

**APPROVAL PAGE
COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES
CURRICULUM PROPOSALS**

Proposal: Institute for Plant Breeding, Genetics and Genomics

Department Head

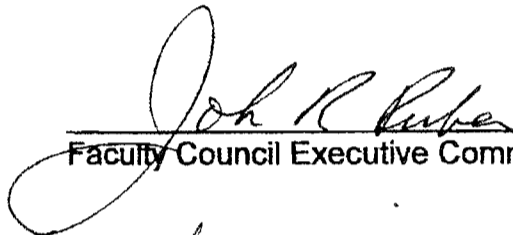
Date



Curriculum Committee Chair

10.30.07

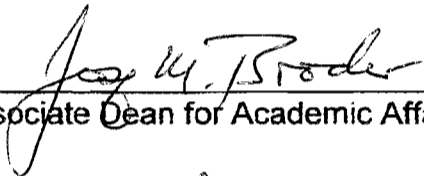
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Faculty Council Executive Committee Chair

30 Oct. 2007

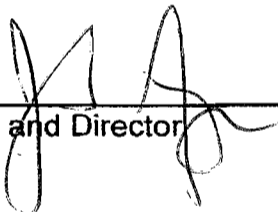
Date



Associate Dean for Academic Affairs

10-31-07

Date



Dean and Director

11/1/07

Date



The University of Georgia

E. Charles Brummer, *Professor*

27 September 2007

John R. Ruberson
Department of Entomology
University of Georgia
Rainwater Road
Tifton GA 31794

Dear John,

Attached is a proposal for the establishment of an Institute in Plant Breeding, Genetics, and Genomics. On behalf of the participating faculty, I would like the CAES Faculty Council to review this proposal at their earliest convenience. I believe that this Institute will have a very positive effect on the plant improvement efforts in the College. I appreciate your assistance. Feel free to contact me with any questions.

Sincerely,

E. Charles Brummer
Professor, Forage and Bioenergy Crop Breeding
Crop and Soil Sciences Department

Proposal: Institute for Plant Breeding, Genetics and Genomics
26 October 2007

Mission

The proposed mission of the Institute for Plant Breeding, Genetics, and Genomics is to develop improved crop cultivars through the integration of classical and modern genetic technologies. Global climate change, concerns about obesity and diet, the need for crop diversification, and aesthetics and quality of public spaces, athletic facilities, and home gardens all demand that agronomic and horticultural crops are continually improved to be of most use to the state's farmers, homeowners, groundskeepers, and others. Through the integration of disciplines related to plant improvement, the Institute will serve as a world leader in the introduction of new cultivars from a range of species of importance to Georgia, the U.S., and worldwide.

Background

The University of Georgia has conducted highly successful plant breeding programs for decades. Beginning with the development and release of Coastal Bermudagrass in the 1950s, the College of Agricultural and Environmental Sciences (CAES) has developed a world-wide reputation for breeding successful forage and turfgrass cultivars. These cultivars presently have wide-spread usage on golf courses and athletic fields throughout the southeastern United States and in several foreign countries. More recently, peanut cultivars developed on the Tifton Campus have dominated the peanut market in the Southeast. Other UGA plant breeding programs have developed successful cultivars licensed by the University of Georgia Research Foundation (UGARF), including soybean, alfalfa and other forages, pearl millet, wheat, blueberry, canola, muscadine, and numerous vegetable and ornamental species. Royalties arising from plant cultivars provided the University with more than \$5 million in FY2006. The total value of UGA-developed, UGARF-licensed plant cultivars marketed in FY2006 approaches \$100 million. Royalties from plant cultivars represent approximately two-thirds of the intellectual property income generated annually by the University.

During the last decade, the CAES has expanded its research in plant breeding and genetics to include genomics and biotechnology. In cooperation with the Georgia Department of Agriculture and the Georgia Research Alliance, an Eminent Scholar in crop breeding and genomics was recruited. A highly productive, senior-level forage breeder has been employed. Efforts in the breeding of ornamental plants have expanded. An ornamental breeder holds the Dirr Professorship, and the Dooley Professorship has been created, which will have molecular breeding/genomics responsibilities. A new position in turfgrass breeding is currently being filled. The broad diversity of plant breeding efforts and the expertise in crop genetics, genomics, and biotechnology provide a unique opportunity for the University to better serve the citizens of Georgia through the release of commercially successful cultivars and to become an international leader in plant breeding, biotechnology, and applied genomics. Unfortunately, no mechanism currently exists to coordinate the diverse programs and expertise to maximize potential cultivar development, research, and education programs. Presently, plant breeding efforts involve two

academic departments, Horticulture and Crop and Soil Sciences, on three campuses located in Athens, Griffin, and Tifton, with minimal communication and no official coordination.

Despite the considerable efforts in the plant breeding, genetics, and genomics area that currently exist at UGA, our lack of a cohesive program has limited our visibility throughout the U.S. UGA has perhaps the most comprehensive set of plant breeders of any university in the country and is well positioned to capitalize on advances in genetics and genomics to enhance breeding programs. Yet Georgia is often not mentioned with other traditionally strong breeding schools such as Iowa State University, Cornell University, North Carolina State University, the University of Wisconsin, the University of California, Davis, and the University of Minnesota. Several of these schools (ISU, NCSU, Cornell, UW, and UM) either have centers or departments with “plant breeding” in their title. We are increasingly at a disadvantage from the standpoints of student recruitment and national and international visibility for our programs because of our lack of a cohesive structure for plant breeding, genetics, and genomics.

Goals of the Institute

The formation of an institute within CAES would serve to foster, highlight, and advance the science of plant breeding, genetics, and genomics. Specific goals are as follows:

- 1) Increase communication and collaboration among plant breeders, biotechnologists, and genomicists.
- 2) Increase collaboration between conventional plant breeders and molecular biologists.
- 3) Increase the application of molecular techniques for developing new cultivars and germplasm.
- 4) Provide greater emphasis on graduate education to increase graduate enrollment and the training of scientists in applied plant improvement.
- 6) Increase extramural funding by promoting interdisciplinary efforts.
- 7) Through increased collaboration, expand the development and licensing of improved plant cultivars, resulting in increased UGARF royalty income.
- 8) Enhance scholarship through an annual meeting to discuss state-of-the-art techniques, including invited presentations by leading plant scientists. The meeting will serve to enhance Institute members’ knowledge and access to leading-edge technology while concurrently showcasing UGA Institute faculty and their achievements. An additional benefit will be to provide the invitees an opportunity to interact with our faculty and become aware of the facilities and expertise located in the Institute.
- 9) Provide a framework to increase communication and collaboration among faculty and graduate students from the Griffin, Tifton, and Athens campuses as well as Georgia-based USDA/ARS scientists and other collaborators working at UGA facilities.

Operating Procedures and Policies

Faculty participation in the Institute will be voluntary. Development and leadership of the Institute will be provided by a Steering Committee consisting of four members elected by the

faculty. The Steering Committee will be required to have at least one representative from the Crop and Soil Sciences and Horticulture Departments and at least one representative from each of the Athens, Griffin, and Tifton campuses. An Institute Director will be recommended by the Steering Committee after consultation with the faculty. The Institute Director will be officially appointed by the Dean of the CAES. The Director will be assigned appropriate administrative time to fulfill the duties associated with the position and will answer administratively to the Dean and Director through the appropriate Associate Deans. The Director and members of the Steering Committee will serve four-year terms, but initial appointments to the Steering Committee will be one to four years to allow for an orderly transition of representation.

The Institute will be headquartered in the space presently assigned to the CAES in the Center for Applied Genetic Technologies Building because most CAES scientists presently occupying space at CAGT will participate in the Institute. The Director will have an office at that location to be in close proximity of secretarial and accounting personnel. Other members from the Departments of Crop and Soil Sciences and Horticulture at all three UGA Campuses in Athens, Tifton, and Griffin will participate. Faculty from other departments within the CAES, such as Plant Pathology and Entomology, from other colleges and units, and from the USDA/ARS will be welcome to participate as affiliate members.

Amounts and Sources of Anticipated Income

Funding for the Institute will come from four areas: (1) funds allocated from the CAES, (2) indirect cost returns, (3) royalty returns, and (4) foundation and/or industry contributions.

1) **Allocated Funds**

The CAES will support an Institute Director (0.10 EFT), an Office Manager (0.50 EFT), a Graduate Assistant (1.00 EFT) and student labor funds to assist in the management of the Institute.

2) **Indirect Cost Return (Facilities and Administrative Costs)**

Faculty members with expertise in plant breeding and genetics have been successful in securing extramural funding to support their research, resulting in significant indirect cost returns. With the addition of two new faculty members this revenue from indirect costs is expected to increase substantially. Allocation of indirect costs will follow UGARF guidelines. At present, 20% of the resources are returned to the originating unit with the remainder used by UGARF and the CAES to support their programs. From the fraction of indirect costs generated by Institute members that is allocated to originating units, 15% will be designated to support Institute activities. For faculty members with joint appointments in colleges other than CAES, only the portion of their IDC returns that lies within CAES will be subject to redistribution. Based on FY2006 figures, a minimum of \$6,000 in indirect costs will be allocated to the Institute.

3) **Royalty Returns**

The UGARF-administered Cultivar Development Research Program is funded by cultivar royalty income to UGARF and The Georgia Seed Development Commission.

This program has provided approximately \$1 million annually to support various CAES cultivar development research projects. An additional \$750,000/year of royalty income is allocated for plant breeding research directly to the breeders who created the existing royalty-generating cultivars and their departments. This funding, the majority of which is expected to be provided to Institute members, is projected to increase as additional cultivars are released.

Allocation of royalty returns will continue to follow UGARF guidelines. Twenty-five percent of all accumulated net revenue is returned directly to the originator and an additional ten percent is returned to the originator's research program. These allocations will be unaffected by participation in the Institute. At present, 10% of intellectual property revenue is returned to the faculty member's department/unit for support of plant breeding programs. Of the 10% of royalty returns that currently go to the originating units, 15% will be reallocated to the Institute, with the remaining 85% allocated to the originating unit, in a method analogous to that for indirect cost returns. Based upon FY2006 data, approximately \$50,000 per year will be allocated to support the Institute.

4) **Industry and Foundation Contributions**

The Samuel Roberts Noble Foundation located in Ardmore, OK, has indicated an interest in providing financial support to the Institute. Additionally, support will be solicited from major corporations, including Monsanto, Pioneer Hi-Bred International, and Syngenta.

Budget Summary (Est. based on FY2005 data)

Institute Director (10%)	\$10,000
Office Manager (50%)	\$15,000
Graduate Assistant (33%)	\$14,500
Student Labor	\$1,500
Indirect Cost Returns	\$6,000
Royalty Income	\$50,000
TOTAL:	\$115,000

Formal Arrangement Through Which Faculty Will Participate in the Institute

Membership and participation in the Institute will be entirely voluntary. The Institute Director, along with the Steering Committee, will screen faculty eligible for membership. No faculty time will be officially budgeted to the Institute. Salary dollars for faculty and their staff will be retained in departmental budgets. However, all members of the Institute will spend approximately 15% of their time on Institute activities related to cultivar development, collaborative research, graduate education, and organizational tasks. Annual evaluations and salary recommendations for participating faculty members will remain the purview of academic department heads, but the Institute Director will provide input concerning Institute activities to the appropriate department heads.

The Use of Core Institute Facilities and Equipment and Other Assigned Responsibilities

The use of shared facilities and equipment will be controlled by the Institute Director under the policies established by the Steering Committee and approved by the Dean and appropriate Associate Dean. A system for cost recovery will be developed.

CAES Faculty in Plant Breeding, Genetics and Genomics

Faculty who have indicated their willingness to be members of the Institute are as follows:

- 1) **Roger Boerma** – Distinguished Research Professor of Crop and Soil Sciences, Athens Campus. Dr. Boerma’s research concentrates on soybean breeding, genetics, and genomics. Dr. Boerma has several soybean cultivars presently being marketed successfully and other cultivars will be released in the next few years. He teaches a 3-hour graduate course (CRSS 8880) entitled, “Quantitative Aspects of Plant Breeding.”
- 2) **Bill Branch** – Professor of Crop and Soil Sciences, Tifton Campus. Dr. Branch is involved in the development of commercial peanut cultivars. Cultivars developed by Dr. Branch presently dominate the peanut market in the southeastern United States.
- 3) **Charles Brummer** – Professor of Crop and Soil Sciences, Athens Campus. Dr. Brummer’s expertise is in forage breeding and genomics. He teaches an advanced graduate course in plant breeding.
- 4) **Peng Chee** – Associate Professor of Crop and Soil Sciences, Tifton Campus. Dr. Chee’s research responsibilities are in cotton breeding and genomics. He co-teaches a 3-hour course (HORT (CRSS) 4800/6800) entitled “Agricultural Biotechnology.”
- 5) **Zhen Bang Chen** - Assistant Research Scientist, turf and small grains molecular breeding.
- 6) **Patrick Conner** – Associate Professor of Horticulture, Tifton Campus. Dr. Conner is a pecan breeder.
- 7) **Katrien Devos** – Associate Professor of Crop and Soil Sciences and Plant Biology, Athens Campus. Dr. Devos’ expertise is in the area of plant comparative genomics.
- 8) **Wayne Hanna** – Professor of Crop and Soil Sciences, Tifton Campus. Dr. Hanna’s research interests are in the breeding of turfgrasses and pearl millet. Dr. Hanna has numerous successful cultivars with a global distribution.
- 9) **Jerry Johnson** – Professor of Crop and Soil Sciences, Griffin Campus. Dr. Johnson’s research expertise is in the breeding of small grains. He has developed several successful cultivars of wheat, oat, and barley.
- 10) **Steve Knapp** – Georgia Research Alliance Eminent Scholar and Professor in Crop and Soil Sciences, Athens Campus. Dr. Knapp’s expertise is in oil seeds breeding and genomics.
- 11) **David Knauff** – Dirr Professor of Horticulture, Athens Campus. Dr. Knauff’s interests are in ornamental plant breeding and genetics. He teaches a 3-hour course (CRSS (HORT) 4140/6140) entitled “Plant Breeding.”
- 12) **Gerard Krewer** - Professor of Horticulture, Tifton Campus. Peach and banana breeding. Five peach cultivars have been released from the moderate chilling peach program at

- UGA Attapulgus and being widely planted in warm temperate areas. Banana breeding for short cycle fruiting types and ornamentals is being conducted at UGA Savannah.
- 13) **Scott NeSmith** – Professor of Horticulture, Griffin Campus. Dr. NeSmith is conducting a successful breeding program in blueberry.
 - 14) **Peggy Ozias-Akins** – Professor of Horticulture, Tifton Campus. Dr. Ozias-Akin’s research interests are in peanut genomics and biotechnology and in apomixis technology development. She co-teaches a 3-hour course (HORT (CRSS) 4800/6800) entitled “Agricultural Biotechnology.”
 - 15) **Wayne Parrott** – Professor of Crop and Soil Sciences, Athens Campus. Dr. Parrott’s expertise is in row crop biotechnology. He teaches a 3-hour graduate course (CRSS 8890) entitled “Plant Cytogenetics: Behavior and Evolution of Plant Genomes.”
 - 16) **Paul Raymer** - Professor of Crop and Soil Sciences, Griffin Campus. Dr. Raymer’s responsibilities are in the area of turfgrass breeding.
 - 17) **Carol Robacker** – Associate Professor of Horticulture, Griffin Campus. Dr. Robacker is an ornamental plant breeder and has released several cultivars presently being marketed. She presently teaches a course in ornamental horticulture on the Griffin Campus.
 - 18) **John Ruter** - Professor of Horticulture, Tifton Campus. Dr. Ruter engages in plant breeding and selection of nursery crops for the Southeastern United States.
 - 19) **Vacant** – Vince Dooley Distinguished Professor of Ornamental Horticulture, Athens Campus. The College is presently recruiting for this position, which will be involved in the general area of genomics of ornamental cultivars.
 - 20) **Vacant** – (Vice – Randle) - Vegetable breeding position to be filled in FY2008.
 - 21) **Esendugue Greg Fonsah** – Assistant Professor, Department of Ag & Applied Economics, Tifton Campus. Banana and ornamental breeding at UGA Savannah.

Adjunct members who have agreed to participate in the institute include the following scientists:

- 1) **Bill Anderson** – USDA/ARS forage breeding, Tifton.
- 2) **Corley Holbrook** – USDA/ARS peanut breeding and germplasm enhancement, Tifton.
- 3) **Charles Chen** - USDA/ARS peanut breeding and genetics, Dawson.
- 4) **Andrea Maas** – USDA/ARS warm-season grass breeding, Tifton.
- 5) **Ming Li Wang** – USDA/ARS germplasm conservation and evaluation, Griffin.
- 6) **Jeff Wilson** – USDA/ARS pearl millet breeding and pathology, Tifton.

Letters of Support from Affected Departments, Schools, Colleges, Units, and Other Administrators Who Have Oversight Responsibilities

Donn Shilling, Head, Department of Crop and Soil Sciences
 Doug Bailey, Head, Department of Horticulture
 Russell Malmberg, Head, Department of Plant Biology
 Robert Ivarie, Head, Department of Genetics

A Plan for How Unavailable Resources are Going to Be Obtained

Funds currently available from CAES's support of CAGT and the IDC and royalty returns are sufficient to establish the Institute and maintain operations. Additional revenues will be provided from royalty income, F&A cost returns for appropriate common property expenses, extramural funding, and private gifts.

A Description of Anticipated Additional Staff or Faculty

As indicated previously, the Vince Dooley Distinguished Professorship of Ornamental Horticulture has been funded and recruitment has begun. An additional position in turfgrass breeding is currently advertised. A vegetable breeding position has been created. Additional membership will be dependent upon the recruitment of faculty having expertise in plant breeding and genomics. In the event additional staff is needed, F&A and royalty income can be used at the discretion of the Institute Director and Steering Committee.

A Description of Responsibilities of Any Participating Departments or Units

The Institute will be responsible for the day-to-day operations through the Institute Director. A Steering Committee will be elected from the faculty. Academic Department Heads with faculty affiliated with the Institute will be expected to coordinate activities with the Institute Director and provide participating faculty sufficient time to meet Institute obligations. In some instances, such as information technology, faculty needs may be a shared responsibility of the Institute Director and academic departments. Necessary resources will be negotiated between the Director and the appropriate Department Head. The Associate Dean for Research will, in consultation with the Dean, provide administrative oversight. Salary recommendations for participating faculty will be provided by Academic Department Heads with appropriate input from the Institute Director. The Dean and Director of the CAES will provide final recommendation. Arrangements with faculty from outside the CAES will be negotiated between the appropriate deans.

Creation of Courses or Degrees and How They are Integral to the Functioning of the Institute

The objective of the Institute is to focus the diverse efforts in plant breeding, genetics and genomics. An interdisciplinary graduate degree program (MS and PhD) in plant breeding, genetics and genomics is under development. Assistantships will be awarded competitively from Institute funds at the discretion of the Institute Director and the Steering Committee. Some of the resources derived from royalty income and indirect cost returns could be used for graduate assistantships. With most of the eligible Institute members participating, these efforts are seen as complementary and synergistic. At an appropriate time, a discussion will be undertaken to investigate the formal merger of the graduate degree programs with the Institute.