryos,” and “Assessing ectomycorrhizal associations and transgene expression in transgenic *Castanea dentata*, respectively.”

American Chestnut Research & Restoration Program, 9/7/11, Beijing Forestry University, China. (Presentation to students and researchers as part of China trip to collect DNA & RNA samples from wild Chinese chestnut species)

Technician, Lilibeth Northern, presented an update at the Annual NE1033 chestnut researchers meeting at the Incarnation Conference Center, Ivoryton, CT, 10/28-29/11

Graduate student, Amelia Bo Zhang, gave an oral presentation, “Oxalate Oxidase Expression Reduced *Cryphonectria parasitica* Necrosis in Transgenic American Chestnut (*Castanea dentata*)” at the annual Consortium for Plant Biotechnology Research (CPBR) symposium, Washington, DC, 3/6-7/12

Graduate students and technicians presenting three posters at the CNY Biotechnology Symposium 2012. 5/21/12

- A. Andrew E Newhouse and William A Powell. Detached Leaf Assay: Quick Screen for Blight Susceptibility in Transgenic American Chestnuts. Poster.
- B. Zhang B, Oakes AD, Newhouse AE, Baier KM, Maynard CA, and Powell WA. A threshold level of oxalate oxidase transgene expression reduces blight-induced necrosis in transgenic American chestnut (*Castanea dentata*). Poster
- C. L.C. Northern, A.D. Oakes, K.M. Baier, A.E. Newhouse, C.A. Maynard, and W.A. Powell. Introducing FT1, an early flowering gene, into American chestnut as a tool for accelerated breeding. Poster
- D. Oakes, Allison, WA Powell, and CA Maynard. 2011. “Darkness and Activated Charcoal Increase Micropropagated American Chestnut Rooting and Acclimatization Success.” presented at the ISAEMP 2011: Fifth International Symposium on Acclimatization and Establishment of Micropropagated Plants, October 17, Nebraska City, NE. <http://agronomy.unl.edu/isaemp-2011>.

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)

Preseation on chestnut research and panel discussion, The Annual American Chestnut Foundation meeting at Jarvis Center, Buffalo, NY, 10/20 – 22/12 (approximately 100 attended)

Restoration of the American chestnut: Old problem, New solutions. 4/18/1. New York Botanical Gardens, Bronx, NY (approximately 120 attended) – Also Planted the first transgenic American chestnut trees ever at NYBG.

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):
2. Industrial and Commercial Groups, etc.

One of my photographs of a person planting transgenic American chestnut is being published in a general biology textbook (Brooker: Biology 3e). This will reference my name and the college’s name.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

Advisor to the NY chapter of The American Chestnut Foundation

Science advisory board member of the national American Chestnut Foundation

ESF Alumni Reunion Weekend tours of labs and greenhouse (9/24/11)

VI. PROFESSIONAL DEVELOPMENT

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)

2. Professional Society Membership

American Phytopathological Society

American Association for the Advancement of Science

3. Other Professional Activities

a. Editorial activity

Journal (s)

Responsibility

Other (books, symposia, etc.)

b. Reviewer

Journal(s)

No. of manuscripts

Tree Genetics and Genomes

3

Journal of Experimental Botany

1

Agency

No. of proposals

Consortium on Plant Biotechnology Research

1

Other

c. Participation (workshops, symposia, etc.)

Name of workshop, etc.

Date

Place

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

D. Foreign Travel (Where, When, Purpose)

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Faculty representative on ARB building Committee

Coordinator for the undergraduate Biotechnology major

Awards Ceremony: Gave the Joseph & Ruth Hasenstab Scholarship and the Distinguished Scholar in Biotechnology. Took photos of the awards ceremony.

Represented the Biotechnology major at the Spring Open house.

B. College-level

Director of the Council on Biotechnology in Forestry

IBC (Institutional Biosafety Committee) member

C. University-wide, including Research Foundation

D. Foreign Travel (Where, When, Purpose)

September 3rd thru Sep 20th, 2011, trip to Beijing and various rural locations in China to collect RNA and DNA samples from native chestnut species, *Castanea mollissima*, *C. Henryi*, and *C. seguinii*. The trip was a success and we were able to clone genes for use in American chestnut.

VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION. One paragraph on each of the following would be most helpful: this past year, what have you done for our students, department/college, and self professionally? NOTE: The information in this section (along with the supporting specific information elsewhere in this report) should be your strongest case for being considered for a discretionary raise, which I'll continue to award based on your contributions to the department and college this reporting period.

Highlights of what I have done for our students:

This year focused on my graduate students. I encouraged them to write grant proposals and they were successful. Amelia Zhang was awarded a USDA/China exchange grant which coupled with a TACF awarded to Katie D'Amico supported most of the research trip to China. They were also awarded travel awards to present our research at the IUFRO Tree Biotechnology meeting in Bahia, Brazil. From this meeting they were able to publish extended abstracts (~ 2pages long) in the proceedings. Both graduated this spring and have submitted papers for review. In addition to working closely with my graduate students, I updated my plant biotechnology course to give the students much more of a realistic lab experience. I could only do this because of my research funding which supported most of the lab experience. Even though this course was "experimental" and has several bugs to work out, the students truly liked it and I received very good feedback. In addition, I continue to do my best at presenting interesting lectures I all my classes, give the best advise I can during advising, help recruit new students, and provide research opportunities for undergraduates in my lab.

Highlights of what I have done for our department and college:

For the college, our team of researchers and students continue to make great progress with the American chestnut project. Our research to develop a resistant American chestnut tree puts ESF in the forefront of tree restoration. This is unique because restoration of a tree species has never done before. This year we planted the first transgenic American chestnut trees at the New York Botanical Garden. I believe this is the first transgenic plants of any kind ever featured in any botanical garden. This is most significant because it brings full circle the fight against blight. This planting is very close to the location that the chestnut blight was first discovered and it should be the place where restoration will begin. This event has generated a lot of good press for the college, from newspaper articles across the US and all the

way to Germany, and just recently Australia. It also made it on PBS TV's "Reith" show. Now, we can't yet say if these particular trees are fully resistant, but we are very close to solving this problem, which will allow us to move toward restoration. For our department, I continued serving as one of the faculty representatives for the new ARB building. As part of this I am also producing chestnut trees the landscape around the building, which will be a reminder of historic nature of this research.

Highlights of what I have done for myself professionally:

I am continuing to collaborate with researchers with various backgrounds from genomics to mycorrhizal interactions, across campus and across the country. This keeps my thinking broad, which is necessary for the chestnut project. From these types of collaborations, we were just awarded a new Biotechnology Risk Assessment Grant (BRAG), and talking with the program manager, he stated that our proposal was ranked number one and the panel was very enthusiastic about it. With this grant and, hopefully, a renewal of the FHI grant, we will move forward toward a restoration program quickly.

IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2012

a. Course(s) to be offered

I will continue to offer research projects at the graduate and undergraduate levels and plan on having two high school interns.

b. Proposed research activity

I will continue to focus the chestnut research including adding a breeding component to our transgenic trees to see how well they propagate.

c. University, professional society, and public service

Same high standards as before.

2. Fall Semester 2011

a. Course(s) to be offered

Principles of Genetics & Genetics Lab
Freshman Seminar for Biotech majors.
Guest lectures as before.

b. Proposed research activity

Same high standards as before focusing on chestnut.

c. University, Professional society, and public service

Same high standards as before.

3. Spring Semester 2012 –

a. Course(s) to be offered

Plant Biotechnology
Research Design and Professional Development

b. Proposed research activity

I will continue all my research

c. University, professional society, and public service

as before