S-009 Regional Technical Advisory Committee
Minutes of Meeting, August 7-8, 2007

USDA-ARS U.S. Vegetable Laboratory
2700 Savannah Highway
Charleston, SC

Members present:

Alabama (Auburn University) ..... Jorge A. Mosjidis (mosjija@auburn.edu)
Florida (University of Florida) ..... Kenneth H. Quesenberry (clover@ifas.ufl.edu)
Georgia (University of Georgia)..... Paul L. Raymer (praymer@griffin.uga.edu)
Guam (University of Guam)..... Mari Marutani (marutani@uog9.uog.edu)
Kentucky (University of Kentucky)..... Timothy D. Phillips (tphillip@uky.edu)
Mississippi (Mississippi State University)..... Mike Collins (mcollins@pss.msstate.edu)
North Carolina (North Carolina State University) ..... Thomas G. Isleib (tom_isleib@ncsu.edu)
South Carolina (Clemson University) ..... Emerson R. Shipe (eshipe@clemson.edu)
Southern Association of Agric. Exp. Sta. Directors ..... Gerald Arkin (garkin@uga.edu)
Tennessee (University of Tennessee)..... Fred L. Allen (allenf@utk.edu)
Texas (Texas A&M University)..... Gerald R. Smith (g-smith@tamu.edu)
Virgin Islands (University of the Virgin Islands)..... Thomas Zimmerman (tzimmer@uvi.edu)

Members absent:

Arkansas (University of Arkansas) ..... Teddy E. Morelock (morelock@uark.edu)
Florida (University of Florida) ..... Wilfred Vermerris (wev@ufl.edu)
Hawaii (University of Hawaii)..... Mike A. Nagao (mnagao@hawaii.edu)
Louisiana (Louisiana State University)..... Don R. LaBonte (dlabonte@agcenter.lsu.edu)
Oklahoma (Oklahoma State University)..... John L. Caddel (jlc@mail.pss.okstate.edu)
Puerto Rico (University of Puerto Rico)..... Bryan R. Brunner (bryan_brunner@cca.uprm.edu)
Virginia (Virginia Polytechnic Inst. and State Univ.) ..... Richard Veilleux (potato@vt.edu)

NP 301 representatives present:

USDA-ARS-PGRCU, Griffin, GA..... Gary A. Pederson (gary.pederson@ars.usda.gov)
USDA-ARS-NPS, Beltsville, MD ..... Peter K. Bretting (peter.bretting@ars.usda.gov)
USDA-ARS-NPS, Beltsville, MD ..... Gail C. Wisler (gail.wisler@ars.usda.gov)

Hosts and visitors present:

USDA-ARS-SAA, Athens, GA..... Darrell Cole, Area Director (darrell.cole@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Howard F. Harrison (howard.harrison@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Richard L. Fery, Research Leader (richard.fery@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Amnon Levi (amnon.levi@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Kai-shu Ling (kai.ling@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Alvin M. Simmons (alvin.simmons@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... D. Michael Jackson (mike.jackson@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... W. Patrick Wechter (pat.wechter@ars.usda.gov)
USDA-ARS-USVL, Charleston, SC..... Judy A. Thies (judy.thies@ars.usda.gov)
USDA-ARS-PGRCU, Griffin, GA..... Noelle A. Barkley (elle.barkley@ars.usda.gov)
USDA-ARS-PGRCU, Griffin, GA..... J. Brad Morris (brad.morris@ars.usda.gov)
USDA-ARS-PGRCU, Griffin, GA..... Dave Pinnow (david.pinnow@ars.usda.gov)

Agenda – 2007 Annual Meeting of S-009
USDA-ARS Vegetable Research Lab, Charleston, SC

Tuesday, August 7, 2007

Time Topic and Speaker
1:10 pm – Call to Order, Dr. Tim Phillips, Chair S-9 RTAC
1:20 pm – Welcome by host Dr. Richard Fery, USDA-ARS Vegetable Research Lab
1:25 pm – Comments by Emerson Shipe (for Dr. Susan Barefoot, Clemson Exp Stn)

1:30 pm – Welcome and remarks by Administrative Advisor, Dr. Gerald Arkin
1:40 pm – Comments by Area Director, SAA, Dr. Darrell Cole
1:50 pm – Remarks by National Staff
Dr. Peter Bretting, National Program Leader, Plant Germplasm and Genomes, ARS, USDA
Dr. Gail Wisler, National Program Leader, Horticulture and Sugar, ARS, USDA
2:20 pm – Approval of minutes from last meeting
Additions to agenda
Appointments of committees (officer nominations, time and place of 2008 meeting)
2:30 pm – Summary of the year at PGRCU, Griffin, GA, Dr. Gary Pederson
3:00 pm – Break
3:15 pm – Germplasm center updates
3:30 pm – Diversity of Peanut Mini-Core, Dr. Noelle Barkley
3:45 pm – Misc. Legumes Curation, Dr. Brad Morris
4:00 pm – State Reports
5:30 pm – Adjourn

6:30 pm – Meet for dinner

Wednesday, August 8, 2007

8:00 am – Finish State Reports, if needed
9:00 am – Business meeting
9:30 am – Facilities Tour, Vegetable Research Lab
12:00 noon – Adjourn

The 2007 meeting was called to order at 1:00 PM on Tuesday, August 7, 2007 by Chair Dr. Timothy Phillips. The committee was welcomed to the U.S. Vegetable Laboratory by Dr. Richard Fery, Research Leader, to South Carolina by Dr. Emerson Shipe representing Dr. Susan Barefoot, CEO, Clemson University Exp. Sta., and to the USDA Southern Region by Dr. Gerald Arkin, Administrative Advisor to the S-009 RTAC. Further comments were provided by Dr. Darrell Cole, Area Director of the USDA-ARS South Atlantic Area, and by National Program Staff members Dr. Peter Bretting, National Program Leader for Plant Germplasm and Genomes and Dr. Gail Wisler, National Program Leader for Horticulture and Sugar.

Items of particular interest from Dr. Bretting's report included the following items: There are two vacancies in the National Program Staff, one for Oilseeds formerly occupied by Richard Wilson and one in Cotton and Plant Physiology formerly occupied by John Radin. There are also two vacancies in the Data Base Management Unit at Beltsville, those formerly occupied by Allan Stoner and Jim Mowder. There was a record number of distributions of germplasm by NPGS in 2006-2007. The national Plant germplasm Coordinating Committee helped to preserve NRSP-6, the potato germplasm center at Sturgeon Bay, WI, and helped to get more funding for the NE-9 RTAC from the Northeastern states. With respect to international exchange of germplasm, the International Treaty is under consideration by the US State Department. Items of concern include the language for proposed Standard Material Transfer Agreement which has an onerous reporting requirement and a requirement for benefit sharing.

Minutes of the 2006 meeting were approved as published on the S-009 RTAC web site (motion by K. Quesenberry, second by E. Shipe). No additions to the agenda were proposed at this time.

Chair Timothy Phillips appointed K. Quesenberry and E. Shipe as an *ad hoc* subcommittee to nominate officers for the 2008 meeting. Thomas Isleib and Mike Collins were appointed as an *ad hoc* subcommittee to recommend the time and place of the 2008 meeting.

G. Pederson presented a summary of the activity of the Plant Germplasm Resource Conservation Unit at Griffin (Appendix 1).

N. Barkley presented the results of her clustering of peanut “minicore” collection and wild species accessions based on M13-tailed SSR marker profiles (Appendix 2). Within *Arachis hypogaea*, there was fairly accurate assignment of the minicore accessions into subspecies and botanical varieties. PIC scores averaged 0.68, ranging from 0.08 (not informative) to 0.96 (highly informative) for different marker loci.

B.Morris presented a summary of the Miscellaneous legumes and Industrial Crops collection held at Griffin (Appendix 3).

State reports for Texas, Florida, Tennessee, Virgin Islands, North Carolina, South Carolina, Alabama, Guam, Mississippi, Kentucky, and Georgia were presented orally (included in 2007 Annual Report at the PGRCU web site). There was discussion of sunn hemp's potential

as a cover crop, as a forage, and as an invasive species. K. Quesenberry pointed out that several other critically important forage species (tall fescue, bermudagrass, and bahia grass) are all on the invasive species list. T. Isleib expressed appreciation for the data provided by Merrelyn Spinks of PGRCU on the state-by-state distributions of germplasm from PGRCU as well as other regional centers.

At 5:00 PM, the meeting was adjourned until 8:00 AM on Wednesday, August 8 when the presentation of state reports was continued.

In the business session, the ad hoc committees reported on their deliberations. G.R. "Ray" Smith of Texas A&M was designated recording secretary for the 2008 meeting which is to be held in Raleigh, NC on August 5 and 6, 2008 at a venue to be determined.

Two items of new business were discussed:

First, a resolution was passed (motion by K. Quesenberry) to recommend to Dr. Phyllis Johnson, area director for BARC, that the vacant positions in the DBMU at Beltsville be filled as soon as possible.

Second, M. Collins stated that Mississippi State Univ. is having difficulty in offering some graduate-level plant breeding and genetics courses due to low enrollment. There was concurrence by several committee members. Erosion of plant-oriented courses in favor of animal and medical courses was mentioned as contributing to the problem. There is a need for inter-institutionally shared plant breeding courses offered via distance education by those universities that have a critical mass of plant breeding and genetics faculty with teaching appointments. NC State Univ. and the Univ. of Georgia were identified as potential sources of such courses as each is in the process of forming a center or institute of plant breeding and genetics. Private sector firms like Monsanto and Pioneer have expressed concern about the numbers of trained plant breeders being turned out by US universities. A resolution was passed (motion by F. Allen, second by K. Quesenberry) to have G. Arkin relay to the Southern SAES Directors the need for distance learning opportunities. Greater investment in plant breeding combined with sharing of resources and sharing of coursework will provide a cadre of trained personnel that will utilize the germplasm collected and maintained by NPGS. F. Allen and M. Collins will develop a short white paper on the topic.

USVL staff provided a tour of the facility to S-9 members.

The meeting was adjourned at 12:00 PM.

Appendix 1

DR. GARY PEDERSON

PLANT GENETIC RESOURCES: CURRENT STATUS

Plant Genetic Resources: Current Status

Gary A. Pederson

USDA, ARS, Plant Genetic Resources Conservation Unit

Griffin, GA

Outline

- PGRCU mission
- Current status of each crop
- Progress made
  - Distributions
  - Funding
  - Staffing
  - Equipment and facilities
- Needs

What is the mission of PGRCU?

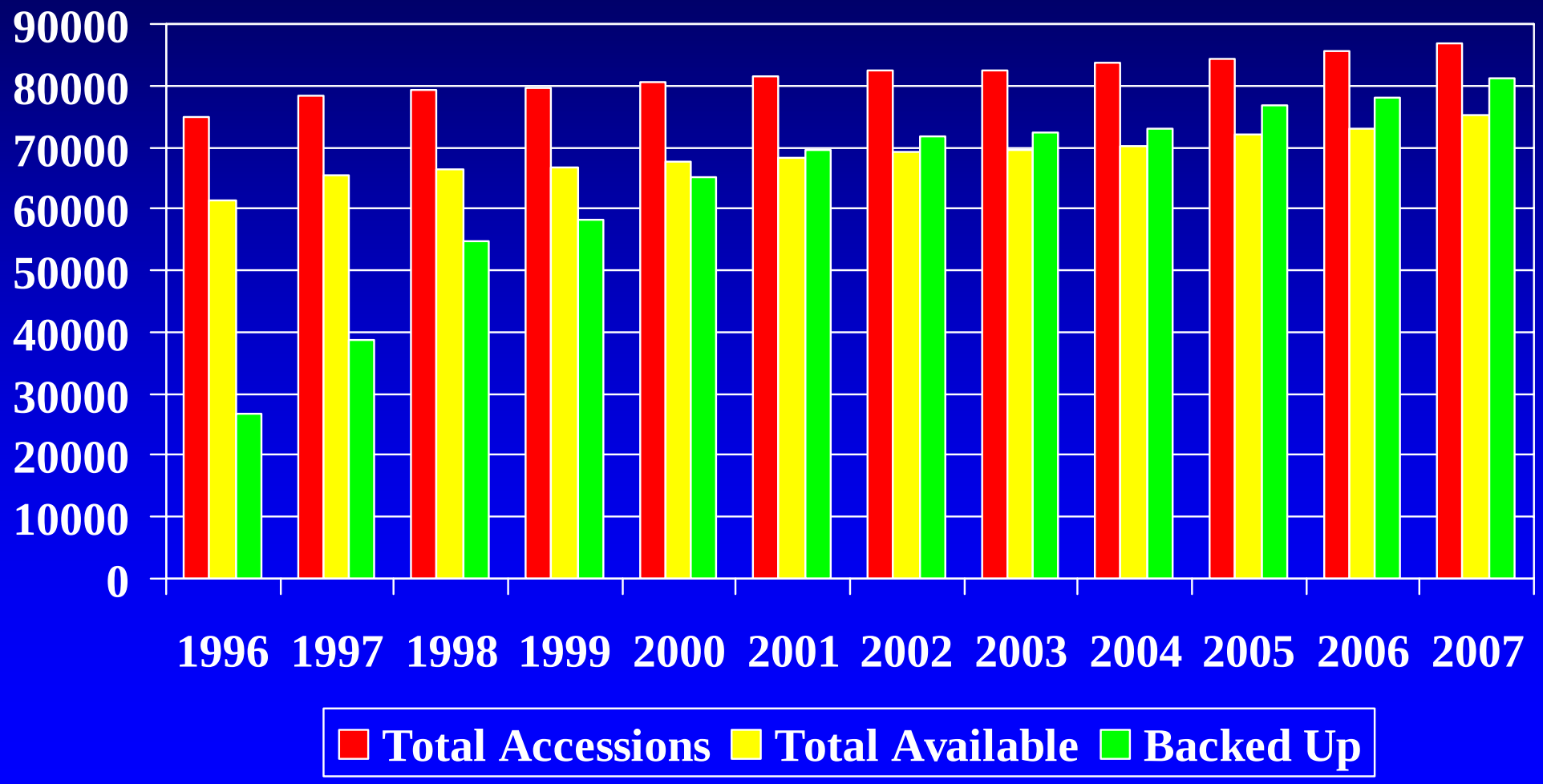
- Plant Genetic Resources Conservation Unit (PGRCU) exists to conserve plant genetic resources for users today and for future generations.
- Mission: “acquire, characterize, maintain, evaluate, document, and distribute plant genetic resources”.
- This is what users of the genetic resources maintained at Griffin expect from the Unit.

PGRCU Collection - June 2007

- Total Accessions
  - 86,829
- Total Available
  - 75,239 (86.7%)
- Backed Up
  - 81,252 (93.6%)

Acknowledgement: Merrelyn Spinks and Lee Ann Chalkley, PGRCU, compiled and summarized all numbers shown in this presentation.

PGRCU Collection 1996 - 2007



Vigna

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Graves Gillaspie (retired) **Gary Pederson (acting)**	Cowpea	8,046	6,144	6,470	294
	Mung bean	4,203	3,840	4,104	264
	Other Vigna spp.	604	261	299	68

Vegetable Crops & Sweetpotato

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Bob Jarret	Cucurbits	2,044	939	1,872	1,850
	Eggplant	995	909	992	371
	Okra	2,986	1,555	2,947	52
	Peppers	4,686	4,511	4,671	5,013
	Sweetpotato - tissue culture	759	719	608	200
	Other Ipomoea spp.	476	207	409	214
	Watermelon	1,877	1,678	1,844	3,448

Legumes and Misc. Crops

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Brad Morris	Castor bean	374	234	373	69
	Kenaf & Roselle	342	291	338	167
	Legumes	3,607	2,672	3,425	983
	Miscellaneous	136	101	130	31
	Sesame	1,213	1,191	1,213	359

Warm-Season Grasses

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Melanie Harrison-Dunn	Bamboo	98	98	3	137
	Grasses	6,924	6,038	6,590	2,379
	Pearl millet	1,091	1,056	1,074	216

Clover and Sorghum

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Gary Pederson	Annual Clover	2,152	1,630	2,128	226
	Sorghum	34,206	32,632	32,957	1,991

Peanuts

CURATOR	CROP	TOTAL ACCESSIONS	TOTAL AVAILABLE	NUMBER BACKED UP	ITEMS SHIPPED IN 2006
Roy Pittman	Cultivated Peanuts	9,232	7,883	8,579	368
	Wild Peanuts	778	650	208	126

Digital photos

Crop	Images
Sorghum	6,731
Pepper	1,122
Peanuts	546
Pearl millet	445
Cowpea	382
Cucurbits	254
Watermelon	120
Bamboo	84
Total	**9,802 (11.3%)**

Germination Testing

(Accessions with seed only, tested since 2002)

Crop	Accessions	%	Crop	Accessions	%
Sorghum	19,917	58.4	Grasses	1,259	18.9
Pepper	4,581	97.8	Clover	1,105	51.7
Mung bean	3,055	72.7	Legumes	957	31.6
Cowpea	1,972	24.5	Eggplant	929	93.4
Watermelon	1,735	92.7	Sesame	711	58.6
Peanuts	1,715	18.7	Cucurbits	643	46.1
Okra	1,584	53.0	Castor bean	353	94.4
			TOTAL	**41,503**	**48.8**

Accessions in -18 C storage

(Accessions with seeds only, seed splitting initiated in 2001)

Crop	Accessions	%	Crop	Accessions	%
Sorghum	21,203	62.2	Watermelon	1,871	100.0
Grasses	5,056	75.9	Cucurbits	1,395	100.0
Peppers	4,683	99.9	Sesame	1,213	100.0
Mung bean	4,044	96.2	Eggplant	993	100.0
Legumes	3,026	100.0	Cowpea	834	10.4
Okra	2,969	100.0	Gourds	485	100.0
Peanuts	2,600	28.3	Castor bean	374	100.0
Clover	2,136	100.0	**TOTAL**	**55,370**	**65.1**

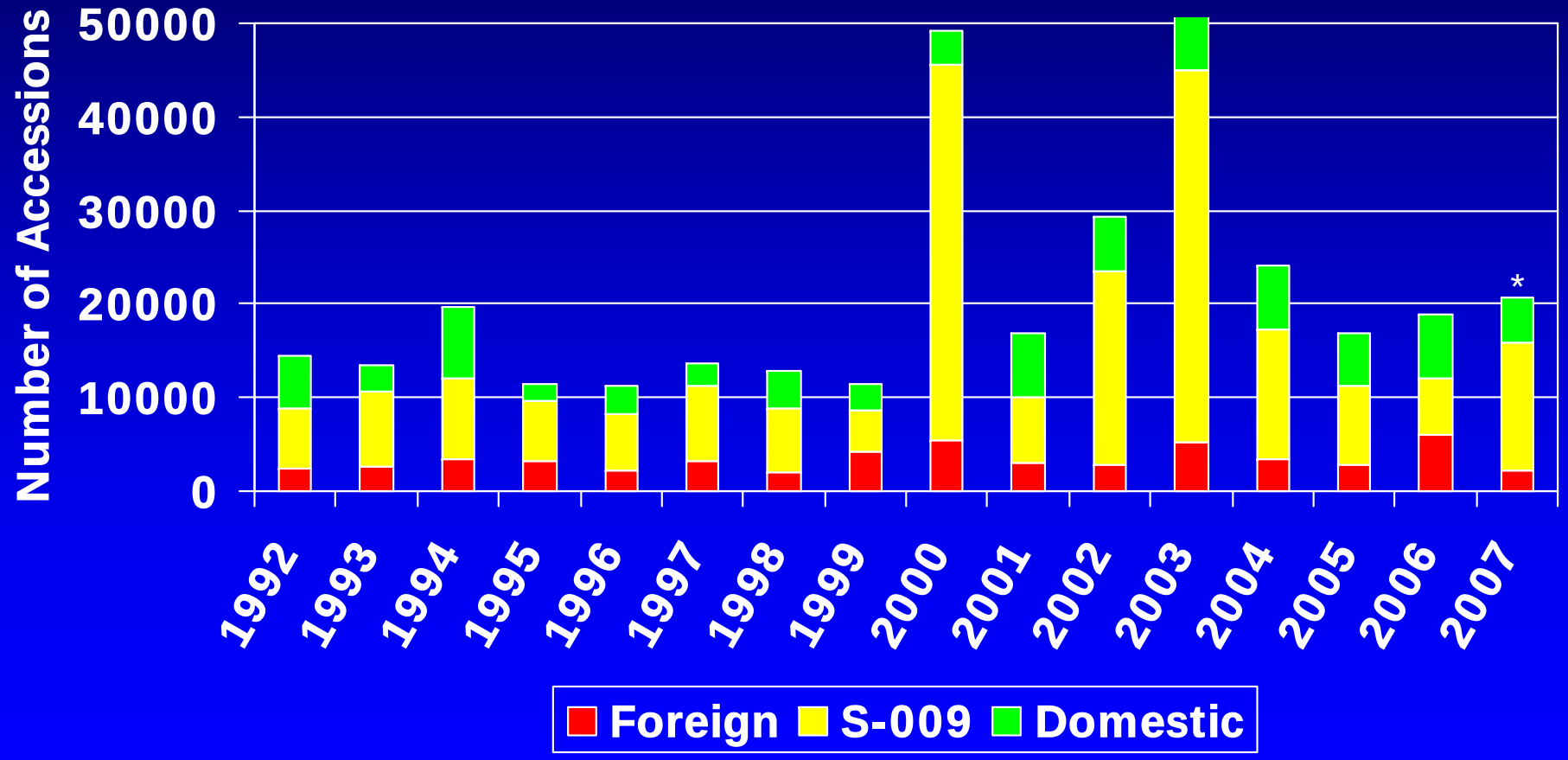
Requested for regeneration in CY2006

Crop	# accessions	Crop	# accessions
Cowpea	192	Grasses	88
Sorghum	2,199	Legumes	269
Cucurbit	24	Misc. crops	21
Clovers	216	Sesame	30
Eggplant	6	Cult peanut	667
Peppers	102	Guar	46
Watermelon	12	Kenaf	12

Distributions in CY2006

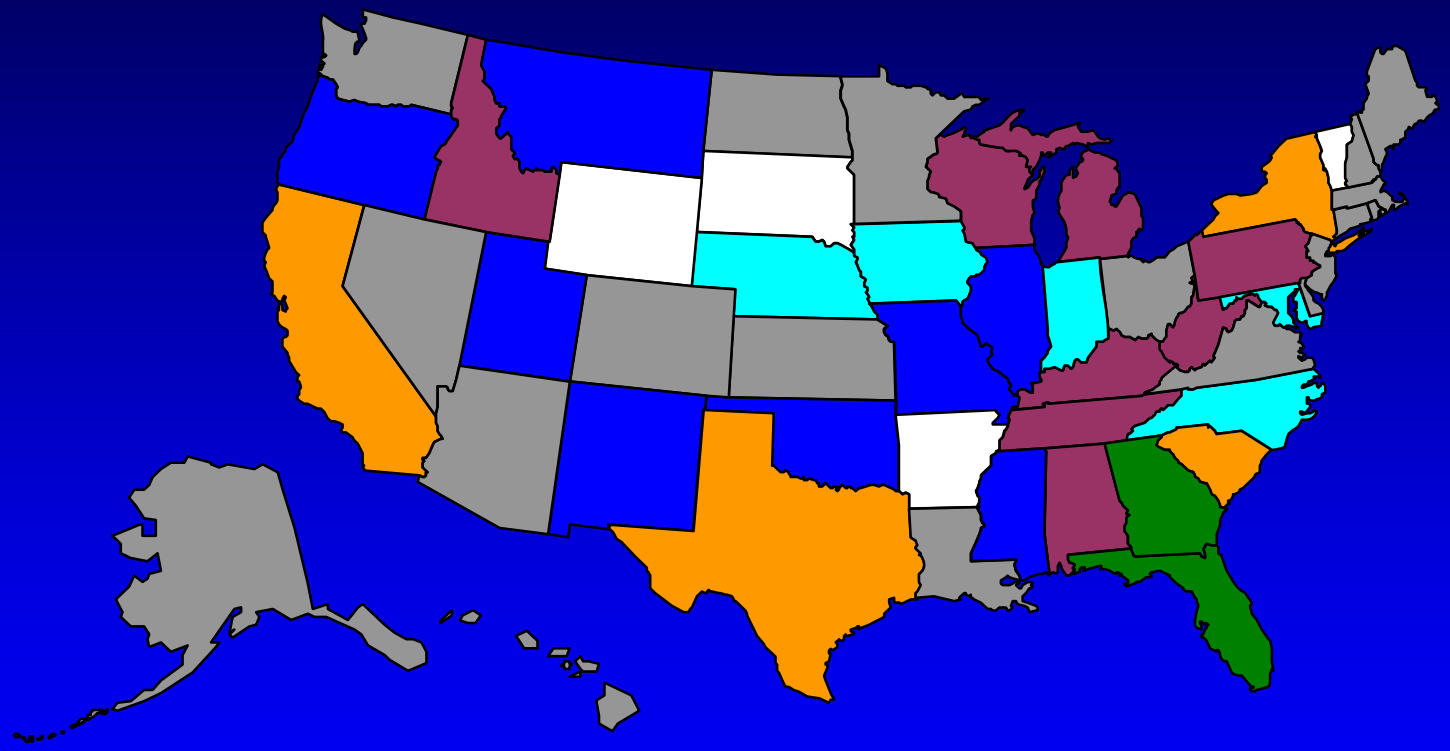
- Domestic = 12,894 items in 496 orders
  - S-9 region = 6,067 items
- Foreign = 5,932 items in 132 orders
- Total CY2006 distributions = 18,826 items

Distributions



* As of July 24, 2007

Domestic Distributions in CY2006



Total number of accessions by state

2,500 to 5,000	500 to 749	50 to 99
1,000 to 2,499	250 to 499	1 to 49
750 to 999	100 to 249	0

Distributions outside of 50 U.S. states in CY2006

Argentina	Eritrea	Italy	Puerto Rico	Thailand
Australia	France	Japan	Slovakia	Turkey
Bolivia	Germany	Kenya	South Africa	United Arab Emirates
Brazil	Guam	Mexico	South Korea	United Kingdom
Canada	Haiti	Netherlands	Spain	Uruguay
China	Ireland	Pakistan	Sweden	Vietnam
Egypt	Israel	Philippines	Taiwan	

Total PGRCU Funding

- ARS base funding
  - FY2007 = $2,195,852
- S-009 base funding
  - FY2007 = $402,517

PGRCU Funding

- ARS base funding increases
  - FY2002 = $248,861 (Congress)
    - FY2002 money in President's budget reduction
- ARS temporary funding increases
  - FY2006 = $24,000 (pepper virus screening)
  - FY2006 = $27,500 (low-range gear tractor)
  - FY2006 = $24,000 (mower and two gators)
  - FY2007 = $40,000 (boiler replacement)

PGRCU Funding

- ARS base funding FY2008
  - President's budget
    - Increases for PI stations, genomics, specialty crops
    - FY2002 money in President's budget reduction
  - Congress
    - Increase in House Appropriations Com. for specialty crops

Staffing - ARS

- 23 ARS full-time employees
- One resignation and position terminated
  - Research Plant Pathologist/Vigna Curator
  - Currently ARS collaborator

Staffing - S-009

- Seven permanent S-009 employees
- Hired
  - Research Technician II (Byron)
  - IT Professional Associate (replaced Res Coordinator II)
- 12 temporary full-time and part-time employees were hired during FY2006 to handle specific labor needs.

Staffing summary

- Current staff is 30 employees (23 ARS and 7 S-009)
- Additional 12 S-009 temporary labor positions

Equipment purchased

- Farm operations
  - Tractor with low-range gear for Reigi weeder and transplanter
  - Gators

Equipment purchased

- Farm operations
  - Transplanter
  - Zero-turn mower
  - Bush hog mower

Equipment purchased

- Germination
  - Germination chamber
- Laboratory
  - Three mini-centrifuges
  - Evaporator, homogenizer, vacuum manifold/drying attachments for HPLC
  - Electronic pipet

Facility Repair and Maintenance

- Replaced cooling system in three S-009 (grass and vegetable) greenhouses.
- Replaced heating system in two S-009 (grass and vegetable) greenhouses.
- Repair side vents of greenhouses
- Replaced heating system and step controls in two ARS greenhouses.
- Replacing the main federal greenhouse and headhouse boiler (in process).

ARS and S-009 greenhouses

Facility Repair and Maintenance

- Installed additional dry wall layer to soundproof office area from seed cleaning area.
- Installed seed storage acoustic door for soundproofing and dust control.
- Installed vinyl siding and soffit on ARS headhouse.
- Installed auto-watering control systems in ARS greenhouse (peanuts and legumes)

Other activities

- PGRCU Customer Service Workshop (Oct 2006)
  - Internal and external customers
  - Videos (Give ‘em the Pickle and Fish)
  - Taking responsibility, attitude, positive language, communication, dealing with anger, stress
  - Customer types (like Myers-Briggs)

- PGRCU Brainstorming session (March 2007)

Needs

- Reinstate money in President's budget reduction ($248,861)
- Curation
  - Cat. 4 curator (Vigna, watermelon, cucurbits)
- Technical support
  - Forage legumes: HPLC characterization
  - Grass: labor to support grass tissue culture
  - Greenhouse manager
  - Seed storage: seed processing
  - Germination: labor for germination testing
  - Field crew: weeding, irrigation, harvesting

Equipment Needs

– Growth chamber (sweetpotato)	$ 8,000
– No till drill	$13,000
– Autogen Quick-Gene DNA isolation	$13,000
– Tractor (low-range gear) for Byron	$28,000
– Cage covers and frames (legumes)	$30,000
– Real time PCR	$30,000
– Truck to haul equipment on trailer	$30,000
– Gas chromatograph	$39,000
– Moveable storage shelves for 4C room	$75,000

Plant Genetic Resources Conservation Unit

Appendix 2

DR. NOELLE BARKLEY

DIVERSITY OF PEANUT MINI CORE AND WILD RELATIVES USING M13 TAILED SSR MARKERS

Diversity of Peanut Mini Core and Wild Relatives using M13 Tailed SSR Markers

Noelle Barkley, PhD
Molecular Geneticist
USDA- ARS PGRCU

Peanut Overview

- Peanut important oilseed crop and nutritious for human consumption
- Native to South America
  - Legume family *Fabaceae*
  - Genus *Arachis* consists 70 species
  - Cultivated peanuts are allotetraploids; wild species are generally diploids
  - Cultivated peanuts (*A. hypogaea*) can be classified into subspecies: *hypogaea* and *fastigiata* (absence or presence of flowers on the main axis)
    - Six botanical varieties: *hypogaea, hirsuta, fastigiata, vulgaris, aequatoriana, peruviana*

USDA PGRCU *Arachis* Collection

- Large: peanut collection ~10,000 accessions
- Core collection (831)- represents majority of genetic diversity with minimal redundancy was constructed by Corley Holbrook 1993
  - Country of origin and morphological descriptors
- Mini Core constructed so that traits difficult to measure or expensive could be assayed on a small scale

Mini Core

- No published studies on the molecular characterization or genetic diversity of the mini core
- Sufficient number of SSR markers were not available until recently
- Objective of study: Assess genetic diversity of mini core accessions and some wild relatives using SSR markers

Molecular Characterization of Mini Core and Wild Relatives

- Determine if SSR markers would produce PCR products in the wild relatives
- Integrate molecular and observational data to tentatively classify mini core accessions into subspecies and botanical varieties
- Determine interspecific and intraspecific phylogenetic relationships of various peanuts

Peanut Accessions Studied

- Accessions examined
  - 111 from mini core
    - 21 (18.9%) classified into subspecies and botanical variety
    - 90 classified only to genus species level
  - 14 wild relatives of cultivated peanuts representing 9 species
    - Included putative progenitors of cultivated peanut *A. duranensis* and *A. ipaensis*
  - 14 cultivated accessions classified into botanical varieties that were not from the mini core

SSR Markers

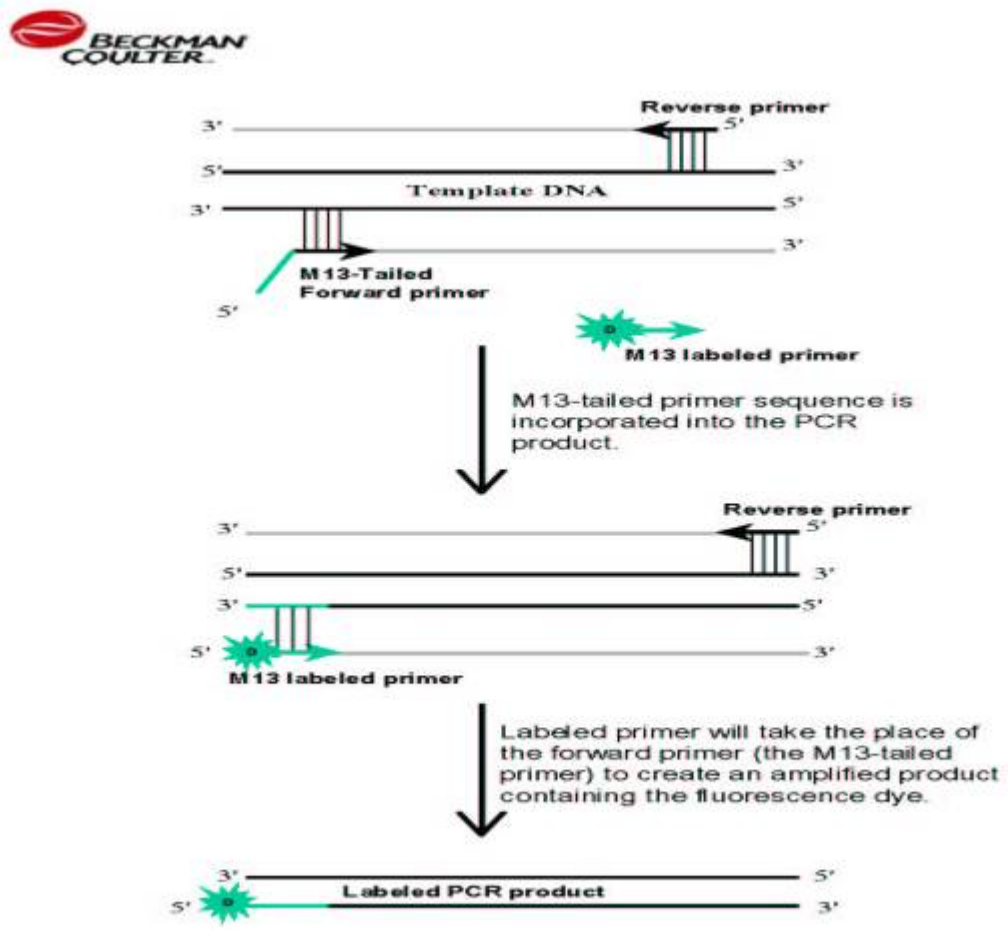
SSR Markers

- Advantages
  - Highly polymorphic
  - Codominant
  - Reproducible
  - Abundant in eukaryotic genomes
  - Automated
- Disadvantages
  - Expensive to develop
  - Time consuming to develop

Running SSR Markers

- Use automated sequencer ABI 377 (polyacrylamide gel electrophoresis)
- Allele detection from fluorescent label/primer that is incorporated in PCR product
  - Fluorescent labels are expensive $99/primer
- Used M13 tail method which provided fluorescent label but only needed one
  - Savings $2,970

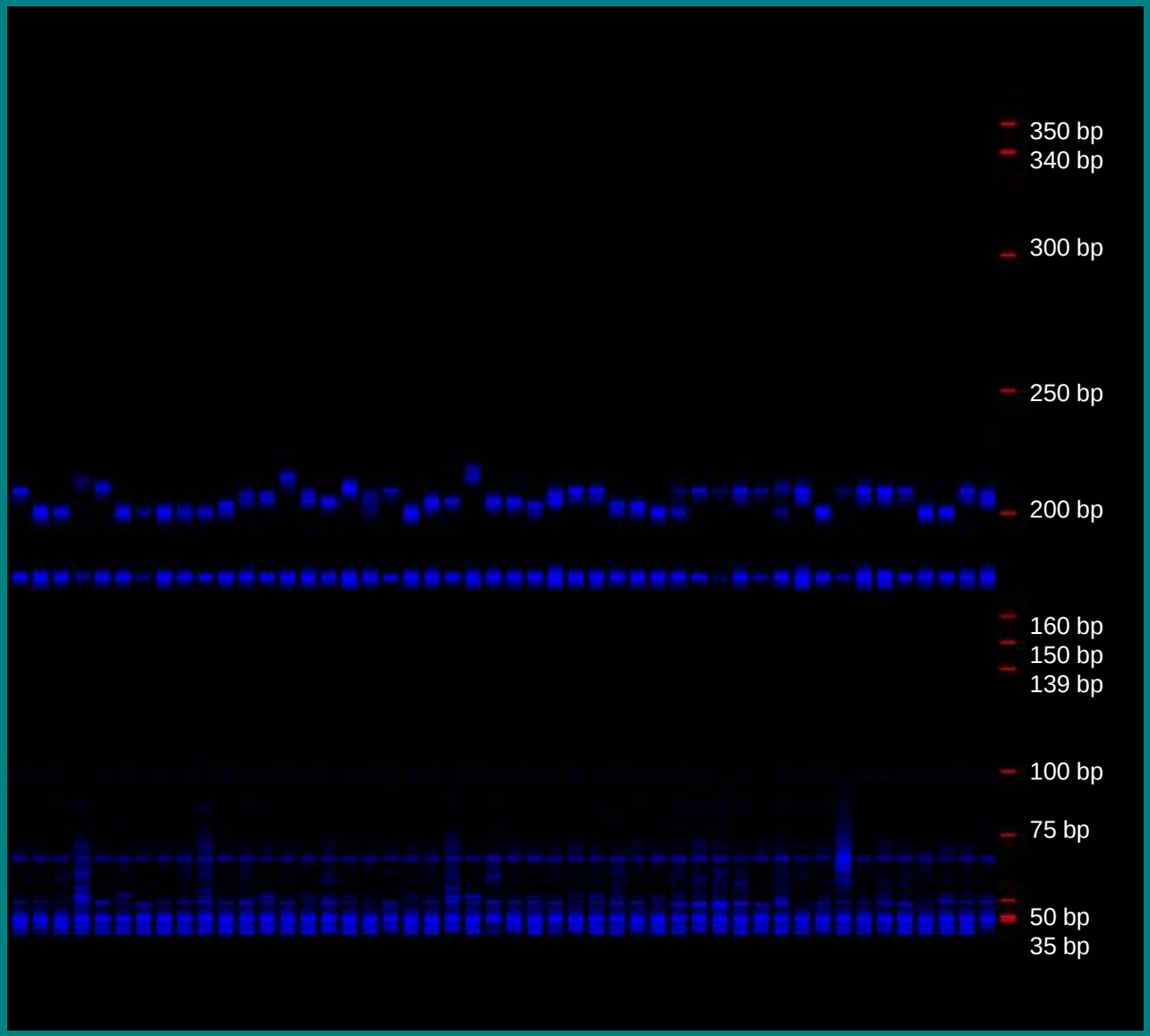
M13 Tailed SSR Method



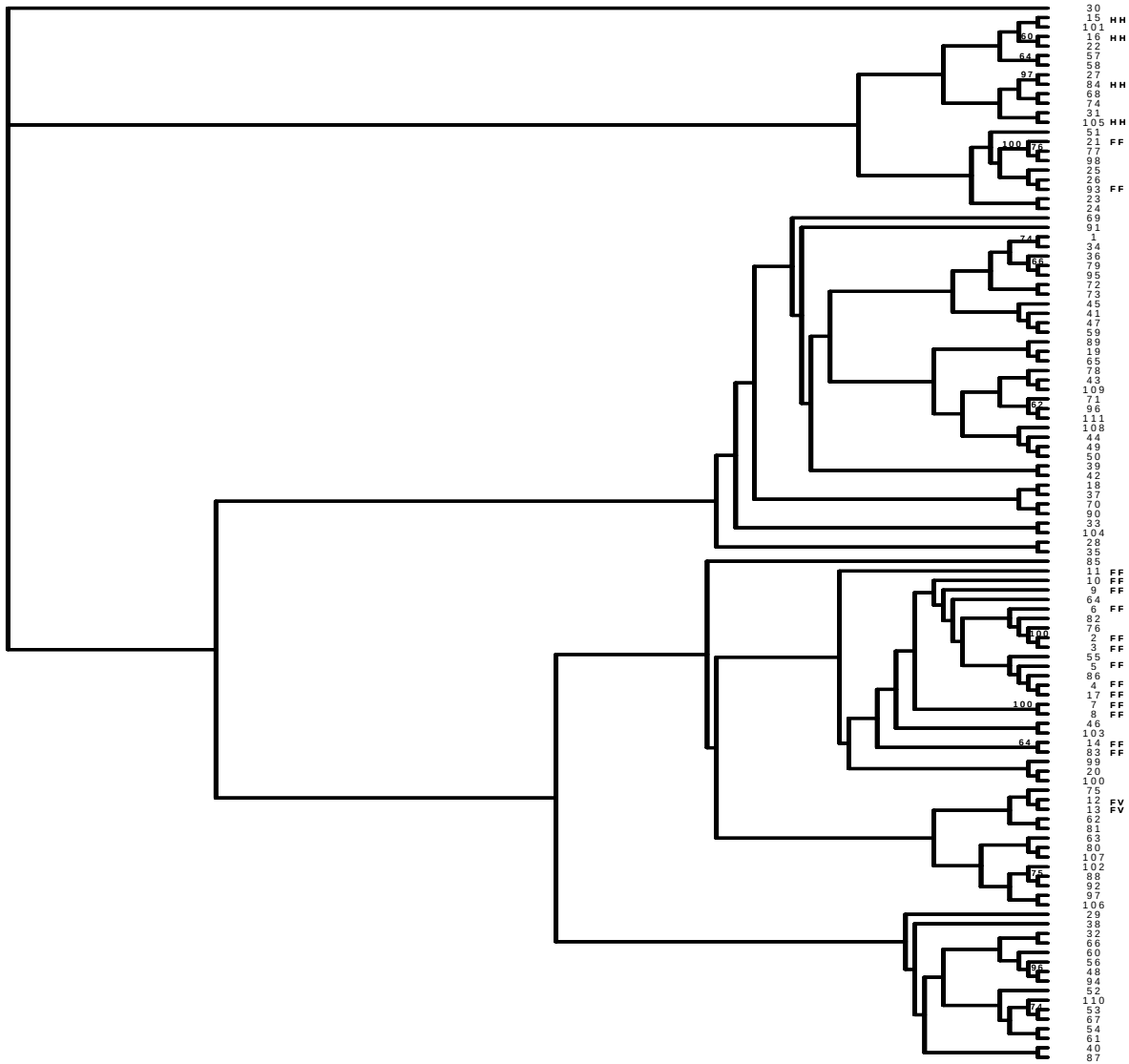
SSR Markers

- 31 Markers (all samples)
  - Total of 477 alleles detected; Range 3-29 alleles per marker
  - Mean of 15.4 alleles/locus
  - Mean PIC score 0.687 (range 0.083-0.911)
- Mini Core only
  - 312 alleles detected; 1-20 alleles per marker
  - Average of 10.1 alleles/locus

Marker Ah426



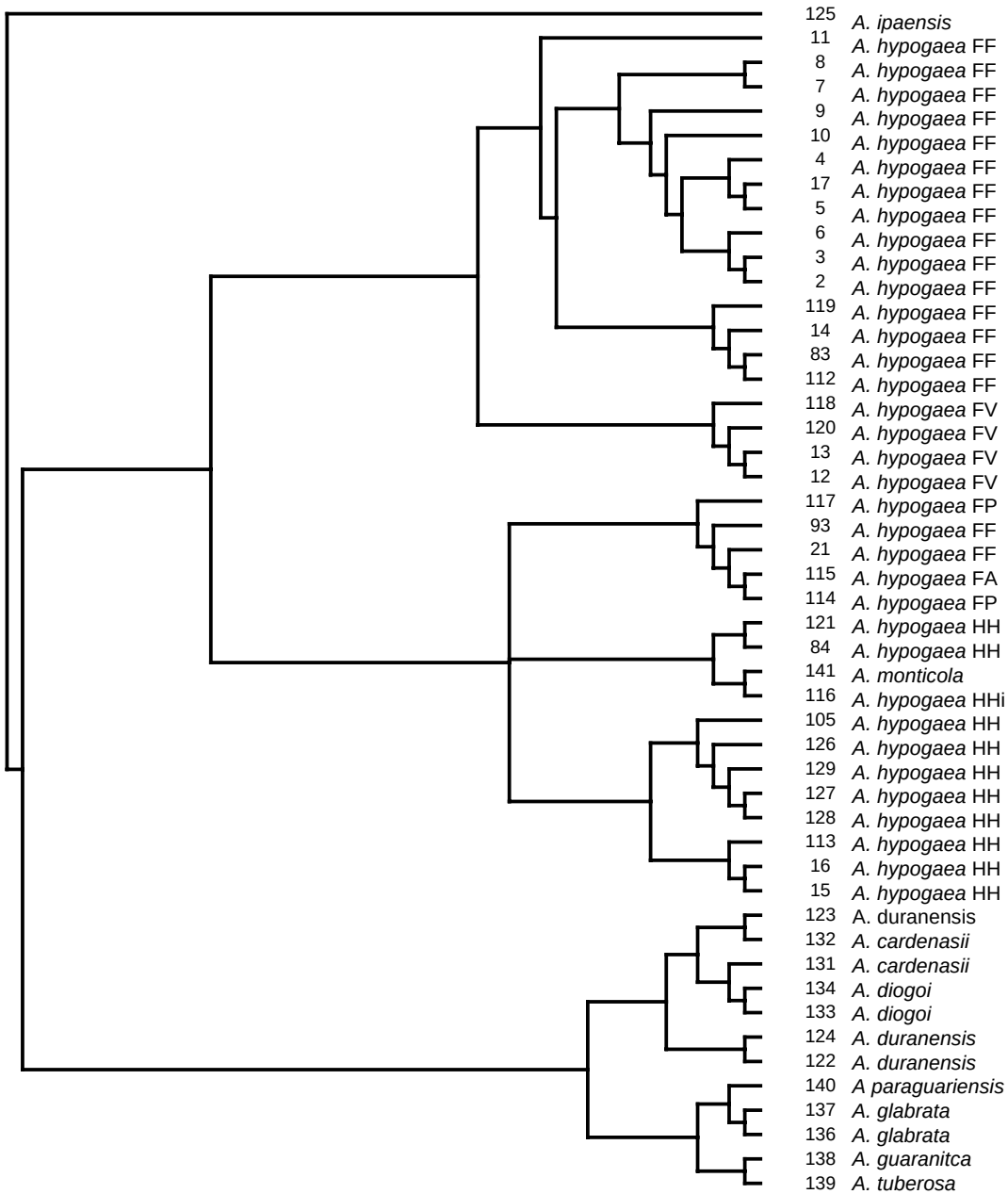
Phylogenetic Relationships of Mini Core



Mini Core

- 2 accessions had identical banding patterns for all 31 markers suggesting they are genetically similar
- Most all of the accessions classified to botanical varieties clustered together
  - Two exceptions after looking at observation in GRIN possible these may be misclassified
  - Peanut curator growing these in the field to verify

Botanical Varieties and Wild Relatives



Classifying Peanuts into Subspecies and Botanical Varieties

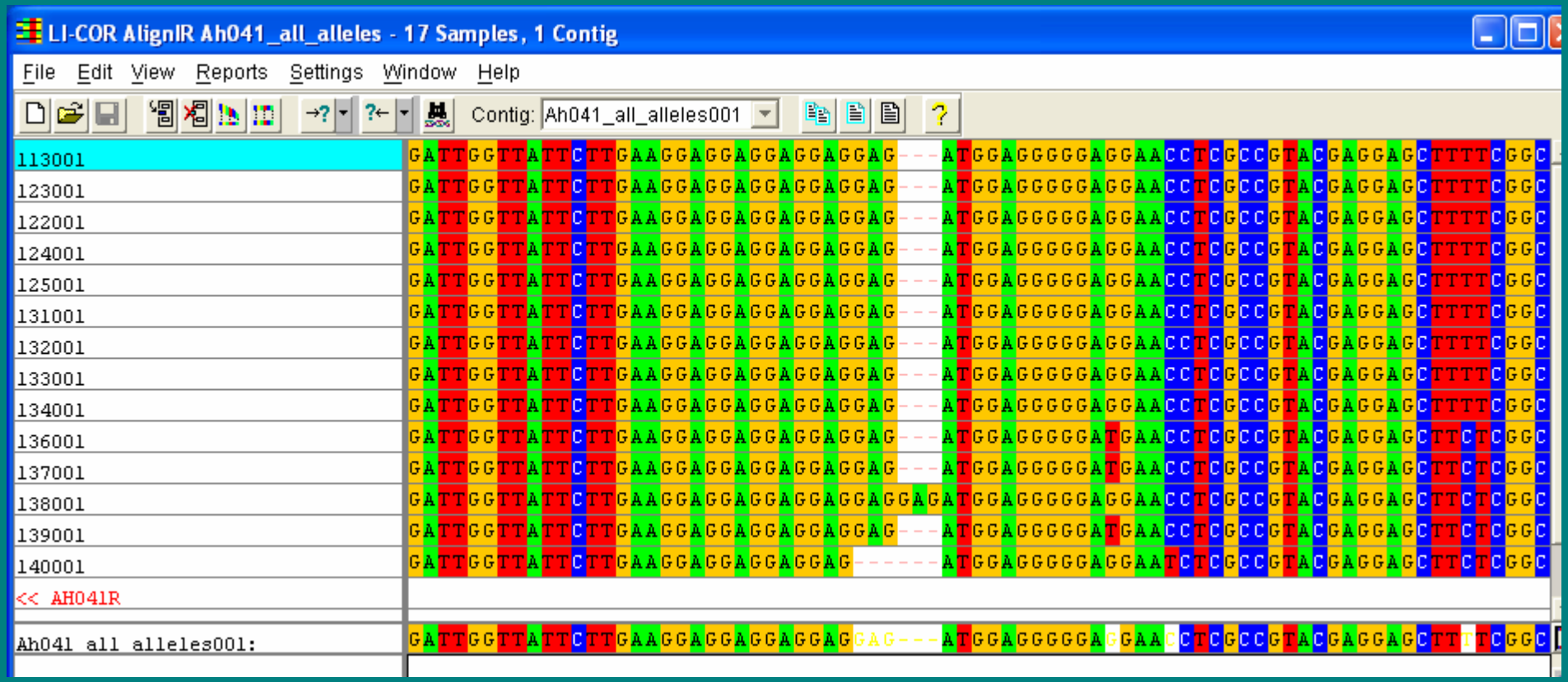
- Used SSR data in combination with phylogenetic analysis to tentatively classify unknowns
  - 11 *fastigiata fastigiata*; 24 *fastigiata vulgaris*; 43 *hypogaea hypogaea*; 13 questionable
  - Used GRIN observational data to verify tentative classification
    - GRIN data seems to be consistent with putative molecular classification of 40 accessions
    - Grown in field to verify
    - Once we have molecular and morphological verification-incorporate data into GRIN

Sequencing SSR Alleles

Sequencing SSR Alleles

- SSR markers do not always transfer across genus or species borders
- Markers designed for *A. hypogaea* not for wild relatives
- Sequenced different size alleles from cultivated and wild relatives to see if SSR repeat was in the relatives
- Sequenced on Beckman CEQ 8000

Sequencing SSR Marker



GAG repeat

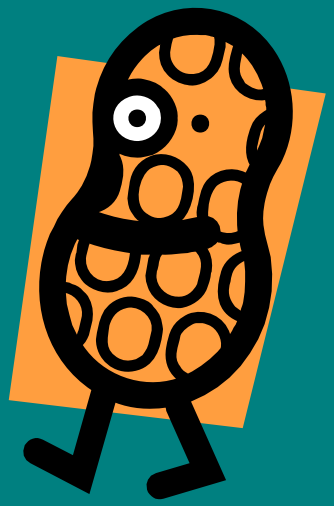
Sequence Results

- Demonstrated SSR element did transfer to wild relatives
- Allele size variation was due to changes in the repeat motif not indels in flanking sequence
- SNPs were uncovered that could distinguish some of the wild species
- One SNP distinguished cultivated from wild species
  - More work needed to develop and test SNP markers

Summary SSR Data

- First molecular phylogenetic study of peanut mini core
- More diversity in wild accessions than cultivated accessions
  - Only 2 accessions in mini core had identical banding pattern
- Two accessions appeared to be misidentified
- Tentative classification of mini core accessions into subspecies and botanical varieties

Thank You



Appendix 3

DR. BRAD MORRIS

MISCELLANEOUS LEGUMES, NEW AND INDUSTRIAL CROPS CURATION REGENERATION

Miscellaneous Legumes, New and Industrial Crops Curation Regeneration

Brad Morris, Agonomist, Curator

Ken Manley, Technician

Legumes

- 58 genera, approx. 400 spp.
- Subtropical
- Tropical
- Temperate
- Native

- Nutraceutical
- Pharmaceutical
- Food
- Cover
- Ornamental
- Forage

New and Industrial Crops

- Sesame
- Kenaf, roselle, related *Hibiscus* spp. (29 species)
- Castorbean
- Miscellaneous

- Oil
- Biofuel
- Ornamental
- Food
- Nutraceutical
- Pharmaceutical
- Paper

Current Regeneration Methods

- Focused on cleistogamous spp. (50 seed/acc.)
- Buffer with at least 2 different spp. separating regenerating accession
- Cross-pollinated species in cages with honeybees (100 seed/acc.)

Juvenile Flowering Species, Photoperiod Sensitive

- Plant seed in pots containing potting soil1st year under greenhouse conditions
- Regenerate plant throughout the 1st year in the greenhouse
- Transplant to potting soil containing pine bark during the 2nd year

Zornia diphylla
Juvenile flowering 1st year

Indigofera miniata
Juvenile flowering 1st year

Senna alata,
Pine bark potting soil vs. Westbrook field

Hibiscus sabdariffa
Photoperiod sensitive

Hibiscus radiatus

Hibiscus acetosella

Perennial spp., juvenile flowering 1st year

- Grown in greenhouse conditions same as the species previously discussed
- Transplanted to the field 2nd year

Hibiscus laevis

Anemophilous (Wind-Pollinated) and Monoecious spp.

- Castorbean
- Bag inflorescence prior to opening of the style
- Bags removed from each inflorescence after 2 weeks because of indeterminate flowering

Ricinus communis, Castorbean

Needs and Future Regeneration Possibilities

- Cages for preventing outcrossing in self-pollinated spp.
- Hydroponic system for regenerating juvenile and large spp. under greenhouse conditions

Thanks