MINUTES

MEETING OF THE S-9 TECHNICAL ADVISORY COMMITTEE

FOR

PLANT GENETIC RESOURCES CONSERVATION AND UTILIZATION
S-9 MULTISTATE RESEARCH PROJECT

A Cooperative Project Among:

THE STATE AGRICULTURAL EXPERIMENT STATIONS
OF THE SOUTHERN REGION

And

U. S. DEPARTMENT OF AGRICULTURE AGENCIES:

AGRICULTURAL RESEARCH SERVICE

COOPERATIVE STATE RESEARCH, EDUCATION, AND
EXTENSION SERVICE

NATURAL RESOURCES CONSERVATION SERVICE

26-28 JUNE 2001

NATIONAL SEED STORAGE LABORATORY
COLORADO STATE UNIVERSITY
FT COLLINS, COLORADO

SUBMITTED BY

KEN QUESENBERRY, CHAIRMAN
Adopted Agenda:

Tuesday afternoon – June 26, 2001

Call to order, 1:00 pm, and opening remarks. Dr. Ken Quesenberry, Chairman

Introduction of attendees

Welcome and remarks – Dr. G. F. Arkin, Assistant Dean, University of Georgia, and S-9 Administrative Advisor

Approval of minutes – 2000 meeting

Additions to the Agenda

Appointment of committees
  Nominations
  Time & place of next meeting

Status of PGRCU and future plans – Gary Pederson, Research Leader

Reports by Curators
  Bob Jarret
  Graves Gillaspie
  Roy Pittman
  Brad Morris
  John Erpelding

Ornamental Plant Germplasm Center – Susan Stieve (Curator) and David Tay (Director)

Reports from S-9 members on state germplasm research and GRIN data

Wednesday morning, 8:00 a.m., June 27, 2001

Continue reports/discussion among S-9 members regarding germplasm activities

Committee reports
  Nominations
  Time and place of next meeting

Adjourn
Attendees:

TAC Members:

Ken Quesenberry, Chair FL - University of Florida
Gerald Arkin, Administrative Adv. GA – University of Georgia
David Coffey TN - University of Tennessee
Don LaBonte LA - Louisiana State University
Bill Rhodes SC - Clemson University
Charles Taliaferro OK - Oklahoma State University
Thomas Zimmerman VI – University of the Virgin Islands

Griffin PGRCU Staff:

Gary Pederson, Research Leader
John Erpelding, Sorghum Curator
Graves Gillaspie, Vigna Curator
Brad Morris, Annual Clovers & Special Purpose Legumes Curator
Roy Pittman, Peanut Curator
Merrelyn Spinks, GRIN Coordinator & Computer Support

Other Attendees:

Ricardo Goenaga, USDA-ARS, National Germplasm Repository, Tropical Agricultural Research Station, Mayaguez, PR
Peter Bretting, USDA-ARS National Program Leader for Germplasm
Recorded Minutes:

The Regional S-9 Technical Advisory Committee was called to order at 8:00 a.m. on Tuesday 26 June 2001 by chairman Ken Quesenberry. The meeting convened in the National Seed Storage Laboratory conference room 251 on the campus of Colorado State University, Ft. Collins, CO.

Dr. Gerald Arkin welcomed the TAC attendees, provided an overview of the S-9 project, and commented on the status of the program. Dr. Arkin reminded the group that the S-9 project is the oldest of its kind, having existed for 52 years. The project must be renewed every 5 years by Southern Regional Agricultural Experiment Station Directors. Dr. Arkin expressed pleasure that positive actions had occurred over the past year addressing major concerns with the Griffin PGRCU program. The first of these was the hiring of Dr. Gary Pederson as Research Leader for the program. A second significant action was an increase in USDA funding for the program. Dr. Arkin noted that the increase was not nearly enough to satisfy the needs of the program, but was a welcome change following a lengthy period of no increases. Dr. Arkin also indicated that good progress was being made addressing some of the difficult questions concerning the handling of germplasm collections, particularly the very large sorghum collection.

Dr. Quesenberry presented the minutes of the 2000 meeting and asked for corrections and additions. The minutes were approved as presented.

Dr. Gary Pederson provided an overview of his vision for the PGRCU and informed TAC members of some of the issues that he had addressed since assuming the RL position. He stated his belief that the fundamental responsibility of the PGRCU is to preserve genetic diversity in the collections. Incumbent in this is the need to develop the knowledge and financial resources to effectively and efficiently achieve this basic goal. Dr. Pederson indicated that he had spent substantial time dealing with problems associated with the sorghum collection and that progress was being made. He indicated that he would fill the grass curator position, left vacant by the retirement of Gil Lovell, at the earliest possible time. He said that the position would probably be filled with a category 3 scientist, but a final decision had not been made. He expressed a concern that the PGRCU receives back very little information on germplasm supplied to users. Such information could greatly enhance the GRIN database for the collections. (Appendix 1)

Updates on curatorial activities were given by Graves Gillaspie (Vigna - Appendix 2), Brad Morris (Clovers & Special Purpose Legumes and Grasses – Appendix 3), Roy Pittman (Peanuts – Appendix 4), and John Erpelding (Sorghum).

Dr. David Tay and Ms. Susan Stieve, Director and Curator, respectively, Floral and Ornamental Plant Germplasm Center, Columbus, OH gave an overview of the newly established center. The center is available to accept floral and ornamental germplasm accessions from existing collections and will augment germplasm of these plant groups through exploration and collection.
There was discussion regarding how to get more evaluation information back from germplasm users. Ideas included trying to identify the intended use of germplasm by those requesting it and then including a request with the shipment for sharing of data in those cases where predicted use would generate useful data. The following motion was made by Quesenberry, seconded by Rhodes, and passed by the committee: ‘The S-9 TAC recommends that the germplasm request page on the GRIN web site be modified to include specific categories of intended use’. Such categories would be developed by PGRCU staff and TAC members.

The addition of liaison representatives from Industry and select public agencies (such as the USDA-NRCS) to the TAC was briefly discussed. Taliaferro, incoming Chair of the TAC, will contact the Southern Seed Association and NRCS to determine their interest in having a representative on the committee. This information will be channeled to Dr. Arkin, who will make formal contact with the organizations and arrange for their representation on the TAC.

Arnie Tschanz, APHIS, National Plant Germplasm Quarantine Lab, announced in the morning joint meeting that a review of quarantine regulations would soon be launched. Taliaferro noted that current quarantine policies/regulations place severe restrictions on the importation of clonally propagated plants. Discussion centered on the need for a thorough review of the plant quarantine regulations, particularly an assessment of currently restricted plants and justification for retention of specific plant groups in the restricted category. The committee asked that a request be conveyed to Mr. Tschanz to keep RTAC’s advised of developments during the review and that the RTAC’s be provided opportunity to examine and comment on drafts of new regulations. This request was voiced in the final joint meeting of the group on Thursday, June 28, 2001.

Quesenberry noted that the S-9 TAC is asked to review germplasm collection proposals. This has usually been done by one representative committee member, but there apparently are not any TAC policy/guidelines addressing the selection of that representative committee member. A motion by Coffey, with second by Rhodes, to designate the outgoing TAC Chair as the representative to review the proposals passed unanimously.

The nominations committee recommended Tom Zimmerman as incoming Secretary and Charles Taliaferro as incoming Chair. The recommendation was unanimously approved.

It was decided that the TAC would meet in Griffin, GA next year. Tentative dates for the meeting are August 5 through 9, 2002.

Dr. Arkin indicated that he would review the membership of the TAC and determine if any new appointments are warranted.

The meeting adjourned at 9:15 a.m.
Appendix 1

DR. GARY PEDERSON

PLANT GENETIC RESOURCES: CURRENT STATUS & FUTURE RESOURCES
Plant Genetic Resources: Current Status & Future Plans

Gary A. Pederson
USDA, ARS, Plant Genetic Resources Conservation Unit
Griffin, GA
Outline

- Background
- NPGS mission
- PGRCU mission and purpose
  - General thoughts on different aspects of mission
- Current status of each crop
- Plans for future
  - Staffing
  - Direction
Background

- ARS research geneticist at Miss State for 18 years
- White clover breeding and genetics
- Genetic resources activities
  - Clover CGC (Chair)
  - Collected 49 clover species in mountains of western Bulgaria with Ken Quesenberry in 1993
  - Participated in three CGC Chairs meetings
  - Other legumes crop registration committee (Chair)
  - Eight research proposals funded by Clover CGC
  - Published on cleaning up duplicates in NPGS
What is the mission of NPGS?

- **Primary** mission = preserve indefinitely the genetic diversity of all plant species of interest and their wild relatives.

- Focus of NPGS must be long term, on plant germplasm preservation for future generations, rather than short-term.
Goal should be an “Ideal Collection”

- Ideal collection = complete range of genetic diversity for every plant species of interest and their wild relatives.
- Little duplication or redundancy.
- All accessions would be available, maintained in high quality, and completely characterized.
Why an ideal collection?

- **Users, who are our customers, expect it.**

- **Users expect:**
  - complete range of genetic variability
  - little duplication
  - complete availability
  - good germination
  - complete characterization
Goals and financial reality

- Obviously, an ideal collection could not be achieved without significantly greater financial resources.
- Goals should not always be limited by financial reality. That is why they are called “goals”.
- Definition of a goal: An end that one strives to attain.
What is the mission of PGRCU?

- A Unit working on Plant Genetic Resources Conservation exists to conserve plant genetic resources.
- Mission statement: “acquire, characterize, maintain, evaluate, document, and distribute genetic resources”.
- This is what the users of the germplasm maintained at this location expect from this Unit.
Thoughts on PGRCU Mission

- Acquire
- Characterize
- Maintain
- Evaluate
- Document
- Distribute
Acquire

- Acquire to increase genetic diversity; not merely to increase collection size.
  - No longer can afford to accumulate everything.
- Avoid acquiring new accessions that duplicate accessions already in the collection.
Users expect characterization of accessions to assist them in making selections.
- Classical passport information
- Traits of interest
- Molecular methods
Is every current accession valuable?
  - Too often once an accession has a PI number, it becomes untouchable.

Duplicate and redundant accessions add nothing to the genetic diversity of the collection.
Duplicate accessions are a waste of resources for both NPGS and users.

- NPGS wastes time and resources maintaining, regenerating, backing up, characterizing, and distributing seed of identical accessions.
- Users waste time and resources evaluating identical material.
Maintain

- Increase the availability of accessions.
  - Base regeneration priority on relative potential for genetic diversity improvement.

- Core collections
  - Core accessions must be readily available and well characterized.
Evaluate

- Prioritize research based on:
  - National priorities
  - Public interest
  - Uniqueness of the evaluation
  - Future usefulness of the germplasm
  - Availability of germplasm

- Cooperate, cooperate, cooperate
Germplasm records should be complete.
  – Poor record keeping reduces usefulness of accessions.

GRIN
  – GRIN should contain all documentation previously published in the PI books.

Data obtained by cooperators must be added to GRIN.
Distribute

- Distribution is the only direct contact this Unit has with many users.
  - Timely, accurate distribution is expected by all users.
  - Users often wait until the last minute to request seed.
PGRCU Collection - June 2001

- Total Accessions
  - 81,660

- Total Available
  - 68,163

- Backed Up
  - 69,483
PGRCU Collection 1996 - 2001
## Vigna

<table>
<thead>
<tr>
<th>CURATOR</th>
<th>CROP</th>
<th>TOTAL ACCESSIONS</th>
<th>TOTAL AVAILABLE</th>
<th>NUMBER BACKED UP</th>
<th>ITEMS SHIPPED IN 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graves Gillaspie</td>
<td>Cowpea</td>
<td>8,030</td>
<td>5,246</td>
<td>5,885</td>
<td>2,157</td>
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<td></td>
<td>Mung bean</td>
<td>4,194</td>
<td>3,836</td>
<td>4,093</td>
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<tr>
<td></td>
<td>Other Vigna spp.</td>
<td>598</td>
<td>267</td>
<td>296</td>
<td>163</td>
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# Vegetable Crops & Sweetpotato

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<tr>
<th>CURATOR</th>
<th>CROP</th>
<th>TOTAL ACCESSIONS</th>
<th>TOTAL AVAILABLE</th>
<th>NUMBER BACKED UP</th>
<th>ITEMS SHIPPED IN 2000</th>
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<tbody>
<tr>
<td>Bob Jarret</td>
<td>Cucurbits</td>
<td>2,017</td>
<td>894</td>
<td>1,301</td>
<td>384</td>
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<td></td>
<td>Eggplant</td>
<td>963</td>
<td>892</td>
<td>923</td>
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<td>Okra</td>
<td>3,003</td>
<td>1,538</td>
<td>1,913</td>
<td>178</td>
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<td></td>
<td>Peppers</td>
<td>3,903</td>
<td>3,712</td>
<td>3,802</td>
<td>3,069</td>
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<tr>
<td></td>
<td>Sweetpotato</td>
<td>715</td>
<td>685</td>
<td>83</td>
<td>208</td>
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<tr>
<td></td>
<td>Other Ipomoea spp.</td>
<td>422</td>
<td>132</td>
<td>140</td>
<td>42</td>
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<td></td>
<td>Watermelon</td>
<td>1,633</td>
<td>1,539</td>
<td>1605</td>
<td>1,022</td>
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## Legumes, Grasses, & Other

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<th>CURATOR</th>
<th>CROP</th>
<th>TOTAL ACCESSIONS</th>
<th>TOTAL AVAILABLE</th>
<th>NUMBER BACKED UP</th>
<th>ITEMS SHIPPED IN 2000</th>
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</thead>
<tbody>
<tr>
<td>Brad Morris</td>
<td>Bamboo</td>
<td>97</td>
<td>97</td>
<td>50</td>
<td>91</td>
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<td></td>
<td>Castor bean</td>
<td>372</td>
<td>279</td>
<td>356</td>
<td>106</td>
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<td></td>
<td>Grasses</td>
<td>6,803</td>
<td>5,829</td>
<td>5,935</td>
<td>1,432</td>
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<td></td>
<td>Kenaf &amp; Roselle</td>
<td>345</td>
<td>276</td>
<td>311</td>
<td>79</td>
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<tr>
<td></td>
<td>Legumes</td>
<td>3,500</td>
<td>2,653</td>
<td>2,732</td>
<td>720</td>
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<td></td>
<td>Miscellaneous</td>
<td>276</td>
<td>213</td>
<td>236</td>
<td>58</td>
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<tr>
<td></td>
<td>Pearl millet</td>
<td>1,081</td>
<td>1,048</td>
<td>1,064</td>
<td>69</td>
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<tr>
<td></td>
<td>Sesame</td>
<td>1,204</td>
<td>1,195</td>
<td>1,204</td>
<td>1,684</td>
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## Clover & Sorghum

<table>
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<tr>
<th>CLOVER CURATOR/ SORGHUM COORDINATOR</th>
<th>CROP</th>
<th>TOTAL ACCESSIONS</th>
<th>TOTAL AVAILABLE</th>
<th>NUMBER BACKED UP</th>
<th>ITEMS SHIPPED IN 2000</th>
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<tbody>
<tr>
<td>Gary Pederson</td>
<td>Annual Clover</td>
<td>2,088</td>
<td>1,422</td>
<td>1,491</td>
<td>873</td>
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<tr>
<td>Sorghum</td>
<td></td>
<td>30,705</td>
<td>28,438</td>
<td>27,754</td>
<td>26,729</td>
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</table>
## Peanuts

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<th>CURATOR</th>
<th>CROP</th>
<th>TOTAL ACCESSIONS</th>
<th>TOTAL AVAILABLE</th>
<th>NUMBER BACKED UP</th>
<th>ITEMS SHIPPED IN 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roy Pittman</td>
<td>Cultivated Peanuts</td>
<td>9,027</td>
<td>7,391</td>
<td>8,122</td>
<td>9,609</td>
</tr>
<tr>
<td></td>
<td>Wild Peanuts</td>
<td>684</td>
<td>563</td>
<td>188</td>
<td>123</td>
</tr>
<tr>
<td>Crop</td>
<td># accessions</td>
<td>Crop</td>
<td># accessions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------</td>
<td>-------------------</td>
<td>--------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cowpea</td>
<td>394</td>
<td>Grasses</td>
<td>106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mung bean</td>
<td>12</td>
<td>Kenaf</td>
<td>9</td>
<td></td>
<td></td>
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<tr>
<td>Cucurbit</td>
<td>42</td>
<td>Legumes</td>
<td>214</td>
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<td></td>
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<tr>
<td>Okra</td>
<td>97</td>
<td>Misc. crops</td>
<td>32</td>
<td></td>
<td></td>
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<tr>
<td>Peppers</td>
<td>80</td>
<td>Sesame</td>
<td>2</td>
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<td>Watermelon</td>
<td>170</td>
<td>Cult peanut</td>
<td>721</td>
<td></td>
<td></td>
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<tr>
<td>Castor bean</td>
<td>1</td>
<td>Wild peanut</td>
<td>23</td>
<td></td>
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</table>
Domestic Distributions in CY2000

- **Items shipped**: 43,927
- **Orders**: 427
Domestic Distributions in CY2000
Distributions to S-9 Region in CY2000

- Items shipped: 40,327
- Orders: 215
Distributions to S-9 Region in CY2000

- < 100: Tennessee (12), Mississippi (21), Louisiana (39), Virginia (54), Kentucky (83)
- >= 100 and < 250: Arkansas (102)
- >= 250 and < 500: South Carolina (254), Alabama (333), Puerto Rico (466)
- >= 500 and < 1000: Florida (562), Oklahoma (630), North Carolina (849)
- > 8500: Georgia (8,592)
- > 28000: Texas (28,330)
Average Distributions 1996 – 2000
S-9 vs. Domestic

Orders Shipped

- S-9: 211
- Domestic: 192

Items Shipped

- S-9: 13,132
- Domestic: 3,187

Legend:
- S-9
- Domestic
Foreign Distributions in CY2000

- Items Shipped: 5,330
- Orders: 118
## Foreign Distributions in CY2000

<table>
<thead>
<tr>
<th>Argentina</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Kuwait</th>
<th>Poland</th>
<th>Taiwan</th>
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</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Ecuador</td>
<td>India</td>
<td>Malaysia</td>
<td>Portugal</td>
<td>Thailand</td>
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<tr>
<td>Botswana</td>
<td>Egypt</td>
<td>Indonesia</td>
<td>Moldova</td>
<td>Saudi Arabia</td>
<td>Turkey</td>
</tr>
<tr>
<td>Brazil</td>
<td>Estonia</td>
<td>Israel</td>
<td>Netherlands</td>
<td>South Africa</td>
<td>Ukraine</td>
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<tr>
<td>Canada</td>
<td>France</td>
<td>Italy</td>
<td>New Zealand</td>
<td>South Korea</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td>China</td>
<td>Germany</td>
<td>Jamaica</td>
<td>Nigeria</td>
<td>Spain</td>
<td>United Kingdom</td>
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<tr>
<td>Croatia</td>
<td>Honduras</td>
<td>Japan</td>
<td>Philippines</td>
<td>Sweden</td>
<td>Uruguay</td>
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</table>
Average Distributions 1996 – 2000

Foreign vs. Domestic

<table>
<thead>
<tr>
<th></th>
<th>Items Shipped</th>
<th>Orders Shipped</th>
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<tbody>
<tr>
<td>Foreign</td>
<td>3,420</td>
<td>110</td>
</tr>
<tr>
<td>Domestic</td>
<td>16,319</td>
<td>403</td>
</tr>
</tbody>
</table>

[Pie charts showing distributions of items and orders shipped]
Future Plans

- Funding
- Staffing
- Unit direction and philosophy
Funding

- ARS increased base funding of PGRCU for FY2001 by $349,370.
- Normal requirement of adding a scientist with these funds was waived by ARS.
- Germplasm approved by House committee for $1.5 million increase in FY2002 with Griffin listed as one of the sites.
Staffing

Retirements in 2001

- Gil Lovell (Federal agronomist)
- Carolyn Toney (Federal admin. specialist, Athens)
- Rella Harrison (S-9 secretary)
Positions added due to funding increase

- Biological science technician (currently advertised)
  » Conduct germination tests.
- Agricultural research technician (currently advertised)
  » Support for clover curation and sorghum coordination.
- Agricultural research technician
  » Support for grass curation
- Nine RSA utility workers (hired)
  » Support for field operations and one worker for each curator
- Other temporary federal technicians to be added.
Staffing

- Positions replaced due to retirements
  - Agronomist/Botanist (advertised soon)
    » Cat. 4 scientist to curate warm-season grasses, pearl millet, and bamboo
  - Administrative Technician (currently advertised)
    » Position based in Griffin instead of Athens
  - S-9 Secretary (advertised soon)
Changes in direction or philosophy

- Curator responsibilities
- Germination testing
- Duplicate identification
- Storage conditions
- Importance of Unit members
- Improvements in procedures and research
- Representation at meetings
Curator responsibilities

- **Pederson**
  - Curate annual clovers and coordinate sorghum

- **Morris**
  - Curate special purpose legumes, new crops, and misc. crops (acting curator for warm-season grasses)

- **Agronomist/botanist**
  - Curate warm-season turf and forage grasses, pearl millet, and bamboo
Germination testing

- Germinations = main priority for new funds.
  - Hire biological science technician.
  - Buy two seed germinators.
  - Redesign space into working seed germination lab.

- Conduct germinations on all new accessions and all seed increases.

- Conduct germinations on all accessions in storage as soon as possible.
Duplicate identification

- PGRCU has 81,660 bags of seed in cold storage but not necessarily 81,660 unique accessions.
- Identify duplicates initially through passport data.
- Link duplicates in GRIN to reduce the total number of accessions.
- Utilize molecular methods to identify genetic diversity and possible duplicate/redundant accessions.
Storage conditions

- Long-term goal is to maximize seed viability under storage.
  - Split samples of all accessions such that the bulk sample is maintained in −18 C storage and a distribution sample is maintained in 5 C storage.
  - Other ideas may also be evaluated.
  - Additional storage facilities may be needed.
Importance of Unit members

- Believe that the mission of the Unit matters.
- Everyone is an integral part of the Unit.
  - State and federal
  - Curators and technicians
  - Farm crew and secretary
  - Seed storage and database manager
- Everyone started off with a clean slate.
- Individual meetings.
Improve procedures and research

- Whole Unit meeting to obtain ideas from all employees on ways to improve Unit procedures.
- Curator meetings to evaluate research program to maximize impact with resources available.
- Continue to explore ideas for cooperation with other researchers.
Crop Germplasm Committee meetings are important and the Unit will be represented.

Research Leader will attend all nine Crop Germplasm Committee meetings within the first two years.

Scientists with research appointment will present papers at their national meeting.
Appendix 2

DR. GRAVES GILLASPIE

COWPEA GERMPLASM WITH CMV RESISTANCE AND HOW THIS RESISTANCE CAN BE USED TO COMBAT COWPEA STUNT DISEASE
Cowpea Germplasm with CMV Resistance and How This Resistance Can Be Used to Combat Cowpea Stunt Disease
COWPEA STUNT DISEASE

Results from a co-infection of the plant by BlCMV and CMV
COWPEA STUNT DISEASE

Most severe disease of cowpeas in the U.S.
COWPEA STUNT DISEASE

Especially bad in Georgia, Arkansas, and other growing areas of the southeastern U.S.
POTENTIAL RESISTANT COWPEA FOUND IN 1998 REGENERATION PLOT IN GEORGIA

PI 441918 observed to be still green toward end of a growing season.
POTENTIAL RESISTANT COWPEA FOUND IN 1998 REGENERATION PLOT IN GEORGIA

ELISA testing showed that there was no BLCMV and only one of 20 with CMV.
PI 441918 is a mixture of white and tan seeds
Seeds were separated by color and planted in greenhouse.
The white-seed plants supported a much lower CMV titer than did the control or tan-seed plants. Neither was infected by BlCMC.
PI 441918 WHITE AND TAN SEED
PI 441918 TAN SEED
PI 441918 WHITE SEED
**Table 1.** DAC-ELISA ratings in field tests of cowpea for susceptibility to *Cucumber mosaic virus*.

<table>
<thead>
<tr>
<th>Cowpea line</th>
<th>Positive plants/total plants</th>
<th>Mean&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Test I, 1 June - 6 August 1999</td>
</tr>
<tr>
<td>PI 441918-white seed</td>
<td>23/45</td>
<td>0.516</td>
</tr>
<tr>
<td>PI 441918-tan seed</td>
<td>32/45</td>
<td>0.711</td>
</tr>
<tr>
<td>Coronet</td>
<td>44/47</td>
<td>0.935</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.01&lt;/sub&gt;</td>
<td></td>
<td>0.213</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test II, 5 June - 25 July 2000</td>
</tr>
<tr>
<td>PI 441918-white seed</td>
<td>10/30</td>
<td>0.304</td>
</tr>
<tr>
<td>Coronet</td>
<td>22/22</td>
<td>1.000</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.01&lt;/sub&gt;</td>
<td></td>
<td>0.551</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test III, 17 August - 19 September 2000</td>
</tr>
<tr>
<td>PI 441918-white seed</td>
<td>6/43</td>
<td>0.133</td>
</tr>
<tr>
<td>Coronet</td>
<td>69/78</td>
<td>0.870</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;0.01&lt;/sub&gt;</td>
<td></td>
<td>0.167</td>
</tr>
</tbody>
</table>

<sup>a</sup> Mean across four blocks of positive plants/ randomized block.
CONCLUSIONS

GC-86L-98 (formerly PI 441918 white-seed) was not infected with BlCMV in any of tests and had significantly better resistance to infection with CMV than did the susceptible control, Coronet. This large seeded line with a 105-day maturity is a line that has promise for use in breeding to develop a cultivar with cowpea stunt resistance.
Appendix 3

DR. BRAD MORRIS

SPECIAL-PURPOSE LEGUME GENETIC RESOURCES WITH BIO-FUNCTIONAL USES
Special-Purpose Legume Genetic Resources With Bio-Functional Uses

Brad Morris, Agronomist, Curator
Clarence Lee, Technician
Will Westmoreland, Summer Assistant
Bio-Functional Legumes

- Guar (*Cyamopsis tetragonoloba*)
- Jackbean (*Canavalia ensiformis*)
- Jicama (*Pachyrhizus erosus*)
- Lablab (*Lablab purpureus*)
- Velvetbean (*Mucuna pruriens*)
Additional Bio-Functional Legumes

Kudzu (*Pueraria montana* var. *lobata*)

Wingbean (*Psophocarpus tetragonolobus*)
The Future For Bio-Functional Legumes
Guar

Galactomannan gum

Lowers cholesterol

Reference: Nishimura, 2000, Bioscience Biotechnology and Biochemistry, V. 64
Jackbean
Canaline
Antimalarial
Reference: Berger, 2000, Antimicrobial Agents and Chemotherapy, V. 44
Lablab
Dolicin
Antifungal and capable of inhibiting HIV

Reference: Wang and Ng, 2000, Biochemical and Biophysical Research Communications, V. 269
Lablab
Dietary fiber
Lowers cholesterol
Reference: Chau and Cheung, 1999, Nutrition Research, V. 19
Velevetbean
Beta-sitosterol
Lowers cholesterol and prevents coronary heart disease

Reference: Plat and Mensink, 2001, Nutrition Metabolism and Cardiovascular Diseases, V. 11
Velvetbean
Gallic acid
Antimutagenic, anticarcinogenic, and Anti-inflammatory

Appendix 4

DR. ROY PITTMAN

IDENTIFICATION OF POLYMORPHIC MOLEULAR MARKERS IN *Arachis hypogaea*
Identification of Polymorphic Molecular Markers in \textit{Arachis hypogaea}

Melanie Newman and Dr. Roy Pittman

Additional Cooperators - Dr. Tracie Jenkins, Mark Hopkins, and Dr. Rob Dean

University of Georgia, Plant Genetic Resources Conservation Unit
1109 Experiment Street, Griffin, Georgia 30223
What Are Molecular Markers?

• Markers based on the genetic make-up (DNA) of the plant and thus independent of environmental factors
• When polymorphic they will produce a banding pattern unique to the individual from which the DNA was isolated
• Examples include RFLPs, RAPDs, SSRs, AFLPs, SNPs, etc.
Why Are Molecular Markers Important?

- They allow for marker-assisted breeding.

- They allow a curator to evaluate the genetic diversity within a germplasm collection.

- They allow for the ability to fingerprint new releases.
Current Markers in Cultivated Peanut

- RFLPs and RAPDs are not polymorphic in the cultivated peanut (only in the wild)
- SSRs (limited number - need many more for sufficient polymorphisms to be detected)
- AFLPs have found to be polymorphic
Study Design

- includes the screening of cultivars from each of the six botanical varieties of peanut
- seven SSR markers were used to screen the study population
- data analysis included creating a dissimilarity matrix (Microsat) and a neighbor-joining dendogram (Phylip) and used AMOVA to estimate within accession variation
Simple Sequence Repeat

- repetitive sequence of DNA (di, tri, tetra, penta) usually > 6 repeat units
- dispersed throughout the genome
- very polymorphic and thus useful for looking at intraspecific variation
- easy to detect using automated PCR-based protocols
Simple Sequence Repeat

TTACCGATAGGGGGCCCGCCATTATAT
CCGATAGCCTGAGCTTCATATATATAT
TATATATATATATATATATATATAT
ATGATGAGCAGAATCCGCAT
CCGATTACCTAGGCAGAAATCCGCAT
ATGGGCCATCCGGGGCCCATACGGATAT
Peanut SSR gel using primer sets Ah4-026 and Lec-1
Preliminary Conclusions

- The current SSR marker system is capable of separating out different cultivars based on geographic location (not by variety)
- Variation does exist within accessions and suggests mixed seeds are present within cultivars in the germplasm system
AFLP Methodology

A. Cut genomic DNA into fragments with the restriction enzymes TaqI and EcoRI:

B. Ligate adaptors: EcoRI and TaqI

C. Modify genomic DNA fragments:

*Adapted from Applied Biosystems AFLP Manual*
Prepared Template: Genomic DNA Fragment, Modified with Adaptors

Adaptors, Core Mix \rightarrow \text{Thermal Cycling}

Preselective Primers:

A : EcoRI adaptor + recognition site + A or EcoRI adaptor + recognition site

C : TaqI adaptor + recognition site + C

*Adapted from Applied Biosystems AFLP Manual*
Screening Study

A small set of individuals from *Arachis hypogaea* were used in the initial screen which include the following:

- two hirsutas (PI 576634 and PI 576613)
- a fastigiata (PI 493722)
- a peruviana (PI 502088)
- three wild species of *Arachis* (*benthamii*, *batizicoi*, and *villosa*) were screened

The population was screened against 70 AFLP primer sets
AFLPs Evaluated for Polymorphisms

<table>
<thead>
<tr>
<th>Restriction Enzymes</th>
<th># of Primer Sets Screened</th>
<th>Population Size Screened</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcoRI\MseI</td>
<td>64</td>
<td>Not sure</td>
</tr>
<tr>
<td>EcoRI\TaqI</td>
<td>70</td>
<td>4 cult.\3 wild</td>
</tr>
<tr>
<td>PstI\MseI</td>
<td>35</td>
<td>40 cult.\3 wild</td>
</tr>
<tr>
<td>PstI\TaqI</td>
<td>35</td>
<td>40 cult.\3 wild</td>
</tr>
</tbody>
</table>
Future Plans

• Continue screening to identify more polymorphic markers

• Establish a mapping population for the cultivated peanut

• Enter mapping population into the germplasm system
Appendix 5

DR. BOB JARRET

VEGETABLE CROPS REPORT
Vegetable Crops Report

R. L. Jarret
Curator, Vegetable Crops
Priority

- Defining goals for individual crops (3 to 5 years)
Goals - *Citrullus*

- Continue seed increase at present rate of 150/yr.
  - “Caught up” in about 2 years.
- Then, start on NSSL heirloom cultivars (200)
Goals – *Cucurbita moschata*

- Increase regeneration from 20 to 30 accessions/year.
- Use resources previously allocated to *Abelmoschus*, if required.
Goals - *Capsicum*

- Maintain present regeneration program of 50 accessions/year, or until facilities are improved to handle larger volumes.
- Priority on core accessions and accessions not currently available for distribution.
Goals – Misc. Vine Crops

- Increase regeneration rate to ensure availability of all sp.
- Maintain rate of 10/yr in Griffin
- Move some regeneration to Byron, possibly 10/yr (non-trellised)
Other vegetable crops

- Reduced emphasis on *Abelmoschus* (core only)
- Low emphasis on *S. melongena* and misc. *Solanum* sp.
Goals – *Ipomoea batatas* and related sp.

- Continued in vitro maintenance of all *I. batatas* accessions.
- Possible core collection of *I. batatas* based on AFLPs.
- Core collection could alter maintenance strategy (cyro)
- Increased emphasis on *Ipomoea* sp. seed regeneration in GH during fall-winter months.
## Anticipated or Desired Acquisitions

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abelmoschus</td>
<td>none at this time</td>
</tr>
<tr>
<td>Capsicum</td>
<td>related sp. from Brazil &amp; SA</td>
</tr>
<tr>
<td>Citrullus</td>
<td>related sp. from Namibia and southern Africa</td>
</tr>
<tr>
<td>Cucurbita</td>
<td>none at this time</td>
</tr>
<tr>
<td>Ipomoea</td>
<td>Annual releases from quarantine</td>
</tr>
<tr>
<td>Misc. vine crops</td>
<td>Only to replace lost sp.</td>
</tr>
<tr>
<td>Solanum</td>
<td>Numerous sp. from CA &amp; SA</td>
</tr>
</tbody>
</table>
Present and Future Seed Regeneration Needs

- Improved permanent (?) facilities for seed cleaning, handling, and drying in Byron.
- Equipment to move harvested fruit to cleaning station
- Back-up power for Bldg. 4457 (in vitro *I. batatas*)
- Additional cage covers (X/yr to replace wear)
- Greenhouse benches need to be reset/gravel replaced.