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