FOLLOWING DOCUMENT CONTAINS TAC08 MEETING MINUTES AND ALL 2007 REPORTS AND MEETING DISTRIBUTIONS AVAILABLE:

NRSP-6 Technical Committee Meeting Minutes

Best Western Columbia River Inn
Cascade Locks, OR / June 9-10, 2008

Chuck Brown, Chair and Host
David Douches, Vice-Chair
Isabel Vales, Secretary

Meeting started on June 9 at 9:07 a.m.

Preliminaries

1. Welcome, introductions, misc. announcements, distribution of documents

People present:
Martin, Max. W. (mwmarti1@wisc.edu) - NRSP6;
Hoopes, Bob (robert.hoopes@fritolay.com) - Frito Lay;
De Jong, Walter (wsd2@cornell.edu) - Cornell;
Bamberg, John (john.bamberg@ars.usda.gov) - USDA-ARS;
Kunibe, Elizabeth (elizbowe@hotmail.com) - USDA-SARU Univ. of AK;
Douches, David (douchesd@msu.edu) - Michigan State University;
Spooner, David (david.spooner@ars.usda.gov) - USDA-ARS;
Wisler, Gail (gail.wisler@ars.usda.gov) - USDA-ARS;
Abad, Jorge (Jorge.A.Abad@aphis.usda.gov) - USDA-APHIS;
Vales, Isabel (isabel.vales@oregonstate.edu) - Oregon State University;
Brown, Chuck (chuck.brown@ars.usda.gov) - USDA-ARS

Introductions were accompanied with highlights of important topics of interest.

Zebra chip is an important economic problem in potatoes. It started in Texas; it expanded to other States and is now in California. The problem is getting bigger. Several people are involved in Zebra Chip work/research, including Jim Crosslin, Joe Munyaneza, Jorge Abad (USDA-APHIS), Frito Lay, etc. Current research indicates that Zebra chip is probably caused by a proteobacteria transmitted by psyllids. The transmission is very fast.

Purple top is caused by phytoplasm. The type present in the Columbia basin has a distinctive name now, purple top Columbia basin, and is different from the one present in Mexico. Purple top is the most important disease in potatoes in central Mexico.

Germplasm screening for *Globodera pallida* and *G. rostochiensis* can be done in Moscow, Idaho. Rich Novy and Chuck Brown will send material to be screened. Corky ring spot resistant material traces back to material with resistance to cyst nematodes, so germplasm with resistance to the Globodera species could be already available in the Pacific Northwest Tri-State potato program and other variety development programs. There is a cyst nematode working group at North Carolina State University, Raleigh, NC. Resistance to *G. Pallida* resistance is multigenic.

Cyst nematodes have been found at Powell Butte, OR, but they do not correspond to the quarantined cyst nematodes *G. pallida* or *G. rostochiensis*.

Betsy (Alaska) collects old versions of potato cultivars and also working on archeology.

David Douches, MSU. Potato Breeding and Geneticist. Traits of interest: light chip color directly from field and after storage, storage/dormancy, scab resistance, late blight resistance, PVY.

David Spooner, USDA-ARS. Did not collect new potato accessions abroad since 2000. Chile is now open to germplasm collections. Peru has not removed collection restrictions. In addition to potatoes, Dave will dedicate part of his time to work on carrots.

Gail Wisler. USDA-ARS Beltsville. Dedicated to vegetable crops, citrus and ornamental crops. Involved in USDA-ARS/NPC funds.

Jorge Abad. USDA-APHIS (replacing Suzanne Hurtt). Jorge is implementing new techniques for disease detection. Jorge visited SCRI (Scottish Crop Research Institute) and Canada to make protocols more uniform. Jorge is also working on Zebra chip, collaborating with Ron French at Texas A&M and the company Agdia. Zebra chip is a potential quarantine pathogen. Jorge is identifying new viruses in the program and working on its characterization.

David Douches and Walter De Jong indicated that the CAP proposal (Solanaceae) was considered to receive a reverse visit. In general this occurs when the probabilities of getting funds are good.

2. Approve, add to, schedule and prioritize agenda items

Walter De Jong approved the agenda and David Spooner seconded it.

3. Review of 2007 minutes.

Walter De Jong approved the minutes and Jorge Abad seconded them.

Note: 2008 NRSP6 annual report and NRSP6 minutes need to be summarized and downloaded in the NIMSS system. Minutes should be presented 30 days after the meeting. Minutes and annual reports are two separate things. The secretary should submit minutes for approval to the group and submit the minutes to Jesse. Jesse will combine minutes and annual reports and submit them to NIMSS.

4. Chair appoints Resolutions Committee

Resolution committee appointed at 10:06 a.m. Committee members: Water De Jong and David Douches. The committee will summarize decisions (motions, etc.) and prepare synopsis at the end of the meeting.

Reports and Comments

5. Lead AA

C. Y. Hu (Western Region), not present.

6. Regional AAs

Southern Region: R. Guthrie (not present)
North Central Region: M. Jahn (not present)
Northeastern Region: E Ashworth (not present)

7. Regional and ARS Tech Reps (Technical Reps submitted hard/electronic reports. Some highlights are included here)

North Central Region: David Douches

There is a lot of potato breeding and genetics research on the NC region.
Minnesota: Christian Thill is working on late blight resistance, scab, virus resistance.
Michigan: Dave has a diploid breeding program. Working with *S. microdontum*, *S. berthaultii*, verticillium resistance (*S. chacoense*, due probably to two complementary genes), Colorado potato

beetle resistance. Dave is interested in white round potatoes. Next year Michigan will release a cold chipper (*S. tarijense* and *S. phureja* are in its background)
Wisconsin: Jiwan Palta is a great user of germplasm. Some of traits of interest include: cold chipping, late blight, Calcium, pH involved with glycemic index, acrylamide formation, quality, vitamin content.
North Dakota: Susie Thompson. Traits of interest: ring rot, late blight, cold chipping. *S. verrucosum* has a gene complementary to the RB gene (LB).
Jeff Davis. Important traits: high dry matter, long storability, yield, high quality. Low sugars = low acrylamide. = low asparagine. Soaking potatoes could reduce asparagines and possible potassium.
Cindy Tong. Basic research on blue light effects on potato tuberization.
Dave passed out a summary provided by Dan Ronis of Frito-Lay, indicating that his breeding program had utilized both TPS and tuber families of several species in the past year—bukasovii, chacoense, demissum, gourlayi, microdontum, okadae, oplocense, phureja, raphanifolium, spegazzinii, tarijense, and andigenum. Health and wellness objectives were paramount reasons for obtaining this germplasm.

Northeastern Region: Walter DeJong
NY uses germplasm mainly for association analyses. A student is working on the shape trait and is close to its locus. Tuber shape is measured on a scale from long to round. The tuber shape trait has good predictive power in tetraploids. Domestication probably linked in coupling a marker associated with shape. Walter indicated that somebody should evaluate Linkage disequilibrium in depth to facilitate association studies in potatoes.
In potato there is no natural variation for beta-carotene. Is there variation for beta-carotene in the germplasm? Suggestion to submit grants: Challenge and Gates

Western Region: Isabel Vales
OSU's main traits of interest: PVY, late blight resistance, value added potatoes (antioxidants, colorants, etc.). Isabel is currently using two sources of resistance to PVY (*S. stoloniferum, S. tuberosum andigena*) and implementing MAS. The genetic basis of PVY resistance present in Premier Russet is under study. Requested to get RH and SH included in NRSP6.

Southern Region: J. C. Miller, Jr (not present). Summary of written report: Three major states in the SR are working with NRSP6 germplasm, and a few others periodically. Texas program is an active user of genebank stocks for breeding and research. Antioxidants, anticancer factors, and Zebra Chip complex are areas of particular emphasis. Texas potato yields now average more than double of what they were when the breeding program began. In North Carolina, breeding for resistance to internal heat necrosis is advancing with exotic potato germplasm. The wild species *S. chacoense* is being used for Colorado potato beetle resistance breeding. NC is also exploring the potential of NRSP6 germplasm as ornamentals. In Virginia, monoploids of exotic potato germplasm are being used in breeding, and a new genetic study is being initiated with germplasm to examine the inheritance of glycoalkaloids.

Lunch Break: Noon to 1:30

USDA-ARS: Chuck Brown
Kathy Haynes is working on the genetics of tolerance to stress. Kathy has a large breeding program connected with the University of Maine. Univ. of Maine is hesitating to rehire a State Potato Breeder. Kathy in collaboration with other researchers is also working on mineral composition on potatoes. She is studying the effect of location on stability and heritability on carotenoids, anthocyanin, minerals,

etc. Potatoes planted in areas with more light and cooler temperatures have higher antioxidant components. Potatoes show lighter color in sandy soils at low altitudes.
West: Rich Novy and Chuck Brown. The potato cyst nematode (*G. pallida*) is an emerging disease. Idaho has been dealing with the cyst nematode for three years. Export markets have been seriously affected and the future of the Idaho industry could be affected. Extensive sampling is currently taking place. Fumigation has been done in 100 acres (8-9 fields). The potato cyst nematode has been found in three fields. There is a program for replacing methyl bromide (the most common option to eliminate cyst nematodes).There is germplasm resistant to potato cyst nematodes. Resistance to the cyst nematode is mainly quantitative (QTL) and a few major genes. Screenings to verify broad-spectrum resistance to *Globodera* pathotypes should be performed. *Solanum sisymbriifolium* (like eggplant) is a non host for potato cyst nematode, it promotes development, but it is a non host. G. pallida is an obligate sexual pathogen, so it is quite diverse. *G. rostochiensis* resistance is mainly due to the effect of a major gene, but resistance to *G pallida* is multi-genic. In order to screen a large set of germplasm (gene bank) it would be necessary to do it at a quarantine facility that also has all pathogen types. In the Andes they grow potatoes every seven years to get Globodera under control. There are 10-30 European varieties resistant to *G. pallida*, *rostochiensis* or both. Javier Franco (Cochabamba, ProInpa) could get involved and/or coordinate activities to test for nematode resistance.

8. Agriculture and Agrifood Canada: T. R. Tarn (not present)

9. Genebank staff reports and comments: Bamberg & Martin

During the 2007 NRSP6 TAC meeting several suggestions were proposed. Summary of action items:

- Request more detailed distribution information: Covered

- Charge a fee for the services provided: It does not make sense due to administrative complexities. Fees will not be charged.

- Segregate in house distribution: Done and included in report posted on web site.

- Modification of technical representative reports: Technical details are ok during the meeting, but NRSP6 wants to receive a paragraph representing the whole region.

- Add pictures to the web site: In progress. There is currently a lot of information on the web site (progress reports, brochures, etc.)

- Representation of the potato industry at the NRSP6 TAC meetings: Done. A member of Frito lay was present this year.

- Quantify efforts, included in Annual Report and add impact statements: Done.

- It was suggested to maintain hybrid seed of cultivars instead of maintaining tissue culture material. The logic behind this suggestion was to maintain/preserve genes, not necessary clones. This was not done since there were other priorities (backlog of things that needed to be multiplied in the back core collection, etc.). In addition, several members indicated that maintaining the hybrids in vitro is very important, more important than maintaining only the true potato seed produced by those hybrids, since hybrids represent particular gene combinations that would be difficult to re-create

- Annual Report on web site: Brief summary of main project responsibilities.

- Introduction of new stocks: Collection expedition to Guadalupe National Park, Texas captured novel germplasm for the genebank.

- Preservation: seed multiplication and disease tests. Normal year.

- Research: projects related to sampling for collecting, preservation, evaluation (how to better manage the germplasm and maximize diversity)

- Evaluation. Results from evaluation are not automatically entered back into the NRSP6 records. In the past there was money to contract evaluation.

-Discovery of potential useful new mutants.

-Interest in nutrition-- K, antioxidants, anticancer factors tomatine and PCI.

-Creating widely segregating populations for various traits in a background that tuberizes in long days.

-Next increase cycle: quarantine seed increases.

-Classification (David Spooner will cover this)

-Distribution statistics

-Discussion about expanding the technical committee.

-Discussions about PSTV. 30-50 accessions in NRSP6 are PSTV positive. These lines show as not available on the lists. David Douches tested the crossing block for PSTV using a bulking (composite) strategy. PSTV is transmitted to the seed.

-There is a backlog of seed increase. There is a plan to expand and use better ventilated greenhouses. Two seed increases will be done, one before and one after Christmas.

-There are new rules for keeping track of MTAs on materials distributed. Materials acquired after 1993 require MTAs.

-Lead Admin Advisor C Y Hu encouraged NRSP6 staff to participate in regional meetings (Experimental Station Directors meetings). Experimental Station Directors are not always informed about what we do, and it was considered very effective that Max Martin and John Bamberg gave presentations at the NER, SR, and WR spring meetings this year.

-NRSP6 business is germplasm, but also information distribution, so part of NRSP6 outreach mandate is fulfilled by staff participation in Potato Association of America and American Journal of Potato Research.

11. Budget report and outlook (Bamberg, others)

NRSP6 was about to be phased out, but is now back at a reduced (US$ 150,000) level. The Germplasm Coordinating Committee was created to get several agencies to talk. A miscommunication almost resulted in a loss of $40K in FY08. However, the directors were lobbied to reject the recommended reduced budget and reinstate a budget for the full $150K with 85% of the directors voting in favor. Bamberg was advised that requests for increases probably would not be successful before FY11, the beginning of the new project cycle.

Douches comments:

2008 is the international year of the potatoes. Promotion is encouraged.

Robin Buell is preparing an educational exhibit (5 or 6 panels, 3 months, Sept, Oct, Nov, Dec 2009. Educational component. David Douches is helping. Washington DC, fall 2009, U.S. Botanic Gardens.

During the PAA meeting, a meeting will be organized to bring together geneticists and breeders.

PTW transgenic program. Project with South Africa. Spunta G2. Syngenta owns the *Bt* gene. Syngenta offered to donate the gene to Michigan State University. Michigan could license the *Bt* gene to other institutions.

Stop time: 5:32 p.m. … on 6/10/08 meeting started at 8 a.m.

10. Collecting and taxonomy (Spooner)
Dave distributed books (taxonomy of potatoes, taxonomy of tomatoes) and papers, list of activities, grants, etc.
Dave serves as Senior Editor for Invited Reviews for Am. J. Potato Research
Several papers by Spooner and colleagues were discussed. Extensive work was done about the origin and domestication of potato.
Literature survey about ploidy counts on section Petota. J. Bamberg counted chromosomes. There are databases with individual accession backing up these counts. Studies now support 4 species of cultivated potato. Redefinition of potatoes as having less species (from 220 to ~100)
Paper on *S. berthaultii* and *S. tarijense*. Used germplasm from genebank to re-evaluate some species.

Dave is currently working with people from Argentina to write a taxonomic monograph of the wild potatoes of the Southern cone of South America (Argentina, Brazil, Chile, Paraguay, Uruguay)..
Paper discussion: The Canary Islands were the first place where potatoes were cultivated outside of S. America. Potatoes from the Canary Islands are ½ Andean origin, ½ Chilean origin. The real evidence on the European origin of potatoes came from European herbarium specimens (before 1845, initiation of late blight epidemic). Andean potatoes were the first introductions, but Chilean potatoes came before the late blight epidemics.

- Genomic origins of potato polyploids based on GBSSI gene. Supports the A, B genome hypothesis of the Mexican potatoes. Genomic origins never supported before were supported.
- GISH data supports previous paper.
- Dave visits to CIP every year for 2 months to conduct research and to write papers.
- Dave submitted a proposal seeking funds from CGC to test the capacity of taxonomy to serve breeders. Taxonomist guide by grouping clones together. Is taxonomy predictive?
- Future work: use SSRs to answer important questions. Paper on TAG re-evaluating neotuberosum (attempt to re-create *S. tuberosum* based on adaptation, production of tubers under short days)

12. USDA, ARS NPGS NPL (Bretting-- not present)
13. USDA, ARS potato NPL (Wisler)

Gail Wisler sent report to Chuck. Budget: Farm bill has been passed. USDA/ARS budget will be under continuing resolution and back to 2006 budget level. Waiting for election. Continue planning. Trends and interests, directions? Germplasm collections will always be important. Main global concerns now: citrus greening, biofuels, food supply.
ARS/NPC funds: Scientific panel and NPC group. What are NPC interests? What is the amount of money available? For the next round, a priority list will be prepared and distributed. Add list of funded proposals. Large projects (ARS coordinator).

Bamberg: NPL Bretting noted that declining budgets are expected in the future, yet curators propose increasing activities. Reality is that projects will likely not be able to pay for even the same amount of activities, so some aspects will need to be reduced or eliminated. Need to develop priorities, and/or look for other sources of funding (grants).

14. CSREES (Thro-- not present)
15. APHIS/Quarantine (Abad)

In order to request germplasm, the first thing is to get in touch with donor. The next thing is to get in touch with Jorge Abad and to provide the list of germplasm. After that, Jorge sends a letter (including label and pre-paid FedEx) to the donor to request the material. Potatoes usually come in tissue culture. Once the material arrives, it is kept for inspection and propagated. Plantlets are established in small pots and tested for PSTVd, moved to greenhouses. Several tests are done: ELISA for PVY, PVX, mop top and PVT and/or PCR for several viruses. If positive, the plants go for therapy (chemotherapy and thermotherapy). For *Ralstonia solanacearum* immunosticks are cheaper than ELISA. Now real time PCR is being implemented for PSTVd since it is more sensitive to hybridization.
Biological tests: mechanical inoculations onto a host range and grafting onto indicator plants.
Zebra chip could be due to bacteria (still under study), possibly Liberibacter (similar as what is thought to cause citrus greening) transmitted by psyllids. Psyllids are emerging in several places, also in Florida.
Tomato Spotted wilt virus: tuber will not germinate (called back plague in Argentina)

16. Guest presentation

Ethnobotanical review of Native Alaskan potatoes. A PowerPoint presentation was made by Betsy Kunibe. There are some old potatoes in Alaska: ‘Maria’ potato and ‘kasaan’ (cream skin, yellow flesh, elongated deep eyes, small).
Note: Ozette and To-Le-ak (purple/purple found on the Olympic Peninsula) represent old potato varieties in the Pacific NW.

The NRSP6 meeting ended, and those present conducted business as the Potato Crop Germplasm committee meeting, conducting a preliminary discussion of FY09 germplasm evaluation grant proposals.

Conclusions

18. Review and approve resolutions

Resolution #1.

WHEREAS, the NRSP-6 TAC met at Cascade Locks Best Western, Cascade Locks, OR on June 9-10, 2008; and

WHEREAS, those attending were educated and stimulated by meetings and mealtime discussions; and

WHEREAS, the location for the meeting was outstanding and the accommodations were both compatible and conducive to effective interaction resulting in a successful meeting; therefore, be it

RESOLVED, that the NRSP-6 TAC expresses its appreciation to Drs. Chuck Brown and Isabel Vales for arranging the facilities and coordinating the meeting, and be it further

RESOLVED, that an original of this resolution be provided to Dr. John Bamberg and that a copy be filed as part of the official minutes of this meeting.

19. Elect new officers and tentatively set next meeting venue

Chair: David Douches, Vice-Chair: Isabel Vales, New secretary: Walter DeJong
Location for next year: Sturgeon Bay, WI

ANNUAL REPORT

Calendar Year 2007

1. NRSP-6: UNITED STATES POTATO GENEBANK

Introduction, Classification, Preservation, Evaluation and Distribution of tuber-bearing *Solanum* Species.

2. COOPERATIVE AGENCIES AND PRINCIPAL LEADERS

State Agricultural Experimental Stations		**Representative**
Southern Region		J. C. Miller, Jr.
Western Region	Secretary (2008)	I. Vales
North Central Region	Vice-Chair (2008)	D. S. Douches
Northeastern Region		W. De Jong

United States Department of Agriculture		
Agricultural Research Service		
Technical Representative	Chairman (2008)	C. R. Brown
National Program Staff		P. K. Bretting
Area Director, Midwest Area		S. Shafer
Cooperative States Research Education & Extension Service		A. M. Thro
Animal and Plant Health Inspection Service		M. D. Bandla
NRSP-6 Project Leader		J. B. Bamberg

Agriculture Canada	T. R. Tarn

Administrative Advisors		
Southern Region		R. Guthrie
Western Region	Lead AA	C. Y. Hu
North Central Region		M. Jahn
Northeastern Region		E. Ashworth

3. PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of New Stocks

John Bamberg and Alfonso del Rio (US Potato Genebank) had a successful collecting expedition to the Guadalupe Mountain National Park (GMNP) in west Texas in late September of 2007 (supported with extramural funding from USDA). They collected four new populations. These were the first *S. stoloniferum* germplasm from Culberson County, TX and first potato collections from Eddy County, NM.

A total of 5 accessions were assigned PI numbers in 2007: one primitive cultivar from Peru and 4 accessions collected from the SW United States. These accessions are now available from the NRSP-6 *Solanum* germplasm collection.

The NRSP-6 web page (http://www.ars-grin.gov/nr6) has been updated to include all new stocks and screening information. Clients who have ordered from NRSP-6 in the past four years are contacted three times per year informing them of new materials that are now available either as true seed, tubers, in vitro plantlets, or herbarium samples. A new service we are offering is dried ground leaf samples for DNA testing. For foreign requesters this is useful since there are no quarantine restrictions on dried tissue.

B. Preservation and Increase of Stocks

In 2007, a total of 155 accessions were increased as botanical seed populations.

A total of 672 potato spindle tuber viroid (PSTVd) tests were performed on seed increase parents, seedlots and research materials. Germination tests were performed on 1120 accessions, ploidy determinations were made on 35 accessions, and tetrazolium seed viability tests were done on 55 seedlots.

Progress was made on several international collaborative projects.
We are working with CIP on a project to assess the impact of agrichemicals on pollen and seed viability of wild species (oral presentation at the PAA07). Agrichemicals depress reproduction and diversity of wild potato germplasm, suggesting remote populations should be targeted for future collecting by genebanks.

John Bamberg visited Peru in May 2007 to harvest calcium and frost plots. A low cost source of calcium applied to research plots located in the highlands of Peru resulted in an increase yield of 60% for some clones. Work is now being planned to identify genetics of stocks that respond well to added calcium.

Frost is a major problem for the highland farmers in Peru, with major devastating episodes in the past two years. We supplied selected frost resistant germplasm for testing, and continue to synthesize hybrids of native cultivars with highly frost resistant wild species for tests in Peru.

We initiated quarantine seed increase of seed rescued from the VIR collection to incorporate into the US Potato Genebank. We are also planning an intergenebank cooperative project to evaluate

primitive cultivated species *andigena* for hidden recessive traits and incorporate word holdings data into the global germplasm database (IPD).

Hypertension in humans and black spot bruise in potatoes are both problems for which increased tuber potassium could have a positive influence. Potassium screening of the minicore collection funded by the Crop Germplasm Committee (CGC) grant has shown great species variation which could lead to a selection of high-K varieties that lower blood pressure and reduce black spot bruise.

We continued screening for antioxidants in uncolored wild potato species tubers of *S. okadae* hybrids with USDA cooperator Dr. Navarre. We have extended this work to discovery of high antiox species more crossable to tuberosum, and synthesis of diploid segregating populations.

We discovered a new floral development mutant in *S. microdontum* which we have named *crazy sepal* (cs1) because it grows multiple (indeterminate) sets of sepals instead of anthers and pistils. This is a potential tool for studying floral development and cost of flowering on tuber yield. It would prevent transgene escape from GMO potato. We have made crosses with diploid *tuberosum* to investigate these opportunities and made the mutant available to other workers (Short Communication in AJPR).

Plant parts are known to vary widely for pH, but little is known about the variation, basis, or utility of pH extremes in potato tubers. When pH was measured on species of the mini-core collection, replicates over years and populations gave consistent results, with pH range of (5.0-6.2). Fine screening has now discovered very acidic species more amenable to crossing with *tuberosum*, and we have produced F2 segregating populations. This opens the door to studies linking acidity to a wide range of tuber parameters like processing quality, skin color retention, disease resistance, calcium content, glycemic index and acrylamide formation.

Solanum microdontum is remarkably extreme and variable for several characteristics (acid, potassium, calcium, late blight and antioxidants). We continued to perform replicated characterization of *S. microdontum* for these traits. We also collected DNA to compare variation for useful phenotypic traits to gross genetic variation.

C. Classification

Dr. Spooner et al. have published and are working on five different areas of potato research: 1) molecular markers for genebank studies, 2) cultivated potato origins, 3) relationships in wild tomatoes and potatoes, 4) the predictive power of taxonomy relative to disease resistance data, and 5) a linkage map showing late blight in wild potatoes.

D. Distribution

The volume and types of stocks sent to various consignee categories are summarized in the table below. NRSP-6 distributed to clients in 24 states of the USA and 8 other countries.

	Units of Germplasm Sent[1]								
Category	S	TF	TC	IVS	DNA	PL	HER	Total	PIs
Domestic	3,892	283	624	603	364	0	11	5,777	3,654
Foreign	1,168	0	25	343	0	0	0	1,536	402
Total	5,060	283	649	946	364	0	11	7,313	4,056

	Units of Germplasm used in house[2]								
NRSP-6	7,233	0	74	215	0	0	0	7,522	1,586

[1] Types of stocks sent/(number of seeds, tubers or plantlets per standard shipping unit): S= True Seeds/(50), TF= Tuber Families/(10), TC=Tuber Clones/(3), IVS=In Vitro Stocks/(1), DNA=DNA samples/(1), PL=Plants in plugs/(1), Her= Herbarium/(1).

[2] Includes chromosome counts, germination tests, ID and Taxonomic check plantings, in vitro maintenance, seed increases, PSTV tests, miscellaneous plantings, and NSSL seed backup.

4. IMPACT STATEMENT

Potato is the number one vegetable crop and ranks number four among world food crops. The US Potato Genebank's purpose is to provide a high quality, ready source of seed, technology and information to support potato enhancement, breeding and research in the USA and around the world.

The impact of the genebank has been strong in the past. Staff have been instrumental in developing technologies widely used in potato breeding, like cut-stem pollination, hormone pre-treatment of seeds for better germination, extraction of haploids and use with 2n gametes in breeding. The genebank imported valuable germplasm and generated, formatted and computerized a wide array of trait evaluation data and taxonomic characterization. One way the impact of these contributions can be measured is by the occurrence of NRSP-6 germplasm in the pedigrees of new, improved potato cultivars. About 70% of all potatoes grown in the United States have germplasm in their pedigrees from the genebank. Three cultivar releases were published in the American Journal of Potato Research in 2007: 'Blazer Russet', 'Dakota Crisp' and 'MegaChip'. Each is known to contain wild species.

The impact of genebank contributions is also evident in the numerous publications in 2007 that provide information that ultimately contribute to better exploitation of the germplasm resource. Section 6 lists 89 papers, 53 abstracts, 1 patent, 2 patents pending and 4 theses which report the use of NRSP-6 *Solanum* introductions this year.

The impact of the genebank is expected to increase in the future for several reasons. 1) Mutants discovered and characterized by staff will be increasingly valuable as research models. 2) Intragenic transformation of potato has now been demonstrated and identified as a kind of GMO much more accepted by the consumer, so useful exotic potato genes will be increasingly valuable as the technology to easily insert them into existing cultivars improves. 3) Potato is rapidly expanding in large new growing regions, so the need for genetic resources for breeding in new environments and for new tastes will surge. 4) The collection and organization of data at the genebank for an ever-

increasing array of traits (e.g., nutritional) is expected to become more and more critical for breeding efficiency.

5. WORK PLANNED FOR 2008

Fast and accurate delivery of high quality germplasm and information will continue to be the general objective of NRSP-6. We also aim to raise awareness of the germplasm resource through an advertising/outreach program, and by conducting and publishing research that demonstrates new ways the germplasm can be useful for potato improvement. It will be a goal to perform 100 additional successful seed increases in the upcoming year, for a total of 250.

Evaluation experiments will continue on *Solanum* species for these and other traits: antioxidants, tuber acidity, apomixis, crazy sepal mutant, tuber potassium, frost hardiness, tuber calcium, hormone mutants and anti-cancer compounds.

APIC Intergenebank projects, such as researching the status and dynamics of genetic diversity using DNA markers will continue to strengthen ties with sister genebanks around the world. We intend to pursue extramural funding to continue the APIC project to study effect of agrichemicals on in situ diversity. We also intend to conduct a collecting expedition for native wild potatoes in the Pinaleno mountains of SE Arizona.

6. PUBLICATIONS ISSUED DURING THE YEAR

A. Publications issued by NRSP-6 Personnel

Alvarez, N.M., I.E. Peralta and D. Spooner. 2007. Morphological evaluation of the *Solanum brevicaule* complex: a replicated field trial from Argentina. Am J Potato Res 84:73-74. (Abstract)

Ames, M., A. Salas-Lopez and D. Spooner. 2007. Taxonomic evaluation of putatively related wild potato species of *Solanum* series *Cuneoalata, Ingifolia, Olmosiana, Piurana,* and *Simplicissima*, by morphological data from an Andean field station. Am J Potato Res 84:74. (Abstract)

Bamberg, J.B. 2007. *Crazy Sepal*: A new floral *Sepallata*-like mutant in the wild potato *Solanum microdontum* Bitter. Am J Potato Res 84:76. (Abstract)

Bamberg, J.B., A. del Rio and C. Fernandez. 2007. Sampling remote *in situ* sites of USA wild potato captures more diversity. Am J Potato Res 84:76. (Abstract)

Bamberg, John and Alecia Kiszonas. 2007. Variation for tuber acidity among potato species. Am J Potato Res 84:76-77. (Abstract)

Bamberg, J.B., J.P. Palta and M.W. Martin. 2007. Using a wild species, *Solanum microdontum*, to move high tuber calcium trait to the cultivated potatoes. Am J Potato Res 84:77. (Abstract)

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C. Theses Reporting Research with NRSP-6 Stocks

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Germain, Hugo. 2007. Caractérisation chez *Solanum chacoense* et *Arabidopsis thaliana* d'un homologue du gène *Notchless* de la Drosophile impliqué dans la différentiation et le destin cellulaire. August 2007. PhD Thesis, University of Montreal, Canada.

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7. APPROVED

_____ _____

J. C. Miller, Jr., Chairman, Technical Committee Date

_____ _____

C. Y. Hu , Lead Administrative Advisor Date

DRAFT/SUGGESTED

NRSP-6 Technical Committee Meeting Agenda

*** WORKSHEET ***

Cascade Locks, OR / June 9-10, 2008
Chuck Brown, Chair and Host

Meeting starts June 9th (9:00 AM) and will end 12:00 PM on the 10th (there is the possibility of taking a sternwheeler trip on the Columbia River on the 10th in the PM).

Preliminaries

1. Welcome, introductions, misc. announcements, distribution of documents
2. Approve, add to, schedule and prioritize agenda items
3. Review of 2007 minutes
4. Chair appoints Resolutions Committee

Reports and Comments

5. Lead AA
6. Regional AAs
7. Regional and ARS Tech Reps
8. Guest presentations…
9. Agriculture and Agrifood Canada
10. Genebank staff reports and comments (Bamberg & Martin)
11. Collecting and taxonomy (Spooner)
12. Budget report and outlook (Bamberg, others)
13. USDA, ARS NPGS NPL (Bretting)
14. USDA, ARS potato NPL (Wisler)
15. CSREES (Thro)
16. APHIS/Quarantine (Abad)
17. Comments by Alberto Pantoja about Arctic Germplasm Collection
18. An ethnobotanical review of Native Alaskan potatoes- Betsy Kunibe
19. Discussion of CGC proposal topics

Conclusions

20. Review and approve resolutions
21. Elect new officers and tentatively set next meeting venue

Summary of the Clonal and True Potato Testing

at

The Plant Germplasm Quarantine Program

NRSP-6 Technical Committee Meeting
Best Western Columbia River Inn
Cascade Locks, OR / June 9-8, 2008

Jorge Abad, PhD
Senior Plant Pathologist-Team Leader
Potato and Sweet Potato Quarantine Programs
Plant Safeguarding & Pest Identification (PSPI)
Plant Health Programs (PHP)
Plant Protection and Quarantine (PPQ)
USDA APHIS
Bldg. 580, Powder Mill Road, Beltsville, MD 20705
Phone 301-504-8630
Email jorge.a.abad@aphis.usda.gov

A total of 79 potato clones were in the PGQP in the 2007-2008 season

All were received *in vitro* except for one tuber:

- 3 clones were received in 2003, tested in 2007-2008
  2 from Korea (J. Bamberg), 1 from Korea (D. Douches)

- 6 clones were received in 2005, tested in 2007-2008

  3 from Peru (C. Brown)
  3 from Japan (J. Bamberg)

- 52 clones were received from March 2007 to February 2008 and tested

  8 from Ireland (R. Novy),
  12 from Sweden (L. Privalle),
  1 from Australia (G. Secor),
  5 from Poland (J. Petrick),
  1 (**tuber**) from Belgium (J. Whitworth),
  5 from The Netherlands (R. Novy),
  15 from Peru (D. Douches),
  5 from China (D. Douches)

- 18 clones from Peru (M. Martin) arrived late for this season and will be tested next year.

- 53 clones were released this year.
- 4 clones died before testing was completed.
- 4 clones tested positive and were sent to the PGQP therapy program.

True Potato Seed (TPS) Testing at PGQO in 2008

- 78 TPS lots were grown at the Potato Repository in Sturgeon Bay, WI for J. Bamberg and M. Martin, and were tested at PGQO this year.

# seed lots	origin
6	Argentina
22	Bolivia
2	Canada
3	Germany
2	Japan
7	Mexico
1	Peru
35	Russian Federation

- 77 seed lots were released

.

- 1 seed lot tested positive for an unknown virus; further tests will be conducted in the 2008-2009 season for its ID.

For the 2008-2009 season:

- Clones at our facility: 55
  New potato clones:
  - 18 from Peru (M. Martin)
  - 2 from New Zealand (C. Brown)
  - 4 from Scotland (G. Secor)
  - 27 from Germany (L. Privalle)

  Clones for therapy:
  - 3 from China (D. Douches)
  - 1 from Ireland (R. Novy)

- TPS lots at our facility:
  - 4 from Mexico (J. Bamberg)
  - 1 from Peru (J. Bamberg)
  - 1 unknown (J. Bamberg)

- Outstanding requests:
  - 11 from Korea (J. Bamberg), requested in 2005

Solanum Therapy - Summary 2007

Accession	Origin	Pathogen	Action	Result
44061	Korea	Potyvirus	thermotherapy and chemotherapy finished	released
44062	Korea	PLRV	thermotherapy and chemotherapy finished	released
44076	S. Africa	PVS	thermotherapy and chemotherapy finished	released
44457	Japan	PVS	thermotherapy and chemotherapy finished	released
44458	Japan	LR, PVS	thermotherapy and chemotherapy finished	released
44459	Japan	PVS	thermotherapy and chemotherapy finished	released
44468	Peru	PVS	thermotherapy and chemotherapy finished	released
44481	Peru	Poty, PVT	thermotherapy and chemotherapy finished	released
44483	Peru	PVT	thermotherapy and chemotherapy finished	released
44881	Peru	unknown	thermotherapy and chemotherapy finished	index fall 2008
45206	China	PLRV, PVS	thermotherapy and chemotherapy finished	index fall 2008
45207	China	unknown	thermotherapy and chemotherapy finished	index fall 2008
45205	China	PSTVd, poty	destroyed by autoclave	destroyed

SUMMARY 2008

- Clonal potatoes:
  - 70 new clones
  - 9 from previous years

  Total 79 potato clones at PGQP this year

- Of these 79:
  - 61 were tested
  - 53 were released
  - 4 were positive
  - 4 died during testing
  - 18 arrived late and will be tested next year

- True Potato Seed:
  - 78 new seed lots were tested
    - 77 were released
    - 1 was positive

2008 NRSP-6 Germplasm Utilization Report from the
North Central Region

Compiled and Submitted by
David S. Douches, NC representative

Jim Bradeen, Potato Pathology & Genomics,Department of Plant Pathology
University of Minnesota

2007 Research Projects:

1. Development and application of a Diversity Arrays Technology (DArT) microarray for wild potato species

In collaboration with Diversity Arrays Technology, Pty. Ltd. (Canberra, Australia), we have developed a publicly available DArT array for the study of wild potato. The DArT method provides a cost effective (as low as a few cents per data point) mapping platform comprised of arrayed markers from clone libraries against which experimental germplasm can be surveyed. DArT also provides all services, including data analysis. The current version of the potato DArT array consists of approximately 16,000 markers. Of these, 10,000 have been generated from diploid 20 genotypes of 1EBN potato species. We are utilizing this array for phylogenetic analyses and linkage mapping.

(A) Phylogenetic analyses. Using the DArT array, we are currently exploring phylogenetic relationships amongst potato species comprising the taxon *Stellata.* These include the 1EBN diploid *Solanum* species and a few 2EBN diploids. In total, 186 genotypes will be included in this project. We will explore concordance between our DArT-based phylogenetic analysis and previously published molecular and morphological phylogenies for this group. This serves to test the robustness of the DArT array for wild potato and will allow selection of maximally diverse genotypes for future linkage mapping efforts.

(B) Structural genomics of 1EBN potatoes. Using the DArT array, we are currently generating linkage maps for three series of 1EBN potatoes using F1 populations. To date, DArT data have been generated for *S. bulbocastanum* and *S. commersonii.* DArT data will also be generated for an interspecific cross involving *S. pinnatisectum.* The resulting three linkage maps will be compared with each other and a common, merged map for the 1EBN potatoes generated, if feasible. Based on sequence data from mapped DArT markers, *in silico* comparisons of genome structure of the 1EBN potatoes and cultivated potato and tomato (both targets of whole genome sequencing) will ensue. Understanding the similarities and differences in genome structure between these taxa will facilitate downstream gene mapping, gene cloning, and development of markers for marker aided selection. The resulting maps for the 1EBN potatoes will also serve as scaffolds upon which agriculturally significant genes (e.g. candidate disease resistance genes) will be mapped.

2. Comparative genomics of disease resistance genes in the genus *Solanum.*

In this project, evolutionary divergence and adaptation of disease resistance genes in the genus *Solanum* is being explored. We have isolated more than 120 candidate disease resistance genes from the wild potato *S. bulbocastanum.* This represents the largest collection of candidate disease resistance genes from any *Solanum* species and complements existing collections for tomato and the wild *S. caripense.* Using DNA hybridization techniques, we are now determining whether homologs of our candidate genes exist in a wide array of Solanaceous species. This project includes extensive sampling of wild potato species. Understanding patterns of birth-and-death of disease resistance genes throughout *Solanum* evolution is essential to the long term efficient application of comparative genomics methods to map and clone agriculturally useful genes from wild potato species.

3. Late blight resistance in wild potato.

As part of an ongoing, multi-year project, in 2007 we surveyed the entire USDA Potato Genebank collection of the wild potatoes *S. commersonii* (61 accessions) and *S. chacoense* (133 accessions) for resistance to foliar late blight disease, caused by *Phytophthora infestans* race US8. This effort was conducted in field plots into which the pathogen was intentionally introduced. Environmental conditions were created that are conducive to disease development. As disease resistance is identified through our efforts, controlled crosses are made, allowing downstream analysis of the genetics of disease resistance. Eventually, gene mapping and cloning may ensue.

2007 Publications:

Bradeen, J.M. and D.S. Mollov. 2007. Herbicide tolerance in primitive diploid potato species comprising superseries *Stellata*: towards establishment of seedling cultivation conditions for field evaluations. American Journal of Potato Research. 84: 415-424.

Aversano, R., M.R. Ercolano, L. Frusciante, L. Monti, J.M. Bradeen, G. Cristinzio, A. Zoina, N. Greco, S. Vitale, and D. Carputo. 2007. Resistance traits and AFLP characterization of diploid primitive tuber-bearing potatoes. Genetic Resources and Crop Evolution. 54: 1797-1806.

Millett, B.P., and J.M. Bradeen. 2007. Development of allele-specific PCR and RT–PCR assays for clustered resistance genes using a potato late blight resistance transgene as a model. Theoretical and Applied Genetics 114: 501-513.

2007 Presentations:

1. Iorizzo, M., J.M. Bradeen, L. Frusciante, and D. Carputo. (2007) Development of a DArT Microarray for Comparative Structural Genomics and Mapping of Agriculturally

Significant Genes in Wild Potato Species. ANNUAL CONGRESS "SOCIETA' ITALIANA DI GENETICA AGRARIA XLXI" (Riva del Garda, Italy Sept 2007)

Abstract: Efficient access to genetic variability is important for breeding programs. For potato improvement, the approximately 180 wild species represent a valuable source for agriculturally significant genes, including genes for disease resistance and cold tolerance. We specialize in a group of 20 wild potato species that collectively comprise the tertiary genepool for cultivated potato. These species are sexually incompatible with cultivated potato, but genes from these species can be accessed using bridge crosses, somatic hybridization, and gene cloning and transformation. To improve access to agriculturally significant genes from tertiary genepool species, we have initiated an effort of comparative structural genomics using the Diversity Array Technology (DArT) marker platform. The first phase of this project was development of the DArT microarray. We used five diverse tertiary genepool species for array construction: *Solanum commersonii, S. bulbocastanum, S. polyadenium, S. chacoense,* and *S. pinnatisectum*. Six accessions for each species were included. Now, DArT array validation via phylogenetic comparison is ongoing. In this phase of our study, deduced relationships between the five species used in array construction plus *S. circaeifolium* and *S. cardiophyllum* will be compared with those reported previously based on morphological and molecular markers. Congruence between the DArT phylogeny and previously reported phylogenies (an expected result) will be interpreted as validation of the DArT array. For *S. commersonii, S. bulbocastanum, S. chacoense*, and *S. pinnatisectum*, parental genotypes have been designated based on crossability studies and preliminary phenotypic evaluations conducted by our laboratories. F1 mapping populations have been generated for each species. Linkage maps will be constructed for each species based on a common set of DArT markers, allowing comparison of genome structures. Significantly, the maps generated will allow efficient mapping of genes conditioning agriculturally significant phenotypes. In support of this effort, large-scale phenotypic analyses are ongoing. Currently phenotypic tests include evaluation of all available accessions of *S. commersonnii* (61 accessions) and *S. chacoense* (133 accessions) for foliar resistance to *Phytophthora infestans*.

2. Bradeen, J.M. and D.S. Mollov. (2007) Herbicide Tolerance in Diploid 1EBN and 2EBN Potato Species. Potato Association of America Annual Meeting (Idaho Falls, ID Aug 2007)

Abstract: Wild potato species are rich sources of genes for improvement of cultivated potato. Superseries *Stellata* encompasses diploid 1EBN and 2EBN species grouped into nine series. These species are documented sources of resistance to biotic and abiotic stresses. Identification and characterization of useful genes in these species often requires field evaluations, yet little has been reported on the cultivation of these materials. In this two year study, tolerance of seedlings of ten diploid potato species to two commonly used broadleaf herbicides, linuron and metribuzin, is evaluated. Each species is represented by four populations and a total of five herbicide treatments are employed. Comparison of visual ratings and aboveground biomass fresh weights revealed variable responses to herbicide treatments. On average, metribuzin treatment reduced biomass accumulation and seedling survival more than did linuron treatment.

Only *Solanum pinnatisectum* was tolerant of both linuron and metribuzin. *Solanum cardiophyllum, S. jamesii,* and *S. trifidum* may be segregating for tolerance to linuron. Species grouped into a common series based on morphological and molecular data do not necessarily respond to herbicide treatment in the same manner. The results of this experiment may assist researchers in establishing field cultivation methods for seedlings of wild potato species.

3. Syverson, R., B.P. Millett, and J.M. Bradeen. (2007) Analysis of Haplotype Frequency of the Late Blight Resistance Gene, *RB*, in *Solanum bulbocastanum* using a Novel MAMA PCR-based Approach. Plant & Animal Genome XV (San Diego, CA Jan 2007)

Previously, the broad spectrum late blight resistance gene, *RB*, was cloned from wild potato (*Solanum bulbocastanum*), and we reported a Mismatch amplification mutation assay (MAMA) transgene-specific assays. MAMA PCR encompasses an approach to primer design that yields robust single nucleotide polymorphism (SNP) differentiation. Briefly, a SNP-specific PCR primer is designed incorporating the SNP at the ultimate (3') position and a mismatch at the penultimate position. Despite the mismatch at the penultimate position, the specificity at the 3' most nucleotide site allows the PCR primer to specifically anneal to a desired sequence, enabling amplification. Here, we report adoption of MAMA-PCR for assessment of haplotype frequency of *RB*. A series of 18 MAMA PCR primers, each paired with standard PCR primers, were designed to target SNPs identified within RFLP, CAPS and BAC end markers within *RB* region. Two fully sequenced BAC clones, associated with *RB* and originating from different haplotypes of the diploid *S. bulbocastanum* genotype PT29 were used for primer design. In total, 17 of 18 markers encompass a 287kb region of *S. bulbocastanum* chromosome 8, including the *RB* gene, with one marker falling outside of this range at an undetermined distance. Segregation analysis in an *S. bulbocastanum* F1 population was used to validate haplotype specificity of each marker. MAMA primers were used to characterize haplotypes of 60 *S. bulbocastanum* genotypes including two individuals from each of 30 populations. Conclusions about haplotype frequency will be reported.

David Douches, Department of Crop and Soil Sciences, Michigan State University

To supplement the genetic base of the varietal breeding program, we have a "diploid" (2x = 24 chromosomes) breeding program in an effort to simplify the genetic system in potato (which normally has 4x chromosomes) and exploit more efficient selection of desirable traits. This added approach to breeding represents a large source of valuable germplasm, which can broaden the genetic base of the cultivated potato. The diploid breeding program germplasm base at MSU is a synthesis of seven species: *S. tuberosum* (adaptation, tuber appearance), *S. raphanifolium* (cold chipping), *S. phureja* (cold-chipping, specific gravity, PVY resistance, self-compatability), *S. tarijense* and *S. berthaultii* (tuber appearance, insect resistance, late blight resistance, verticillium wilt resistance), *S. microdontum* (late blight resistance) and *S. chacoense* (specific gravity, low sugars, dormancy and leptine-based insect resistance). In general, diploid breeding utilizes haploids

(half the chromosomes) from potato varieties, and diploid wild and cultivated tuber-bearing relatives of the potato. Even though these potatoes have only half the chromosomes of the varieties in the U.S., we can cross these potatoes to transfer the desirable genes by conventional crossing methods via 2n pollen. We continue to source the genebank for additional germplasm that offers, enhanced nutrition, late blight resistance, Verticillium wilt resistance, potato tuber moth resistance, Colorado potato beetle resistance and virus resistance.

Each year less than 5% of the populations evaluated as single hills are diploid. After the second year of selection, we plan to screen the selections chip-processing from storage. In addition, selections were made from over progeny that was obtained from the USDA/ARS at the University of Wisconsin. These families represent material from South American potato species and other countries around the world that are potential sources of resistance to Colorado potato beetle, late blight, potato early die, and ability to cold-chip process. Through GREEEN funding, we were able to initiate a breeding effort to introgress leptine-based insect resistance. From previous research we determined that the leptine-based resistance is effective against Colorado potato beetle. We have made a new round of crosses in 2008 tobegin a new cycle of selection. We will continue conducting extensive field screening for resistance to Colorado potato beetle at the Montcalm Research Farm and at the Michigan State University Horticulture Farm in 2006. In the past we made crosses with late blight resistant diploid lines derived from *Solanum microdontum* to our tetraploid lines. This *S. microdontum*-based resistance is unique and very effective against the US-8 strains. These progeny are being grown in the greenhouse and now we have used DNA marker analysis to identify which lines have the late blight resistance. We will evaluated these lines are the Muck Farm in 2008.

UW Breeding Program: Germplasm Report for NRSP-6

Jiwan Palta

As in previous years, in our breeding program the ongoing strategies include the use of lines derived from the crosses made with several wild species including *S. andigena, S. brevidens, S. bulbocastanum, S. chacoense, S. curtilobum, S. demissum, S. gourlayi, S. leptophyes, S. phureja, S. raphanifolium, S. stenotomum, S. sucrense and S. tarijense*. The traits that this germplasm contribute to our breeding effort includes fungal, bacterial, virus and nematode resistance as well as chipping and French fry quality. In addition *S. bulbocastanum* and *S. demissum* are currently used as sources of late blight resistance. We have on hand over 250 lines derived from these species that are used in our program. For example the newly released (White Pearl) and advanced chipping breeding lines (W2324-1, W2133-1, W2310-3) in our program were developed by using *S. tarijense* as the maternal grandparent providing chipping ability (*S. chacoense* also contributed on the paternal side of the pedigree).

We are conducting following projects in co-operation with NRSP-6:

The frost resistant breeding clones have been developed in cooperation with NRSP6 staff using S. *tuberosum*, S. *andigena*, S *commersonii*, and S. *acaule.* The elite clonal

selections from this population grown in Hancock, Wisconsin had good tuber type and cold hardiness to –5^{o}C.

Using *S. microdontum* and *S. kurtzianum* species, we are developing segregating progenies for tuber calcium. In cooperation with NRSP-6, we are evaluating these progenies to understand the genetics of tuber calcium uptake. In cooperation with NRSP-6 staff, the entire collection of *S. microdontum* is being evaluated for tuber calcium (and other traits).

We are continuing the cooperation with CIP to conduct calcium application trials in the highlands. We are getting impressive yield improvement with in-seasons calcium apploications. These studies suggest our parallel ongoing program with NRSP-6 staff to enhance calcium uptake efficiency from *S. microdontum* introgression might also have application in some locations in the Andes. Species used = *microdontum, kurtzianum, tuberosum*.

Potato potassium is in a unique position to mitigate hypertension, which has huge health and economic impact. Potassium levels in the tubers are also correlated to the incidence of black spot bruise. We screened the 25 species of the mini-core collection and found significant species differences in K uptake potential.

In cooperation with NRSP-6and CIP, study of the impact of agrichemicals on *in situ* wild potato reproduction continued, and we initiated a related project to assess the impact of mining pollution and acid rain on wild potato reproduction. Species used = the 25 species of the mini-core collection and *ambosinum, cajamarquense, chiquidenum, chomatophilum, dolichocremastrum, hypacrarthrum, limbaniense, medians, tarapatanum, urubambae*.

Tuber acidity is characterized in 25 species that form the mini-core collection at NRSP-6. This parameter is being evaluated in relationship to skin color and calcium uptake efficiency.

Utilization of Germplasm Resources from NRSP-6
Susie Thompson, North Dakota State University

In 2007 the only germplasm requested by the NDSU potato breeding program was Burbank. We were interested in including it in our crossing block and did utilize it in our 2007-2008 crossing conducted December to April. The NRSP-6 program is invaluable to our potato breeding and improvement efforts at NDSU, allowing us to access cultivars and Solanum species from around the globe.

Over the past several years we have accessed several accessions for use in our program, including several selections of *Solanum demissum* and *S. chacoense*. Our intent is to hybridize with *S. tuberosum* in order to enhance disease, pest and stress resistance in our breeding lines and potential releases, and also to improve quality traits, including processing qualities. We continue to maintain these accessions and also have *S. tuberosum* hybrid progeny with several that are at various stages of early generation

selection. Additionally, we have several *S. andigena* genotypes that we have been trying to increase in order to evaluate for sugar end resistance. We have struggled with late maturity and tuberization, thus leading to low or no yield for subsequent testing.

Dr. Jeff Davis, Assistant Professor, Dept. of Entomology
LSU AgCenter, 404 Life Sciences Bldg.
Baton Rouge, LA 70803

The material we requested was originally screened by Dr. Radcliffe for resistance to green peach aphid and potato aphid. We selected 25 PIs which differ in their resistances. These PIs are being used for Electrical Penetration Graph studies to determine the nature of the aphid resistance; antixenosis or antibiosis. Work is on-going.

Dr. Dan Ronis, Frito Lay, Rhinelander, WI

This year we have made multiple requests to the Potato GeneBank for both tuber families and for true seed for several species including bukasovii, chacoense, demissum, gourlayi, microdontum, okadae, oplocense, phureja, raphanifolium, spegazzinii, tarijense, and andigenum. The genebank has been extremely helpful and responsive to requests including growing out tuber families upon request. As we are incorporating new breeding efforts in line with company health and wellness directions, the genetic material and knowledge of the USDA genebank staff has been invaluable.

Dr. Cindy Tong, University of Minnesota

We have collected data showing that different varieties of tissue-cultured *Solanum tuberosum* L., incubated in tuber-inducing media, vary in their responses to blue light. Most varieties tuberize under blue light, but one variety in particular does not. In contrast, its sports produce tubers under blue light. Sangre is a variety that is unaffected by blue light, such that 90% of Sangre plants placed under blue light tuberize. We are now grafting the variety whose tuberization is inhibited under blue light onto 'Sangre' and vice versa to determine the effect of shoot versus root on tuber inhibition under blue light.

Southern Region Report

to NRSP-6 Technical Committee
J. Creighton Miller, Jr.
June 9-10, 2008

Potato Research Programs and Use of NRSP-6 Stocks in the Southern Region

There are three states in the Southern Region with on-going active potato improvement and/or research programs utilizing NRSP-6 stock: North Carolina, Texas, and Virginia. Several other states periodically conduct potato research utilizing NRSP-6 stock.

GENERAL REPORT

Texas – J. Creighton Miller, Jr. The Texas Potato Variety Development Program continues to strive for the development and identification of improved early maturing russet, colored flesh, chip, and red varieties adapted to Texas growing conditions in order to enhance the competitiveness of the Texas potato industry. In 2007, 76,270 first-year seedlings representing 581 families were grown, and 304 original selections were made. We cooperate with the North Dakota, USDA/ARS Aberdeen, ID, USDA/ARS Madison, WI, Oregon, and Colorado breeding programs through exchange of first-year seedling tubers and/or advanced selections. We continue to participate in the Western Regional Trials (russet, red/specialty and chipping) and the Southwestern Regional Trials (russet, red, specialty, and chipping). Work continues on screening for and identifying important antioxidants in potato and its wild relatives. Advanced selections under consideration for release include NDTX4271-5R and ATTX961014-1R/Y. Plant Variety Protection has been granted for TX1523-1Ru/Y (Sierra Gold™) and is pending for Stampede Russet and Rio Rojo (NDTX4304-1R). Virtually all of the russet potatoes grown in Texas in 2007 were to the improved Texas Russet Norkotah strains. We continued the expansion of our capabilities to evaluate processing /chipping selections and our effort to develop improved red and colored flesh varieties. A major new initiative has involved research regarding the Zebra Chip Complex with emphasis in our program on screening for host plant resistance.

When this program was initiated in 1973, the average yield of the summer crop in Texas was about 200 CWT/A. In 2006, Texas recorded the highest summer crop yields in the nation (440 CWT/A) among the 11 states producing a summer crop.

Specialty potatoes are a good source of bioactive phenolics and carotenoids, which have been shown to have anticarcinogenic properties. Four specialty selections (ATTX 98462-3YR/Y, PATX99P32-2RY/YR, CO112F2-2P/P, and ATTX98491-3YR/Y) were evaluated for anti-proliferative and pro-apoptotic activity on both androgen-dependent (LNCaP) and androgen-independent (PC-3) human prostate cancer cell lines. Down regulation of proliferation (reduction in cell number/cell growth) and up regulation of apoptosis (increase in cell death) were observed in treated cells. Increase in cell death by specialty potato extracts is through activation of

caspases (caspase-dependent) and nuclear translocation of endonuclease G (EndoG) and apoptosis inducing factor (AIF; caspase-independent) in LNCap cells. Only caspase-independent cell death was observed in PC-3 cells treated with specialty potato extracts. From these results, two papers were published and one is in review. Current studies are focused on further identification of the compounds responsible for these effects. One such study entitled "Maximizing the Nutritional Value/Health Benefits of Potato by Metabolic Profiling and Identification of Compounds with Anticancer Properties in Wild Potato Species" continues in cooperation with Dr. Roy Navarre, USDA/ARS Prosser, WA.

Past research conducted by our lab demonstrated that potatoes contain significant levels of phytochemicals important to human health. Earlier, we reported our cooperative work with Dr. John Bamberg on interspecific variability for antioxidant activity and phenolic content among a number of *Solanum* species. We found wider variability among the wild species than in the commercial cultivars evaluated. In our previous research we established that certain accessions of tuber-bearing wild potato species, *S. jamesii*, *S. pinnatisectum*, *S. megistacrolobum*, and *S. microdontum*, are higher in antioxidant activity (AOA) and total phenolics (TP) than commercially grown potato cultivars. These species can be used as sources of genes in breeding for high AOA. However, most wild species are reported to contain high levels (>200 mg/kg) of glycoalkaloids which are toxic to humans. Therefore, fine-screening of 186 accessions of *S. jamesii* and *S. microdontum* from the US Potato Genebank for AOA, TP, and total glycoalkaloids (TGA) was conducted. Relationships among these traits were investigated since use of wild species as parental material in breeding for high AOA and TP might result in progenies with unacceptable glycoalkaloid levels if the traits are positively correlated. More than 90% of *S. jamesii* accessions had TGA levels < 200 mg/kg, while only two (P1 500041 and PI 473171) of the 86 *S. microdontum* accessions exhibited TGA content < 200 mg/kg. Also, neither AOA nor TP was significantly correlated with TGA in *S. jamesii* and in *S. microdontum*. Hence, using wild accessions in breeding for high AOA would not necessarily increase glycoalkaloids in newly developed potato cultivars. Currently, some of the *S. jamesii* accessions are being investigated for potential anti-proliferative and cytotoxic effects on human prostate and colon cancer cells *in vitro*.

Publications:

Nzaramba, M.N., J.B. Bamberg, and J.C.Miller, Jr. 2007. Effect of propagule type and growing environment on antioxidant activity and total phenolic content in potato germplasm. Amer. J. Potato Res. 84:321-328.

Reddivari, L., A.L. Hale, and J.C. Miller, Jr. 2007. Determination of phenolic content, composistion and their contribution to antioxidant activity in specialty potato selections. Amer. J. Potato Res. 84:275-282.

Reddivari, L., A.L. Hale, and J.C. Miller, Jr. 2007. Genotype and location influence antioxidant activity, phenolic content, carotneiod content, and phenolic composition in specialty potatoes. J. Agric. Food Chem. 55:8073-8079.

Reddivari, L., J. Vanamala, S.H. Safe, and J.C. Miller, Jr. 2007. Specialty potato (*Solanum tuberosum* L.) induces caspase-independent apoptosis through nuclear uptake of Endo G and AIF in LnCaP and PC-3 cells. Carcinogenesis. 28:2227-2235. (doi 10.1093/carcin/bgm117).

Hale, A.L., L. Reddivari, N.M. Nzaramba, J.B. Bamberg, and J.C. Miller, Jr. 2008. Interspecific variability for antioxidant activity and phenolic content among *Solanum* species. Amer. J. Potato Res. 84:(In Press).

North Carolina - G. Craig Yencho The North Carolina program focuses on two areas: the development of new potato germplasm and varieties through collaborative early-generation breeding and selection projects with the USDA-ARS, Cornell University and the University of Maine; and the evaluation of preliminary and advanced breeding clones for adaptation to NC from a wide range of potato breeding programs in the US and Canada.

The bulk of our breeding work is conducted at the Tidewater Research Station (NCDA&CS)/Vernon G. James Research and Extension Center (NCSU) in Plymouth, NC, or on one of the 4-5 on-farm trials we conduct each year. During 2007, we planted 17,682 single hills (the most seedlings that we have ever planted in NC) and 509 clones were selected for a 2.9% selection rate. Out of the 178 clones in our 6-hill plots, 57 were selected for future evaluation. In the 20-hill plots, 69 clones were planted and 20 were selected for further evaluation. Our sixty-hill plots had 7 clones and 2 were carried through for evaluation next year.

In our yield trials, we evaluated 193 preliminary and advanced clones. The evaluations were conducted either on-farm, and/or at the TRS/VGJREC. We typically evaluate advanced clones at more than one site in NC. The results of the yield trials are summarized and can be viewed and downloaded at our website http://potatoes.ncsu.edu/.

To address the internal heat necrosis (IHN) problems endemic to the mid-Atlantic and southeastern states, we continued a collaborative IHN project with Dr. Kathleen Haynes. These materials for this study were derived from 4x-2x S. tuberosum x (S. phureja X S. stenotomun (phu-stn)) hybrids developed by Dr. Haynes. Mr. Per McCord, will complete his PhD studies focused on identifying molecular markers (AFLP) associated with resistance to IHN during late 2008 or early 2009. He is developing a molecular map of potato and is using this resource to tag quantitative trait loci (QTL) for several traits including IHN and dry matter content.

We are also continuing to evaluate a set of 4x *S. tuberosum (tbr) x Solanum chacoense (chc)* leptine-producing clones for resistance to CPB in the field and greenhouse. Paired plots have been established to simultaneously select for CPB resistance, and tuber yield and quality in the same year. This information will be combined for advancement and to make crossing decisions.

Last, during spring 2008 we received from the NRSP-6 project a set of approximately 60 wild species accessions, which will be evaluated for their potential as an ornamental crop.

Publications:

Yencho, G.C., P.H. McCord, K.G. Haynes, and S.B. Sterrett. 2008. Internal heat necrosis of potato – a review. Am. J. Potato Research. 85(1): 69-76.

Virginia – Richard Veilleux Variety trials were done at Kentland Farm in Blacksburg, encompassing five advanced selections and nine cultivars. Only one selection exceeded Atlantic for tuber yield, but its internal defects were significantly greater than Atlantic. In 2008, the variety trials will be conducted at the Eastern Shore AREC in Painter where Josh Freeman has recently been hired. Crosses were done in Blacksburg between doubled monoploid clones and selections of the diploid enhanced phu-stn breeding population. Kathy Haynes made these selections based on high specific gravity, horizontal late blight resistance or high carotenoid production. Approximately 25-30 different diploid families are available for future studies on the inheritance of these traits against a homozygous maternal contribution to the population. An ongoing study of genes controlling potato glycoalkaloid production is underway using a diploid population of *S. chacoense*.

Publications:

Stupar RM, Bhaskar PB, Yandell BS, Rensink WA, Hart AL, Ouyang S, Veilleux RE, Busse JS, Erhardt RJ, Buell CR, Jiang JM (2007) Phenotypic and transcriptomic changes associated with potato autopolyploidization. Genetics 176: 2055-2067

Levy D, Veilleux RE (2007) Adaptation of potato to high temperatures and salinity -- a review. Amer J Potato Res 84: 437-456

Lightbourn GJ, Jelesko JG, Veilleux RE (2007) Retrotransposon-based markers from potato monoploids used in somatic hybridization. Genome 50: 492-501

Lightbourn GJ, Veilleux RE (2007) Production and evaluation of somatic hybrids derived from monoploid potato. Amer J Potato Res 84: 425-435

Nowak J, Veilleux RE, Turgeon S (2007) Priming for transplant stress resistance in in vitro propagation via plantlet bacterization. Acta Hort 748: 65-75

Veilleux, RE and H De Jong, 2007. Chapter 2: Potato. In: Genetic Resources, Chromosome Engineering, and Crop Improvement: Vegetable Crops. Ram J. Singh (ed.), CRC Press LLC, Boca Raton, pp. 17-58

Report to NRSP-6 Technical Committee, June 2008

Northeast Region Representative: Walter De Jong

Comments received from those who requested germplasm in 2007:

1. Chun Suk Jung. Yongfei Zhang, and Walter De Jong (Cornell University) requested clones of cultivated species with red or purple pigmented flesh, to study the genetics of flesh-. pigmentation, and also requested cultivated clones with long tubers, to study tuber shape.

2. Mark Lichtenwalner of Winrock International (Macungie, Pennsylvania) is continuing research to find parental lines for TPS adapted to long day, hot climates in Central Asia. Two major traits neccesary for this objective are the ability to set seed balls, and heat tolerance. Many of his requests are lines from CIP research and varieties that have been grown in the former Soviet Union. His farm in eastern Pennsylvania does not receive the extreme summer heat that scorches Central Asia, but it is at a similar latitude and often with hotter than ideal summer temperatures for growing potatoes.

Mark appreciated Jesse putting together his last minute request last year. Mark wanted some red lines that might have some heat tolerance, and he wanted to look at the adaptability of the South Korean lines. Most of the material was grown in his screenhouse. He had enough pieces to plant Gui Valley and Unica in the field. Both seemed very adaptable, Gui Valley a big seed ball producer, a desired trait for my TPS work. Last year was my first chance to make crosses with Omega, it looks like a good breeder, will evaluate the crosses this year. Mark didn't request any material in 2008, he hardly has room for any more, but hopes to request more in the future.

3. Laura Miller and Keith Perry (Cornell University) have been requesting material and, on occasion, information from Sturgeon Bay from quite a few years (10 +?). Without exception, they have found the support staff very helpful and service excellent: prompt shipments and very well packed. They received 2 types of materials from Sturgeon Bay over this past year.

Plantlets: these are prepared to order so there is a lag between request and shipment but it is always a very reasonable time frame. They are using these to add varieties to their *in vitro* collection and to fill grower requests. It is time saver not to start from untested tubers and instead begin with tested (presumptively clean) material and simply retest with no virus eradication therapy needed.

Minitubers:
In conjunction with their project to investigate varieties for suitability to small and/ or organic growers in NY State, they have been ordering 50-80 minitubers of potato varieties for evaluation in the field each year. These have been very valuable to this work and are in good condition and well organized and packed.

4. Melanie Sacco (Boyce Thompson Institute) requested material to amplify R-gene analogues. She found the service to be prompt.

NRSP-6 TAC 2008
Best Western Columbia River Inn
Cascade Locks, OR / June 9-10, 2008

Report of 2007 Western Region orders
Prepared by M. Isabel Vales (Western Region Technical Rep.)

The list of 2007 Western Region orders (included at the end of this document) represents requests from individuals, public and private institutions in several Western States (Alaska, Idaho, Oregon, Washington, Montana, California, Colorado, Arizona and Nuevo Mexico); USDA/ARS orders are reported separately. The number of clones ordered was not specified in the list provided by NRSP6 this year.

A total of thirteen people/institutions ordered germplasm from NRSP6 in 2007. Eight out of 13 (61.5%) people answered an email requesting a brief report of activities performed with the materials requested. Everybody was very appreciative of the service provided by NRSP6. One person (Meg Weesner) was surprised to receive my email since they (Saguro National Park) did not order germplasm from NRSP6.

Reports and comments from NRSP6 germplasm users:

M. Isabel Vales, Oregon State University.

My program has not requested material from NRSP6 in 2007, but we have done it many times in the past. Each year we use 80-90 parental lines in our crossing block. These clones include elite lines (varieties and advanced experimental lines) from all market classes with good yield and quality and a diverse set of clones carrying genes for resistance to diseases/pests, environmental stresses and enhanced nutritional/health/taste traits. Many lines used in the crossing block are derived from material provided by NRSP6 directly or indirectly via more advanced versions provided by our collaborators (Chuck Brown, Rich Novy and others). A few examples illustrating the use of NRSP6 germplasm follow.

We are currently using three different sources of resistance to Potato Virus Y (PVY) in our breeding program, one source traces back to *S. tuberosum andigena,* another to *S. stoloniferum* and a third one present in the variety Premier Russet (probably derived from the parental line Summit). We are using molecular markers associated with the first two sources of resistance as indirect selection tools (Marker-Assisted-Selection) and we are studying the genetic base of PVY in Premier Russet.

Potato Tuber Worm (PTW) resistant clones used as parental lines and sources of resistance to PTW trace back to *S. berthaultii.* Advanced lines produced by the Oregon program derived from crosses involving PTW resistant parents have been screened using artificial inoculation at Hermiston, OR (Silvia Rondon and Dan Hane, collaborators) and additional lines will continue to be screened in the next few years.

The quantitative sources of late blight (*Phytophthora infestans*) used in my program could come *from S. acaule, S. demissum, S. phureja, S. bulbocastanum, S. acaule, and S. tuberosum* spp. *andigena.* There is not precise information about the origin or the genetic base, but once the genes are targeted we should be able to better incorporate this quantitative sources or resistance in our breeding programs.

Parental lines carrying resistances to additional diseases/pests and abiotic stresses have landraces and wild relatives of potatoes in its background and were provided directly or indirectly by NRSP6.

A variety recently published and PVPed, Willamette (Amer. J. Potato Res. 85: 85-92) has *S. tuberosum* spp. *andigena* in its background. We are currently working on releasing three specialty potatoes (PORPG01PG16-1, POR01PG22-1 and POR01PG20-12) that have NRSP6 germplasm in its background; the original crosses were made by Chuck Brown and the TPS seedling tubers and subsequent selections were done by my program.

In addition to germplasm used for practical breeding and genetic perspectives, we are also using what we consider important genetic stocks. For example, the parents of the BCT mapping population (provided by NRSP6 in 2006) are used as common controls in our PCR-based SSR assays. The whole BCT population (also provided by NRSP6 in 2006) is used for mapping new markers. Other important stocks include SH and RH (parents of the RHxSH population). These two clones were provided by The Netherlands (via Chuck Brown - I am not sure if NRSP6 has them). There is an ultradense genetic map available for the RHxSH population, which is a great genetic tool. In addition, the parent RH is currently used for sequencing the entire potato genome. So, RH and SH are also used as references in our genetic mapping, fingerprinting and diversity efforts. The SHxRH population is not available yet in the US (NRSP6?), but it would be a good resource to have as well. Tuber, tissue or DNA could be provided to users upon request.

The great diversity of germplasm available at NRSP6 represents a gold mine for breeders and geneticists. The materials provided by NRSP6 have always been in excellent condition. The service and advice provided by NRSP6 professionals is also a great asset.

William Campbell, Alaska Plant Materials Center.

'The State of Alaska potato program has used germplasm obtained from NRSP-6 for over 20 years. The materials provided have been utilized in many ways. Species identified as having hypersensitive reactions are used for disease diagnostics, other material has been used to screen for disease resistance. Some material is used for breeding stock and some for yield and quality trials. The work performed by NRSP-6 has enabled many Alaskan programs.

The materials provided have been used for virus detection, photoperiod studies, and parents for crosses and for yield and quality studies. The named varieties have been propagated and entered into variety trials.

The NRSP-6 repository remains a treasure trove of undiscovered potential'

Tony Chen, Oregon State University.

'I am using two Solanum species for cold hardiness studies. They *are S. commersonii* and *S. cardiophyllum*. I received them as true seeds in high quality'

3) Dave and Fahrettin Goktepe, CSU San Luis Valley Research Center.

'We obtained the seed for some collaborative work with individuals on campus where we are trying to develop an in vitro technique to screen for nematode resistance. Currently we are using in vitro material of some of Chuck Brown's resistant clones but we are also considering the possibilities of screening individual seedlings in vitro. That is why we specifically requested the two PI that we did since they were used in Chuck's original work in generating the nematode resistant clones. We are still working with the clonal material and have not started the seedling

screening. We hope to move to that phase sometime this year'

Sastry Jayanty, Colorado State University.

'We are still working on the project. It is still long way to go. I will let you if we come across any significant findings using that germplasm. I appreciate supplying the material which is very helpful in conducting our study. Thank you'

5) Rick Machado, Machado Farms.

'Yes, I have received much germplasm from the folks at Sturgeon Bay, mostly Max and Jesse. They have been extremely kind and efficient regarding tubers and TPS that I have requested. I have been receiving germplasm for about 8 years.

Being a simple potato farmer before that, you can see I had somewhat of a steep learning curve. It took me a few years to get it somewhat understood. Although I have gone through a lot of material, there are two particular triumphs to note, along with a few more bright spots.

First was a seed from a wild progenitor, *S .chacoense*. It came from TPS, and I noticed it stayed dormant in the cooler months, but germed in the summer, here at our farm in South. Calif. USA. This was very helpful, as we were breeding tubers, as well as other crops strictly for heat and drought tolerance. Our temps range from about 10F to 115F, very desert like conditions, blazing hot or freezing cold. This *S. chaco*, as we call it, handled the summer heat beautifully. We use it in the background for all our summer plantings, and like it a lot. However, the tuber itself is bitter and very small- quite the challenge for us. But still, a summer tuber, very nice, and uses very little water.

The other is a tuber from S. Korea called Bora Valley. A blue/blue. We got it in a lot sent that both Max and Jesse felt showed heat/drought tolerance. The first year we planted it, we got about 15 times our weight back. This is how we judge our yield- less than 10 x back is fair to poor, 10-15 is good, over 15 is great. So we felt good right away. The next year we planted about June 1. Hot, but we like to plant in the summer to test our tubers. We planted a little of all our tubers then. Well, it was a summer to remember. We got only about 1 1/2" of rain from last Oct to June, so everything was dry dry dry. By July 4th, the temp had already hit 115F, for several days running. This was bad news for tubers, no matter how heat tolerant, they were going to cook, along with anything that wasn't corn chiles or watermelons. By the end of August the place was a mess of thorny desert weeds, dry soil, and dead tubers. We irrigate, but drip line, no overhead sprinklers to cool anything off. The temp had hit an all time high of 119 for 3 days in a row in August. I prepared myself for the worst. We lost 90% of all the tubers, the white flesh ones were no where to be seen, not the reds, or any thing else. The *S, chacoense* was going fine (!!!), but with nothing to cross to it didn't help. When we dug up the Bora Valley, we were stunned. There were tubers under every dead plant, just like a regular harvest. They weren't particularly small, just a smaller harvest, but nearly every plant had some. We ended up harvesting about 10x our weight. This was a year so hot, tomatoes and chiles died, and here these tubers pull through. The next year we planted, this time in the spring to increase our viable tubers, just to make up for some losses, and planted about 17#. We harvested almost 300#. over 15x. We again marveled at the strength and tenacity of this variety.

Need less to say, without the Potato Program, I might not be growing potatoes. And I certainly wouldn't be in the breeding business. The NRSP6 has been all the difference in the world to me. They are literally indispensable.

As we speak, we are trying tubers from The South American countries, and they look very good. We have TPS from an S .*chacoense* x Bora cross, and are working on them, the germ is low for now. But things are looking bright'

6) Elaine Nichols,
'I sent this report to Jack Martin, mid May.
The plants were requested by a Montana Seed Potato grower. The lines were increased and given to the grower on June of 2007'

Peter van Hest. Beio Seeds, Inc.

'For the past 5 years or so I have received germplasm from the NRSP-6 on an annual basis, both as clones and as TPS. The materials are planted/seeded, and observed during the season and at harvest, with the aim to look for genetic materials to be used in our breeding efforts for true seed potato varieties.

Each year I have written a small report to acknowledge receipt of germplasm, and to voice my appreciation to have such material available to Bejo Seeds, Inc. In 2007 I received 48 lines, this time only clones, and of these 5 lines were selected to continue work with. Of materials received prior to 2007, currently some 20% of selections carry genes from original NRSP-6 material. This percentage can change dramatically from year to year due to the nature of breeding work and its associated selections.

Unfortunately, as a private company, I am not at liberty to digress on the whats and hows of the breeding program, all our work is research, sales are basically non-existent, but if you have any specific questions I may be able to answer.

Typically the quality of the tubers and true seed is very good. The availability of these genetic materials from such an extended bank is very valuable to us'

TO NRSP6 TAC

June 27, 2007

Colleagues,

Here are follow up notes on action items brought up at our recent TAC meeting.

1. Distribution details: We will add to future Annual Reports. However, check the resources already on website under Admin reports, especially Appendix 6 of the project outline, and the CSREES review document. These give a detailed breakdown of the types, amounts and destinations of germplasm distributions as well as voluminous details on the service, research and data outreach and collaborations that have made the program of value to the industry—all states and regions.

2. Fee for services. Topic was tabled, but note that CSREES review of 2004 made this assessment with regard to potential alternate sources of funding for NRSP6:

> A fee system for NRSP-6 germplasm, or for any germplasm in the NPGS, has consistently been avoided because charging a fee would contradict the U.S. international negotiating position. A fee system would favor the opposed position that germplasm users owe a financial return to the source of the germplasm. This would make it more difficult and costly for the U.S. to acquire germplasm from other countries in the long run. It would ultimately do most harm to developing countries, which have fewer resources than the U.S. to negotiate for germplasm from other countries.

3. In-house "distributions": We will segregate in future tables.

4. Tech rep reports: Have been removed from website. Jesse reminds that we previously determined that these had bragging value and should be posted. May I suggest that staff continue to supply tech reps with these details, but that each rep then prepares an abstract suitable for adding to the official annual meeting minutes (which, of course, will be posted). This would be in line with how sub-reports are often managed in other meetings.

5. Pictures on website: Will do.

6. Keep cooperator connections strong with continued email news distributions: Will do.

7. Frito Lay rep to TAC: Will add to expanded membership list.

8. Specifics of venue for next meeting. Here request host W. DeJong to choose and announce tentative date and place.

9. Quantify genebank workplan. Will do.

10. Solicit evaluation data. Will make it a point to announce this request to NRSP6 email list, regional, & PAA groups.

11. Keeping hybrid seed of cultivars. To be discussed at PAA (CGC or B&G). First step is to review historic philosophy and practice of preservation of tuberosum varieties and breeding stocks/selections. Also, likely scope of project, resources required and potential source of those resources. Will prepare and distribute such talking points for PAA meeting.