

ANNUAL REPORT

Calendar Year 2010

with 2011 updates and pictures

1. NRSP-6: UNITED STATES POTATO GENE BANK

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

2. COOPERATIVE AGENCIES AND PRINCIPAL LEADERS

State Agricultural Experimental Stations

Representative

Technical Representatives

| | | |
|----------------------|-------------------|-------------------|
| Southern Region | Vice-Chair (2011) | J. C. Miller, Jr. |
| Western Region | Secretary (2011) | F. Goktepe |
| North Central Region | | D. Douches |
| Northeastern Region | Chairman (2011) | W. De Jong |

Administrative Advisors

| | | |
|----------------------|---------|-------------|
| Southern Region | | C. Nessler |
| Western Region | | L. Curtis |
| North Central Region | Lead AA | R. Lindroth |
| Northeastern Region | | E. Ashworth |

United States Department of Agriculture

Agricultural Research Service

| | |
|--------------------------|------------------------|
| Technical Representative | C. Brown |
| National Program Staff | P. Bretting |
| | G. Wisler |
| Midwest Area | L. Chandler & P. Simon |

National Institute of Food and Agriculture

A. M. Thro

Animal and Plant Health Inspection Service

J. Abad

NRSP-6 Project Leader

J. Bamberg

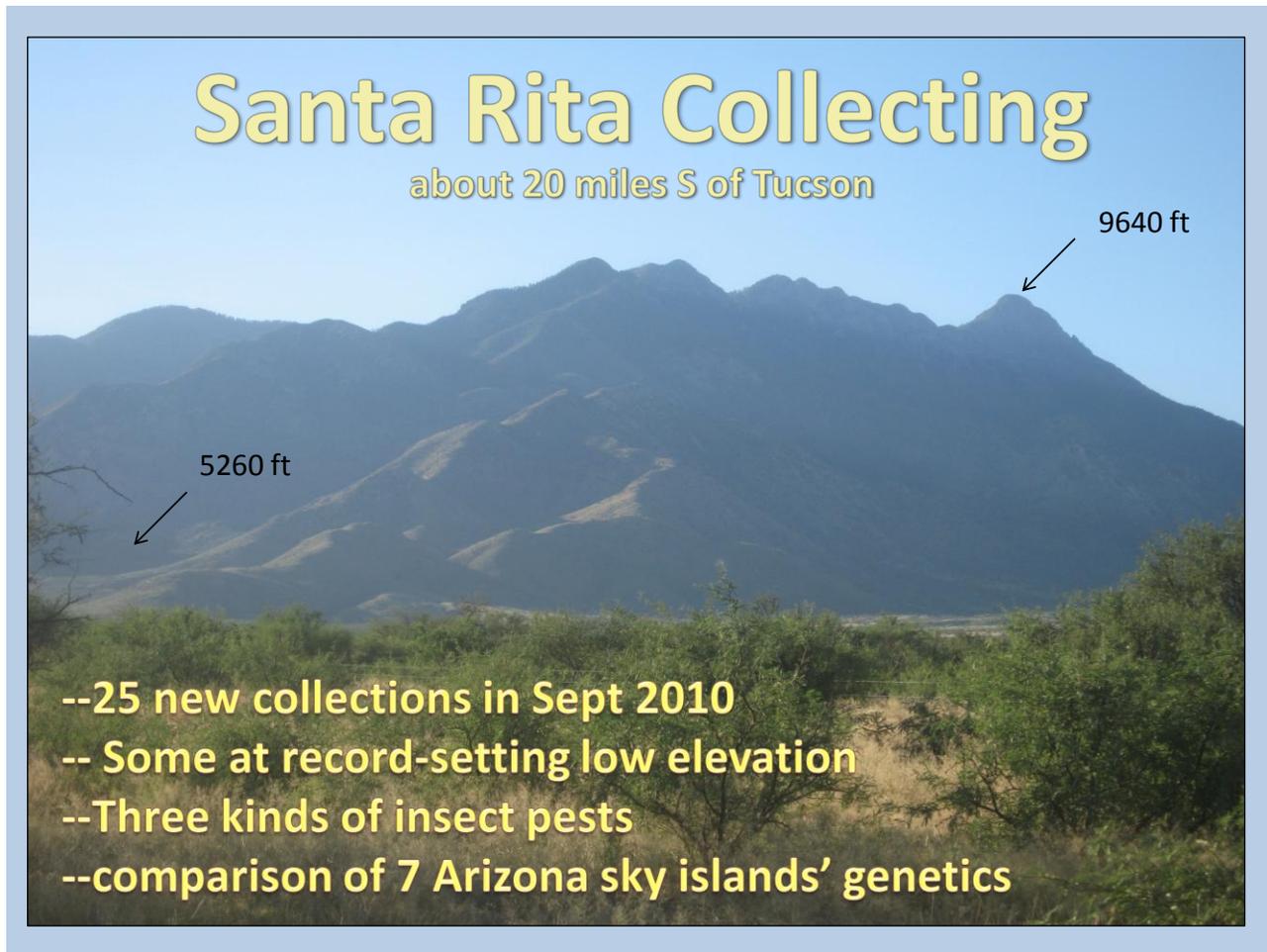
Agriculture Canada

B. Bizimungu

3. PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

A. Acquisitions and associated work

Bamberg and del Rio collected in the Santa Rita Mountains in SE Arizona in late September (supported with extramural funding from USDA), sampling 22 new *S. fendleri* sites (report available on request).



This expedition was prompted by an observation by Correll that the Arizona sky islands have the most diverse potato germplasm. Dr. Bamberg and del Rio also recollected true seed from 3 of the 2009 Santa Catalina sites which had been collected as only 10 plants each.

Four new acquisitions were from Peru having drought tolerance and high phenolics...



Gruincho Negra (high antiox)

..., two clones from Poland with frost tolerance, two of Dr. Helgeson's somatic fusions with late blight resistance, and 25 Arizona collections by Dr. Bamberg and Dr. del Rio.

The NRSP-6 web page (<http://www.ars-grin.gov/nr6>) was updated to include all new stocks and screening information. Clients who have ordered from NRSP-6 within the past four years were contacted three times in 2010 informing them of new stocks of true seed, tubers, in vitro plantlets, or herbarium samples.

NRSP-6 - United States Potato Genebank

The mission of the NRSP-6 Potato Genebank is to facilitate improvements in the potato of the future by promoting the use of valuable exotic genes found in wild potato germplasm. Small tubers are typical of wild potato species (as illustrated in the picture to the left), but they represent a veritable treasure chest of genetic diversity for potentially useful traits that may someday be bred into new varieties. These new varieties must be able to overcome the challenges of pests and stresses with less dependence on chemical fertilizers, insecticides and fungicides. NRSP-6 is doing this through a 5-fold approach: Acquisition, Classification, Preservation, Evaluation and Distribution of potato germplasm.

| | |
|---|---|
| MORE ABOUT NRSP-6 | AD HOC TUBERS |
| NRSP-6 IN PRESS | DRIVING DIRECTIONS |
| GENEBANK HOLDINGS | ORDERING POTATO STOCKS |
| EVALUATION DATA | INTERGENEBANK DATABASE |
| STAFF | ADMINISTRATIVE REPORTS |
| GERMPLASM HANDLING TIPS | OTHER SITES OF INTEREST |

B. Preservation and Evaluation

We increased 235 wild seed populations...



Particularly successful seed increase cycle in 2010-11, even on this very difficult species.

..., performed 600 PSTVd tests, 1450 germination tests, 106 ploidy determinations, and 30 tetrazolium seed viability tests. Cultivated species can be difficult to seed increase under screen or glass, so a backlog had developed. Over nine seasons we have removed most of that backlog by growing over 865 accessions (mostly *andigena*) in the field for OP seeds. This compromises the distinctiveness of the original material, but that seed was already produced mostly on samples of uncertain identity and genetic composition and, unlike wild species, having no natural site of origin.

The *in vitro* collection of cultivars was tested for viruses by A. Charkowski, Madison.

Cooperation with other genebanks

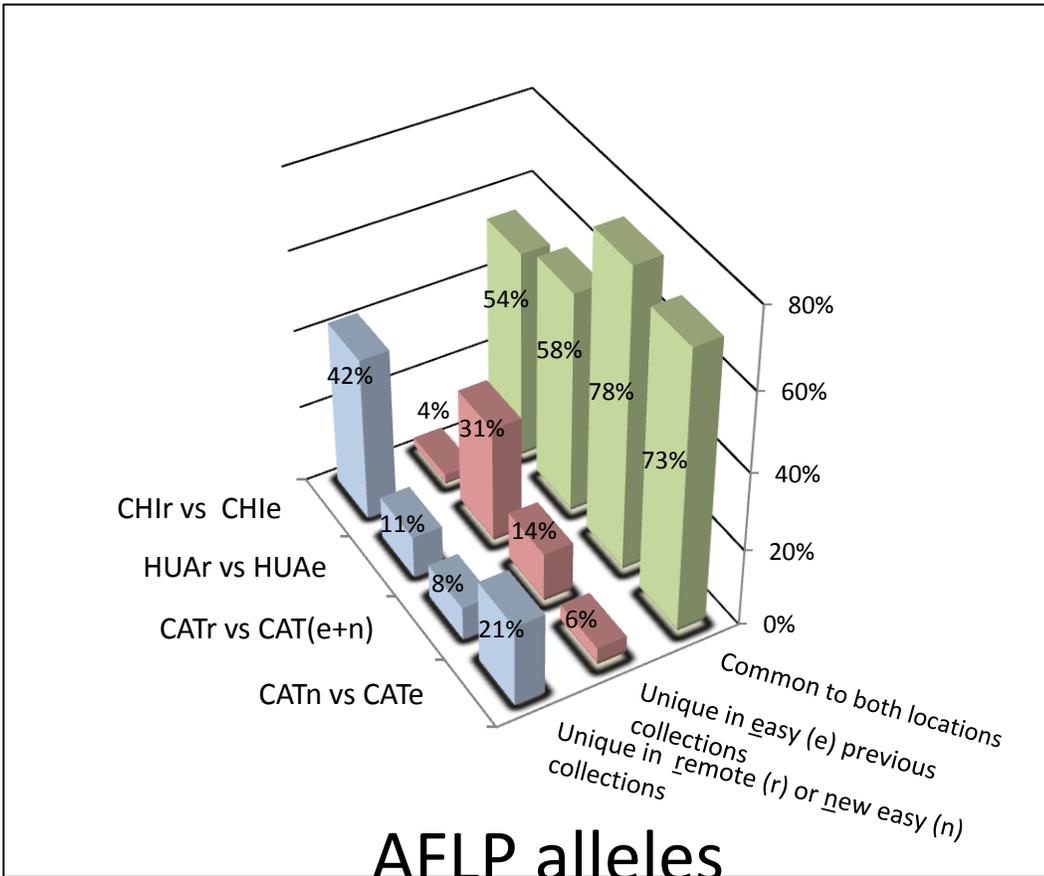
Test cold tolerant hybrids and calcium fertilization response with CIP in Peru. Some selections reported as having very promising frost resistance and yield in Puno and Cuzco. Some germplasm responds to calcium fertilization with 60% yield increase.



Frost testing our hybrids in Puno dept., Peru

You can see they have *S. commersonii* in them

Did follow-up to easy versus remote collection sites study. Produced AFLP data with help of visiting scientist.



Confirms that Santa Catalina Mountains (at the NE edge of Tucson) are a hot spot for unique alleles in SE Arizona

Requested all *microdontum* stocks from other world genebanks.



Imported USPG-missing collections from Russian and EU genebanks of *S. microdontum*, a species with many valuable traits

Recovered *topiary* mutant to the genebank from E. Leue, PanAm Seeds.

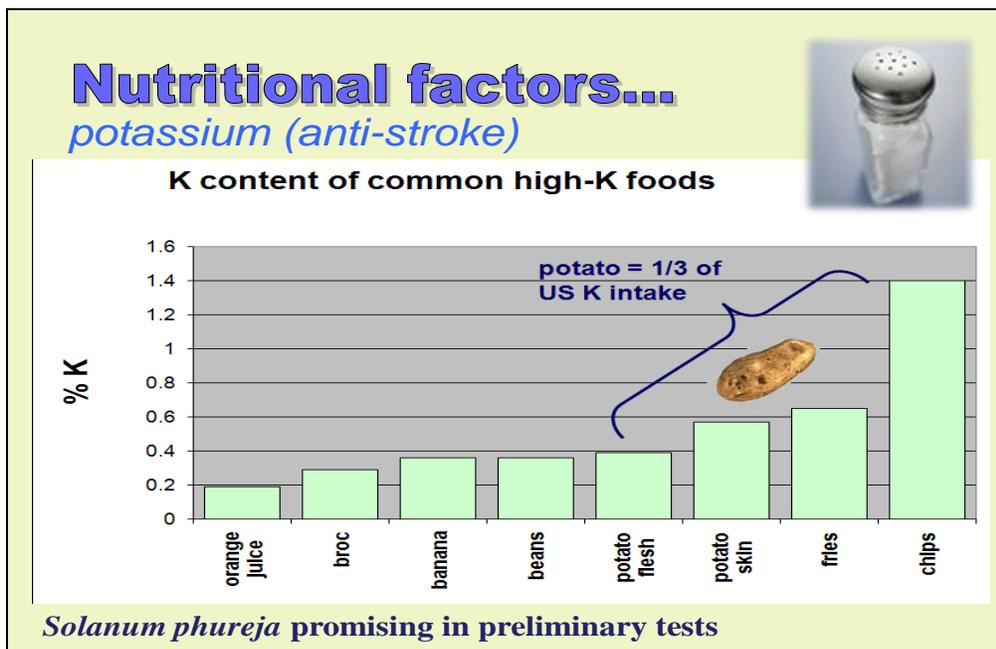
Evaluation for useful traits

General: Continue selecting 2x *tuberosum* family with improved tubers and male fertility. Discovered new highly female-crossable, high-flowering and good field-tuberizing 2x *tuberosum* clone. Made F1 hybrids with all *microdontum*, *boliviense* and representatives of 30 other species.



We need good universal nobilizing *tuberosum* crossing partner for wild species to promote field tuberization – USW4_{self}#3 may be the answer

K: Prepare samples for testing 200 field-grown varieties.



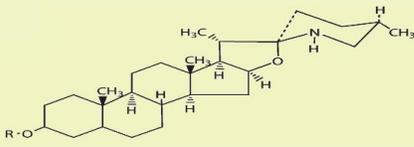
Screening for higher K in exotics to meet current 4700 mg recommendation

Prepared samples of an additional 200 clones from the collection.

Tested 500 individuals of the pop identified as having extremely high proteinase inhibitor, produced field tubers of 70 Colombian *phureja* populations (rich in colors and antiox), and field tested reputed long-day adaptation of 70 phu/stn populations (donated by F. Haynes).

Anti-cancer: Changed course from *microdontum* to instead confirm high tomatine *okadae* with R. Navarre and made hybrids with *tuberosum*.

Nutritional factors...
tomatine (anti-cancer)



Solanum okadae

The image contains a chemical structure of tomatine, a tropane alkaloid, showing its complex ring system and ester group. Below the structure is a photograph of several green tomatoes on the vine. To the right is a photograph of a tall, bushy *Solanum okadae* plant in a pot, with a small white tag attached to its stem.

Anticancer tomatine in *S. okadae*

Ca: Pursue mapping and enhancement with NRI grant collaborators. Found *microdontum* populations with even higher tuber calcium than previous elites.

pH: Select and test hybrids for screening in improved 2x *tuberosum* background.

GA: Genotype 2x and 4x revertants of dwarf-to-normal. Also testcrossed three Texas Norkota sports (coop with C. Miller). Discovered 2x forms of GA dwarfs have surprisingly high levels reversion to normal phenotype. These may have application in transformation.



Gibberellin deficiency mutant (right) and revertant to normal (left)

Production of custom forms, selections and hybrids resulted in: Discovery of a super-high antioxidant clone (with R. Navarre);

Mitigating cognitive impairment caused by lead contamination using antioxidants from potato sources.

Research Plan

- International research partnership between USPG & Univ. Cayetano Heredia in Peru.
- Use of cultivar with extremely high antiox content
- Experiment will retest finding that antioxidants attenuate lead toxicity effects in rats in the context of mental impairment.



Highest antiox potato reported discovered in cooperation with R. Navarre (announced at Potato Assn of America annual meeting, 2010)

high anti-cancer tomatine in breeding-friendly *S. microdontum*, anti-prostate-cancer proliferation factors in *S. jamesii* (C. Miller)...



***S. jamesii*... extreme tuber dormancy and anti-prostate cancer – we have collected most germplasm extant in world genebanks**

...anti-appetite proteinase inhibitor at six times the level of the previous standard extraction stocks; and novel materials resistant to black dot (C. Brown), late blight (H. Lozoya), *chitwoodi* nematode (C. Brown), high thiamine and folate clones (A. Goyer). All genebank *S. microdontum* families were cooperatively screened (B. Narasimhamoorthy) resulting in identification of extremely high protein stocks in this breeding-friendly species. We facilitated selection of clones suitable for organic production (A. Charkowski). We are producing replicate powder samples of over 400 field-grown clones for starch composition screening (S. Jansky). We secured an agreement with two Peruvian Universities to invest in testing our super-high antioxidant clone as means to mitigate cognitive effects of lead poisoning in children in Peruvian mining cities—and produced about 80 pounds of tubers for rat food... (see picture above)

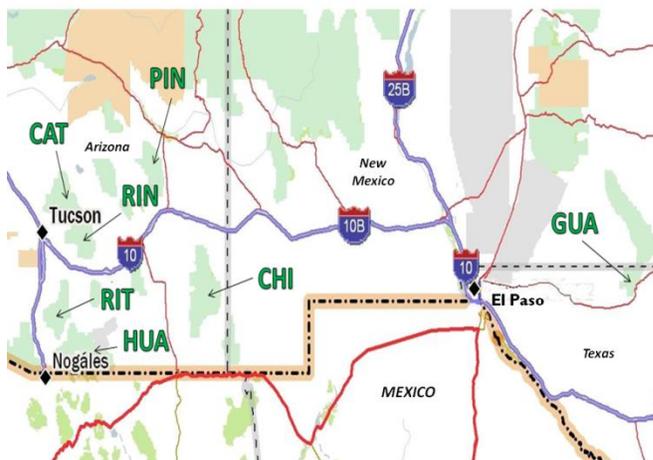
Produced and screened 93 populations of *microdontum* tubers for tuber late blight (D. Douches). Screened all of these and found some with consistent resistance to greening under fluorescent light and replanted for 2nd tuber generation to confirm.



Differences in illuminated greening in *S. microdontum*

Evaluation of genetic diversity within species and populations (continue or start)

Assess drift due to low germination in model population PI 473166. Complete *a priori* visual clustering of LON species accessions. Planned comparison of diversity from collections from Rincon, Chiricahua, Santa Catalina, Santa Rita, Huachuca, Guadalupe and Pinaleno sky islands we have now collected in the southwest USA.



12% of unique bands among 7 mountain ranges come from one spot in the Pinaleno Mts. (PIN)

Planned study of potential of drift due to selection of first-germinating seedlings. Investigated use of cell DNA content screening of seeds to detect apomicts.

C. Classification

This year David Spooner did research on: 1) phylogeny of wild potato ingroups and outgroups, 2) chromosome evolution of potato, 3) evolution of cultivated potato, 4) geographic information system (GIS) analyses of distribution of escaped populations of wild potato and of ploidy of cultivated potato, and 5) characterization of genebank accessions of potato.

D. Distribution

The volume and types of stocks sent to various consignee categories are summarized in the table below. NRSP-6 distributed 201 orders to clients in 31 states of the USA and 20 orders to 12 other countries.

| Category | Units of Germplasm Sent ¹ | | | | | | | Total | PIs |
|----------|--------------------------------------|----|-------|-------|-----|--------|------|-------|-------|
| | Seed | TU | TC | IV | DNA | Plants | Herb | | |
| Domestic | 2,639 | 10 | 1,835 | 2,070 | 117 | 0 | 0 | 6,671 | 4,345 |
| Foreign | 655 | 0 | 0 | 911 | 3 | 0 | 0 | 1,569 | 740 |
| Total | 3,294 | 10 | 1,835 | 2,981 | 120 | 0 | 0 | 8,240 | 5,085 |

¹ Types of stocks sent/(number of seeds, tubers or plantlets per standard shipping unit): Seed= True Seeds/(50), TU = Tuber families/(12), TC = Tuber Clones/(3), IV = *in vitro* stocks/(3), DNA = dried leaf samples/(1), Plants = rooted cuttings /(1), Herb= Herbarium specimens/(1).

E. Outreach and recognition

Bamberg and del Rio presented papers at the 2010 Potato Assn of America meeting. Bamberg got invitation (paid) to be keynote speaker at Latin American Potato Assn (ALAP) meeting at Cuzco, Peru.



Latin American Potato Association (ALAP) meeting, spring 2010, Cuzco, Peru

Invitation to present southwest USA germplasm collecting and research program at ASHS. Invitation (paid) to present general genebank talk at US Botanic Gardens Potato Expo on the capitol mall in DC.

Nutritional factors...

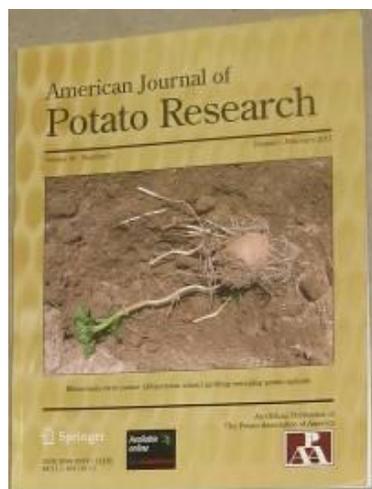
--- Why important? ---

| | | |
|--|--|--|
|  < 1 lb./ yr | Annual US healthcare costs . . . |  126 lb. / yr |
| | obesity = \$147B cancer = \$90B stroke = \$43B | |
| = 100 times the total annual US potato crop value | | |
| <i>...and we eat a lot of potatoes!</i> | | |

Explained the current and potential impact of exotic potato to audience at US Botanic Gardens Potato Expo, Washington, DC

Invited to present genebank's service to potato industry at NPC planning session in Orlando. An agenda brief on NRSP-6 progress was sent to all regional association spring meetings.

Bamberg continued as Editor in Chief for the American Journal of Potato Research, and Chair of the USDA Potato Crop Germplasm Committee.



Providing potato research information exchange through leadership of AJPR

CETS, a cooperating company in central Wisconsin, gave technician Adele Douglass an award, “*gratefully acknowledging genebank technical work of outstanding value to the potato industry*”



Adele Douglass, CETS “Genebank Special Recognition Award” winner, 2010 with some of the fruits of her labor

At the 2008 TAC meeting, it was resolved to name the main USPG building for the founding Project Leader, Dr. Robert Hougas.



Plaque designating “R. W. Hougas Memorial Office Building” at USPG

4. SPECIFIC IMPACT STATEMENT for 2010 -- Health

Annual healthcare cost of obesity is about \$147B. In 2009 we started working with Kemin Company to improve the yield of PI2, a safe and effective appetite suppressant from potato. To date, we have identified exotics with roughly 6-fold concentration as the standard cultivar previously used! We are also working with S. Jansky to screen for lower-glycemic starch composition. This could help prevent and manage diabetes, which incurs extra annual healthcare costs of about \$10-12K per person per year in the US. Cancer costs the nation about \$90B. With cooperators R. Navarre and C. Miller we made progress in identifying anti-cancer potato germplasm (*jamesii* antiproliferation and high tomatine *okadae*) for use in breeding, and have hybridized the latter with our new “universal crosser”. Stroke is the 3rd leading cause of death in the USA, the leading cause of disability, and costs \$43B. Hypertension promoted by sodium is a prominent risk factor. Estimates indicate that a high potassium diet would reduce hypertension and avert 100,000 deaths each year. In 2009-2010 we prepared test samples and are arranging tests for potassium. With R. Navarre, we also identified a *phureja* clone with extremely high antioxidants, well-known for their health-promoting effects. Lead poisoning is a worldwide threat, with mental development of children being particularly at risk. The high antiox clone has been exported to Peru and testing is being arranged to test the ability of high antiox potato to attenuate lead toxicity effects on cognitive skill in young rats. The total cost of these diseases each year is more than 100 times that of the total annual farmgate value of the potato crop, so we conclude that the prospect of making a significant impact through nutrition must have much greater potential than using germplasm to increase yield or reduce production costs. Of course, improving nutritional reputation of potato will also increase crop demand in an increasingly health-conscious society.

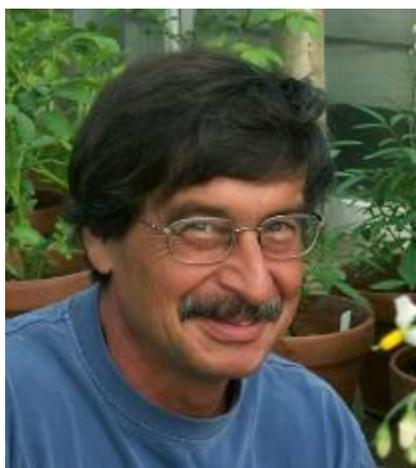
5. WORK PLANS / STAFF & FUNDING / ADMINISTRATION

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.

Tim Kazmierzak was hired as a new USDA/ARS “Gardener” to replace retiring Charles “Chico” Fernandez.



Tim Kazmierzak



Charles “Chico” Fernandez

Restrictions on acquisitions and limited funds for preservation mean we need optimal efficiency in keeping the diversity we already have. Thus, finding the best techniques for assaying the status and dynamics of genetic diversity in the genebank (using DNA markers) remains a high priority. We try to make use of all

USA collection expedition stocks as subjects for genetic diversity research that will help the genebank know how to maximize preservation of diversity.

6. PUBLICATIONS ISSUED DURING THE YEAR 2010

A. Publications issued by NRSP-6 Personnel

Ames, M. and D.M. Spooner. 2010. Phylogeny of *Solanum* series *Piurana* and related species in *Solanum* section *Petota* based on five conserved ortholog sequences. *Taxon* 59:1091-1104 + 4-pg foldout Fig.1 (tree.).

Bamberg, John B. 2010. Tuber dormancy lasting eight years in the wild potato *Solanum jamesii*. *Am J Pot Res* 87:226-228.

Bamberg, J.B. and A. del Rio. 2010. Selfing potato species produce robust spontaneous seed increase under floating mesh. *Am J Pot Res* 87:113. (Abstract)

Bamberg, J.B. and A. del Rio. 2010. Diversity relationships in tetraploid wild potato native to the USA. *Am J Pot Res* 88:29-30. (Abstract)

Bamberg, John B. and Alecia M. Kiszonas. 2010. Survey of tuber pH variation in potato (*Solanum*) species. *Am J Pot Res* 87:167-176.

Bamberg, John, A. del Rio, C. Fernandez, A. Salas, S. Vega, C. Zorrilla, W. Roca, and D. Tay. 2010. Comparison of “Remote” versus “Easy” *In Situ* collection locations for USA wild *Solanum* (potato) germplasm. *Am J Pot Res* 87:277-284.

Cai, X, D. Spooner, D. Halterman, A. Charkowski, R. Groves, and S. Jansky. 2010. A test of taxonomic and biogeographic predictivity: resistance to potato virus Y in wild relatives of the cultivated potato. *Am J Pot Res* 88:32. (Abstract)

Chung, Y.S., K. Holmquist, D.M. Spooner, and S.H. Jansky. 2010. A test of taxonomic and biogeographic predictivity: Resistance to soft rot in wild relatives of cultivated potato. *Phyto* 101(2):205-212.

Del Rio, A. and J.B. Bamberg. 2010. Impact of seedling transplant selection on the genetic diversity of genebank populations of outcrossing potato species. *Am J Pot Res* 87:118. (Abstract)

Del Rio, A., J. Bamberg, R. Centeno-Diaz, J. Soto, A. Salas, W. Roca, and D. Tay. 2010. Microsatellite (SSR) marker analysis to examine the effects of pesticide contamination on the genetic diversity of potato species. *Am J Pot Res* 88:35-36. (Abstract)

- Gavrilenko, T., O. Antonova, A. Ovchinnikova, L. Novikova, E. Krilova, N. Mironenko, G. Pendinen, A. Islamshina, N. Shvachko, S. Kiru, L. Kostina, O. Afanasenko, and D.M. Spooner. 2010. A microsatellite and morphological assessment of the Russian National cultivated potato collection. *Genet Res Crop Evol* 57:1151-1164.
- Kumar, Syam, Roy Navarre and John Bamberg. 2010. Phytonutrient analysis of *S. Phureja*, *S. stenotomum* and *S. andigena* genotypes. *Am J Pot Res* 88:50-51. (Abstract)
- Lou, Q.F., M. Iovene, D.M. Spooner, C.R. Buell, and J.M. Jiang. 2010. Evolution of chromosome 6 of *Solanum* species revealed by comparative fluorescence in situ hybridization mapping. *Chromosoma* 119:435-442.
- Lozoya-Saldana, Hector, Aida Juarez Cruz, M. Teresa Colinas Leon, and John Bamberg. 2010. Enzymatic activation against (*Phytophthora infestans* Mont., de Bary) in *Solanum* species. *Am J Pot Res* 88:53. (Abstract)
- Mione, T. and D.M. Spooner. 2010. *Jaltomata bohiana*, A new species and key to the *Jaltomata* (Solanaceae) of Mexico. *Novon* 20:186-189.
- Nitzan, Nadav, R.A. Quick, W.D. Hutson, J.B. Bamberg, and C.R. Brown. 2010. Partial resistance to potato black dot, caused by *Colletotrichum coccodes* in *Solanum tuberosum* group *andigena*. *Am J Pot Res* 87:502-508.
- Rodriguez, F., M. Ghislain, A.M. Clausen, S.H. Jansky, and D.M. Spooner. 2010. Hybrid origins of cultivated potatoes. *Theor Appl Genet* 121:1187-1198.
- Simon, R., C. Xie, A. Clausen, S. Jansky, D. Halterman, T. Conner, S. Knapp, J. Brundage, D. Symon, and D.M. Spooner. 2010. Wild and cultivated potato (*Solanum* sect. *Petota*) escaped and persistent outside of its natural range. *Invasive Pl Sci Mgmt* 3:286-293.
- Spooner, D.M. 2010. Botany of the potato, 2. Morphology and anatomy, 3. Plant introduction and maintenance. pp. 4-7 In: W.H. Bohl and S.B. Johnson (eds.). *Commercial potato production in North America*, ed. 2. The Potato Association of America Handbook, Supplement Vol. 57 of USDA Handbook 267. The Potato Association of America, Orono, ME.
http://potatoassociation.org/documents/A_ProductionHandbook_Final.pdf
- Spooner, D.M. 2010. COSII-based mapping and diversity in potato, tomato, sweet potato, and carrot. 2010 Plant and Animal Genome Meeting. (Abstract)
- Spooner, D.M. 2010. Development of asymmetric single-strand sequence polymorphism (SSCP) to separate COSII alleles in potato, tomato, sweet potato, and carrot. 2010 Plant and Animal Genome Meeting. (Abstract)
- Spooner, D.M. 2010. Unraveling the evolutionary history of wild potatoes and tomatoes. Botany 2010 Annual Meeting Abstracts. (Abstract)

- Spooner, D.M. 2010. Complex multiple reticulate origins of potato polyploids. Botany 2010 Annual Meeting Abstracts. (Abstract)
- Spooner, D.M. 2010. Taxonomy of cultivated potatoes (*Solanum* section *Petota*: *Solanaceae*). Botany 2010 Annual Meeting Abstracts. (Abstract)
- Spooner, D.M. 2010. Multiple nuclear ortholog (COSII) phylogeny of wild Potatoes and tomatoes. Crop Science Society of America Annual meeting Abstracts. (Abstract)
- Spooner, D.M., T. Gavrilenko, S.H. Jansky, A. Ovchinnikova, E. Krylova, S. Knapp, and R. Simon. 2010. Ecogeography of ploidy variation in cultivated potato (*Solanum* sect. *Petota*). *Am J Bot* 97:2049-2060.

B. Journal Articles and Abstracts Reporting Research with NRSP-6 Stocks

- Agrawal, Lalit and Roy Navarre. 2010. Exploring opportunities to increase potatoes protein content and disease resistance using molecular methods or germplasm mining. *Am J Pot Res* 88:29. (Abstract)
- Alyokhin, Andrei and Raymond Choban. 2010. Maturity-dependent mortality of Colorado potato beetle eggs treated with novaluron. *Am J Pot Res* 87:557-560.
- Bhaskar, P.B., L. Wu, J.S. Busse, B.R. Whitty, A.J. Hamernik, S.H. Jansky, C.R. Buell, P.C. Bethke, and J. Jiang. 2010. Suppression of the vacuolar invertase gene prevents cold-induced sweetening in potato. *Plant Physio* 154:939-948.
- Bizimungu, B., T. Archbold, G. Kereliuk, A. Sullivan, A. Murphy, and M.Z. Fan. 2010. Variation of fibre components in potato breeding germplasm and association with quality parameters. In: Potato Association of America Abstracts, August 15-19, 2010. Corvallis, OR, USA. (Abstract)
- Boluarte-Medina, T., N. Manrique-Carpintero, S.M. Piovano, A. Pereira, and R.E. Veilleux. 2010. Activation tagging in potato: developing a population of mutants to facilitate genetic studies. *Am J Pot Res* 88:31. (Abstract)
- Brown, C.R., J.M. Crosslin, R. Quick, and L. Hamlin. 2010. Characterization of resistance to PVY derived from *Solanum tuberosum* Group *Phureja*. *Am J Pot Res* 88:32. (Abstract)
- Brown, C.R., H. Mojtahedi, L.-H. Zhang, and E. Riga. 2009. Independent resistant reactions expressed in root and tuber of potato breeding lines with introgressed resistance to *Meloidogyne chitwoodi*. *Phyto* 99(9):1085-1089.
- Cho, J., Y. Park, J. Kim, H. Cho, K. Cho, and D. Chang. 2010. Selection of new potato germplasm with common scab resistance from wild species of potato in Korea. *Am J Pot Res* 88:33. (Abstract)
- Clough, M., G. Yench, W. Christ, W. De Jong, D. Halseth, K. Haynes, M. Henninger, C. Hutchinson, M. Kleinhenz, G. Porter, and R. Veilleux. 2010. An interactive online database for potato varieties evaluated. *HortTech* 20:245-249.

- DeKoeper, D., K. Douglass, A. Murphy, S. Whitney, L. Nolan, Y. Song, W. De Jong. 2010. Application of high-resolution DNA melting of genotyping and variant scanning of diploid and autotetraploid potato. *Mol Breed* 25:67-90.
- Douches, David S., J. Coombs, K. Felcher, W.W. Kirk, C. Long, and G. Bird. 2010. Missaukee: A round white potato variety combining chip-processing with resistance to late blight, *Verticillium* wilt and golden cyst nematode. *Am J Pot Res* 87:10-18.
- Douches, D.S., F.M. Navarro, C.A. Thill, and A.L. Thompson. 2010. North Central Regional potato cultivar development. *Am J Pot Res* 88:36. (Abstract)
- Farnsworth, B.L., N.C. Gudmestad, J.A. Pasche, G.A. Secor, N. David, R. Nilles, H. Hatterman-Valenti, M. Glynn, J.R. Sowokinos, C. Rosen, D. Preston, and A.L. Thompson. 2010. *Am J Pot Res* 88:37-38. (Abstract)
- Goyer, A. 2010. Why and how to increase the contents of vitamins in potato? Proceedings of 1st Annual Washington Oregon Potato Conference, Kennewick, WA, January 26-28, 2010. Pp 14-20.
- Goyer, A. 2010. Thiamine and folate in potato: Targets for increased nutritional value and enhanced disease resistance. *Am J Pot Res* 88:40-41. (Abstract)
- Halterman, Dennis, Shelley Jansky and Austin Meier. 2010. *Verticillium* wilt in potato: Host-pathogen interactions and breeding for resistance. *Am J Pot Res* 88:42-43. (Abstract)
- Haynes, K.G., L. Wanner, C.A. Thill, J.M. Bradeen, J. Miller, R.G. Novy, J.L. Whitworth, D.L. Corsini, and B.T. Vinyard. 2010. Common scab trials of potato varieties and advanced selections at three U.S. locations. *Am J Pot Res* 87:261-276.
- Houser, Andrew J. and Robert D. Davidson. 2010. Development of a greenhouse assay to evaluate potato germplasm for susceptibility to powdery scab. *Am J Pot Res* 87:285-298.
- Jansky, Shelley H. 2010. Potato Flavor. *Am J Pot Res* 87:209-217.
- Jansky, Shelley, Andy J. Hamernik and Paul C. Bethke. 2010. Germplasm release of tetraploid clones with resistance to cold-induced sweetening. *Am J Pot Res* 88:45-46. (Abstract)
- Kirk, W.W., A. Rojas, P.G. Tumbalam, E. Gachango, P.S. Wharton, F.A. El-Samen, D. Douches, J. Coombs, C. Thill, and A. Thompson. 2010. Effect of different genotypes of *Phytophthora infestans* (Mont. De Bary) and temperature on tuber disease development. *Am J Pot Res* 87:509-520.
- Kozlov, V.A. 2010. Using of species *S. andigenum* for creating basis material of potato // Potato growing: collected of scientific publication *RUE «Research and practical center of National Academy of Sciences of Belarus for potato, fruit and vegetable growing»*. -Minsk. V.17. P.127-137.
- Kozlov, V.A., A.V. Chashinsky and N.V. Rusetsky. 2010. Involvement rarely using wild potato species into selection. / Introduction of non-traditional and rare plants / Materials of theoretical and practical conference. -Mychurinsk. V.1. P.201-202.
- Kozlov, V.A., N.V. Rusetsky, A.V. Chashinsky, and I.A. Shutinskaya. 2010. Creating of new basic material of potato on the basis of wild and cultural species // Adaptive intensification of agriculture and crop

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