

ANNUAL REPORT

Calendar Year 2003

1. NRSP-6: INTER-REGIONAL POTATO INTRODUCTION PROJECT

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

2. COOPERATIVE AGENCIES AND PRINCIPAL LEADERS

State Agricultural Experimental Stations

		<u>Representative</u>
Southern Region		J. C. Miller, Jr.
Western Region		A. R. Mosley
North Central Region	Vice Chair (2004)	D. S. Douches
Northeastern Region	Secretary (2004)	W. De Jong

United States Department of Agriculture

Agricultural Research Service		
Technical Representative	Chairman (2004)	C. R. Brown
National Program Staff		P. K. Bretting
Area Director, Midwest Area		A. D. Hewings
Cooperative States Research Education & Extension Service		A. M. Thro
Animal and Plant Health Inspection Service		L. E. Levy
Inter-Regional Potato Introduction Project	Project Leader	J. B. Bamberg

Agriculture Canada

T. R. Tarn

Administrative Advisors

Southern Region		R. L. Westerman
Western Region		C. Y. Hu
North Central Region	Lead	S. A. Slack
Northeastern Region		S. D. Reiling

3. PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of New Stocks

Dr. Bamberg and Charles Fernandez (US Potato Genebank) had a successful expedition to the southwest United States and obtained four new accessions of *Solanum jamesii*. They explored the Northwest corner of Arizona and found the first potato germplasm from Mojave County, two new collections at previous herbarium record sites near Flagstaff, and a new site on the south rim of the Grand Canyon.

A total of 13 accessions were assigned PI numbers in 2003: two from Sweden, one from Poland, one from Mexico, five from the United Kingdom, and four from the SW United States. These accessions are now available from the NRSP-6 *Solanum* germplasm collection.

Several steps were taken in the past year to promote and educate researchers of NRSP-6's services and stocks. The NRSP-6 web page (<http://www.ars-grin.gov/nr6>) has been updated and made more user friendly. Clientele that have ordered from NRSP-6 in the past four years are contacted biannually informing them of new materials that are now available either as true seed, tubers, in vitro plantlets, or herbarium samples. An NRSP-6 informational poster was presented at the PAA and CSSA meetings. A new trifold pamphlet was printed for distribution to school and tour groups and is available on the web page.

B. Preservation and Increase of Stocks

In 2003, a total of 124 accessions were increased as botanical seed populations.

A total of 900 potato spindle tuber viroid (PSTV) tests were performed on seed increase parents, seedlots and research materials. Germination tests were performed on 1,437 accessions, ploidy determinations were made on 51 accessions, and tetrazolium seed viability tests were done on 101 seedlots.

Tetrazolium testing is a new tool to help increase understanding of poor germination on some seedlots. Investigations continue on low germ seedlots, trying different heat treatments and longer GA presoak. A project with NSSL on long-term potato seed viability in different storage systems and methods of prestorage handling was started.

The Association of Potato Intergenebank Collaborators (APIC) (visit the APIC database at www.potgenebank.org/ipd/) have several cooperative research projects planned: a graduate student working on an in-situ pollen study at CIP (The International Potato Center), a recessive allele mining study for nematode resistance in *S. andigena* with Russian (VIR) colleagues, and a completed publication of the screening *S. andigena* for new sources of nematode resistance in collaboration with

Dr. S. Kiru (VIR). Dr. A. Del Rio attended the APIC meeting in Valdivia, Chile in March 2004.

Publications of collections and documentation of stocks play an important role in information dissemination. 2003 had two publications of significant importance to the Genebank: Wild Potatoes (*Solanum* section *Petota*) of North and Central America, Spooner et al. and A decade of collecting and research on wild potatoes of the Southwest USA, Bamberg et al.

Work continued with Dr. C. Miller's lab screening for antioxidants in uncolored wild potato species tubers. Previous screening among species identified ones with promising levels of tuber antioxidant capacity. Some diploid "Mexican" species seem to have high antioxidants in common: *S. cardiophyllum*, *S. jamesii*, and *S. pinnatisectum*. Continued fine screening is discovering high levels of antioxidants in species that are crossable to *tuberosum* and known to have acceptable levels of glycoalkaloids.

Screening the minicore collection for the ability to stop or reduce the growth of tumors of *Agrobacterium tumefaciens*. From a literature search on anti-cancer foods there is evidence that some potato varieties have high levels of proteinase inhibitors known to help in the fight against some forms of cancer.

Cold resistant breeding work continues with recurrent selection of *S. tuberosum*, *S. acaule* and *S. commersonii* hybrids. *S. commersonii* cytoplasm was eliminated as a source of frost resistance in cytoplasmic substitution backcross families. Materials are now maturing earlier with the introgression of very early varieties and which survive in vitro leaf freezing to -5°C . These samples were tested in the Biotron at Madison using the relative freezing tolerance (RFT) method. The results closely correlate the in vitro leaf-freezing assay.

Screening the *S. andigena* population (170 accessions) for Jelly End with cooperator Dr. Asunta Tompson at North Dakota. Twelve plants per accession were planted in the greenhouse for tuber production, and a parallel planting was done in ND. The greenhouse tubers are planted in Weslaco, TX and will be evaluated in June.

High glycoalkaloid levels in the leaves correlates to insect resistance and low levels in the tubers makes them palatable. Continued screening and recurrent selection within accessions for high foliage and low tuber glycoalkaloid levels and generated another cycle of tissue for testing in 2004.

A publication entitled "The Association of Ecogeographic Parameters and Genetic Diversity in *S. verrucosum*" was completed. Geographical parameters and proximity to related species predict genetic variation in the inbred potato species *Solanum verrucosum*. Such links had not been previously detected in *S. fendleri*, *S. jamesii* or *S. sucrense*. Resolution and fine-tuning to locations may be enhanced by inbreeding and uniformity. The highest correlations to genetic rarity (a population's average

genetic difference from all others) were latitude, longitude and proximity to the nearest *S. hjertingii* population.

It is habit to select the largest seedlings when transplanting. Does this practice unknowingly cause genetic drift? A comparison of the genetics of small and large seedlings from original seedlots to detect potential selection in the genebank at transplanting was initiated.

Several interesting mutants were discovered in the collection this past year that are now being crossed for genetic studies. *S. fendleri*, typically a purple flowered plant with purple highlights, was found pigmentless. A *S. microdontum* mutant has a fused sepal. Lucky (*S. juzepczukii*), a Bolivian variety, had a spontaneous clonal dwarf.

C. Classification

Dr. Spooner et al. have published Wild Potatoes (*Solanum* section *Petota*) of North and Central America. Dr. Spooner continues to resolve problems in taxonomic classification that impede both efficient documentation and use of the germplasm. At present he is working on a use-based classification of varieties.

D. Distribution

NRSP-6 distributed 5,520 units of seed, 63 tuber families, 2,121 tuber clones, 943 in vitro stocks, and 153 herbarium samples to clientele in 24 states of the United States and 13 other countries. Internally, NRSP-6 used 6,013 units of seed for seed backup, chromosome counts, germination tests, identification and taxonomic check plantings, in vitro maintenance, seed increases, PSTV tests, and miscellaneous plantings. The volume and types of stocks sent to various consignee categories are summarized in the table below.

VOLUME AND TYPES OF STOCKS DISTRIBUTED

Category	Units ¹					TOTAL	PIs
	S	TF	TS	IVS	HERB		
Domestic	4,430	52	2,089	634	153	7,358	4,184
Foreign	1,090	11	32	309	0	1,442	1,151
NRSP-6 ²	6,013	0	0	0	0	6,013	1,510
Total	11,533	63	2,121	943	153	14,813	6,845

¹ Types of stocks sent/(number of seeds, tubers or plantlets per standard shipping unit): S= True Seeds/(50), TF= Tuber Families/(10), TS=Tuber Stocks/(3), IVS=In Vitro Stocks/(1), 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. USEFULNESS OF FINDINGS

NRSP-6's purpose is to provide a ready source of raw materials, technology and information to support potato enhancement, breeding and research in the US and around the world. Thus, one way the success of NRSP-6 can be measured is by the use of NRSP-6 germplasm in the pedigrees of new, improved potato cultivars. Another is in the use of NRSP-6 stocks in more basic research programs, which also ultimately contribute to human utilization of the potato crop, these being reflected in publications.

Five cultivar releases were published in the American Journal of Potato Research in 2002: 'Alturas', 'Boulder', 'Ivory Crisp', 'Modoc', and 'Wallowa Russet'. All are known to have wild species in their pedigrees.

Section 6 lists 91 papers, 39 abstracts, and 4 theses which report the use of NRSP-6 *Solanum* introductions this year.

5. WORK PLANNED FOR 2004

Evaluation experiments will be continued on *Solanum* species for the following traits: antioxidants, frost hardiness, rooting vigor, tuber calcium, late blight resistance, hormone mutants, proteinase inhibitors, and glycoalkaloids.

Continuing high quality service with respect to introduction, preservation, classification, evaluation, and distribution of potato germplasm to clients in the U.S. and around the world will pursue the general objective of NRSP-6, to promote and facilitate potato research and breeding.

APIC Intergenebank projects researching the status and dynamics of genetic diversity in the collection using RAPDs and strengthening ties with sister genebanks around the world will be continued.

6. PUBLICATIONS ISSUED DURING THE YEAR

A. Publications issued by NRSP-6 Personnel

Bamberg, J.B. and A. del Rio. 2003. Hypothetical obscured recessive traits in tetraploid *Solanum* estimated by RAPDs. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 78. (Abstract)

Bamberg, J.B. and A.H. del Rio. 2003. Vulnerability of alleles in the US Potato Genebank extrapolated from RAPDs. *Am. J. Potato Res.* 80:79-85.

- Bamberg, J.B., A.H. del Rio, Z. Huaman, S. Vega, M. Martin, A. Salas, J. Pavek, S. Kiru, C. Fernandez, and D.M. Spooner. 2003. A decade of collecting and research on wild potatoes of the Southwest USA. *Am. J. Potato Res.* 80:159-172.
- del Rio, A. and J.B. Bamberg. 2003. The effect of genebank seed increase on the genetics of recently collected potato (*Solanum*) germplasm. *Am. J. Potato Res.* 80:215-218.
- del Rio, A. and J.B. Bamberg. 2003. Geographical parameters and proximity to related species predict genetic variation in the inbred potato species *Solanum verrucosum* Schlecht. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 51. (Abstract)
- Hijmans, R.J., M. Jacobs, J.B. Bamberg, and D.M. Spooner. 2003. Frost tolerance in wild potato species: Assessing the predictivity of taxonomic, geographic, and ecological factors. *Euphytica* 130:47-59.
- Lara-Cabrera, Sabina and David M. Spooner. 2003. Taxonomy of North and Central American diploid wild potato (*Solanum* sect. *Petota*, Solanaceae) species: AFLP data. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 51. (Abstract)
- Moreyra, Rocio, J. Bamberg and A. del Rio. 2003. Genetic consequence of collecting tubers vs. seeds of wild potato species indigenous to the USA. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 50. (Abstract)
- Spooner, D.M., R.G. van den Berg, A. Rodriguez, J. Bamberg, R.J. Hijmans, and S.I. Lara-Cabrera. 2003. Wild potatoes (*Solanum* section *Petota*) of North and Central America. *Syst. Bot. Monogr.*
- Vega, S.E., A.H. del Rio, G. Jung, J.B. Bamberg, and J.P. Palta. 2003. Marker-assisted genetic analysis of non-acclimated freezing tolerance and cold acclimation capacity in a backcross *Solanum* population. *Am. J. Potato Res.* 80:359-369.

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

- Andrivon, Didier, Roselyne Corbiere, Jean-Marie Lucas, Claudine Pasco, Jean-Michel Gravouelle, Roland Pelle, Jean-Paul Dantec, and Daniel Ellisseche. 2003. Resistance to Late Blight and Soft Rot in six potato progenies and glycoalkaloid contents in the tubers. *Am. J. Potato Res.* 80:125-134.
- Babosha, A.V., V.V. Boiko and Z.R. Morozova. 2002. Effect of plant oligoadenylates on viral infection and antistress and growth-regulating properties in potato plants grown *in vitro*. *Russian J. Plant Physio.* 49(3):399-405.

- Bakker, E., P. Butterbach, J.R. van der Voort, E. van der Vossen, J. van Vliet, J. Bakker, and A. Goverse. 2003. Genetic and physical mapping of homologues of the virus resistance gene *Rx1* and the cyst nematode resistance gene *Gpa2* in potato. *Theor. Applied Genetics* 106(8):1524-1531.
- Barta, E., A. Pintar and S. Pongor. 2002. Repeats with variations: accelerated evolution of the *Pin2* family of proteinase inhibitors. *Trends in Genetics* 18(12):600-603.
- Berthou, F., A. Kouassi, M. Bossis, J.P. Dantec, M. Eddaoudi, Z. Ferji, R. Pelle, M. Tachzouti, D. Ellisseche, and D. Mugniery. 2003. Enhancing the resistance of the potato to Southern Root-knot Nematodes by using *Solanum sparsipilum* germplasm. *Euphytica* 132(1):57-65.
- Bolvaran, Sonia and C.A. Thill. 2003. Selection for resistance to late blight from early generations in a breeding program. University of Minnesota, Department of Horticultural Science. Proc. Of the 33rd Annual Meeting, NCR-84 Potato Breeding and Genetics Technical Committee Feb. 3-4, 2003, East Lansing, MI.
- Bradeen, J.M., S.K. Naess, J. Song, G.T. Haberlach, S.M. Wielgus, C.R. Buell, J. Jiang, and J.P. Helgeson. 2003. Concomitant reiterative BAC walking and fine genetic mapping enable physical map development for the broad-spectrum late blight resistance region, *RB*. *Mol. Genet. Genom.* 269(5):603-611.
- Buso, J.A., F.A.S. Aragao, F.J.B. Reifschneider, L.S. Boiteux, and S.J. Peloquin. 2002. Assessment under short-day conditions of genetic materials derived from three potato breeding strategies: 4x-4x (intra- Tuberosum), 4x-2x (FDR 2n-pollen), and 4x-4x (diplandrous tetraploid). *Euphytica* 126(3):437-446.
- Buso, J.A., L.S. Boiteux and S.J. Peloquin. 2003. Tuber yield and quality of 4x-2x (FDR) potato progenies derived from the wild diploid species *Solanum berthaultii* and *Solanum tarijense*. *Plant Breeding* 122(3):229-232.
- Cantle, S.E. and G. Wang-Pruski. 2003. Identification of cinnamic acid 4-hydroxylase in potato (*Solanum tuberosum* L.) and its relationship to after-cooking darkening. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 34. (Abstract)
- Caromel, B., D. Mugniery, V. Lefebvre, S. Andrzejewski, D. Ellisseche, M.C. Kerlan, P. Rousselle, and F. Rousselle-Bourgeois. 2003. Mapping QTLs for resistance against *Globodera pallida* (Stone) Pa2/3 in a diploid potato progeny originating from *Solanum spegazzinii*. *Theor. Applied Genetics* 106(8):1517-1523.
- Carputo, D. 2003. Cytological and breeding behavior of pentaploids derived from 3x x 4x crosses in potato. *Theor. Applied Genetics* 106(5):883-888.

- Carputo, D., A. Barone, F. Consiglio, M. Ercolano, A. Sebastiano, and L. Frusciante. 2000. Evaluation of tetraploid and diploid potato genotypes suitable for true seed (TPS) production and use. *Annali della Facolta di Agraria della Universita degli Studi di Napoli-Federico II, Portici* 34:7-14, Napoli, Italy.
- Carputo, D., L. Frusciante and S.J. Peloquin. 2003. The role of 2n gametes and endosperm balance number in the origin and evolution of polyploids in the tuber-bearing *Solanums*. *Genetics* 163(1):287-294.
- Carputo, D., M. Parisi, F. Consiglio, M. Iovene, G. Caruso, L. Monti, and L. Frusciante. 2003. Aneuploid hybrids from 5x - 4x crosses in potato: chromosome number, fertility, morphology and yield. *Am. J. Potato Res.* 80:93-101.
- Chen, Q., L.M. Kawchuk, D.R. Lynch, M.S. Goettel, and D.K. Fujimoto. 2003. Identification of late blight, Colorado potato beetle, and blackleg resistance in three Mexican and two South American wild 2x (1EBN) *Solanum* species. *Am. J. Potato Res.* 80:9-19.
- Coombs, J., D. Douches, S. Cooper, E. Grafius, and W. Pett. 2003. No-choice cage study of glandular trichomes, glycoalkaloids and *Bt-Cry3A* potato resistance mechanisms for control of Colorado potato beetle. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 58. (Abstract)
- Cotes, J.J., C.E. Nustez, R. Martinez, and N. Estrada. 2000. Analysis of genotype by environment interaction in potato (*Solanum tuberosum* spp. *andigena*) by a non-parametric methodology. *Agronomia Colombiana* 17(1/3):43-48.
- Daniele, E., J. Dommes and J.F. Hausman. 2003. Carbohydrates and resistance to *Phytophthora infestans* in potato plants. *Acta Physio. Plant.* 25(2):171-178.
- DeJong, W.S., D.M. DeJong and M. Bodis. 2003. An approach to measure allele dosage in autotetraploid potato. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 61. (Abstract)
- DeJong W.S., D.M. De Jong and M. Bodis. 2003. A fluorogenic 5' nuclease (TaqMan) assay to assess dosage of a marker tightly linked to red skin color in autotetraploid potato. *Theoretical and Applied Genetics* 107:1384-1390
- Dinu, I.I. and C.A. Thill. 2003. Endosperm and embryo development in interspecific incompatible *Solanum* crosses. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 46. (Abstract)

- Dinu, I.I. and C.A. Thill. 2003. Introgression of wild *Solanum* species germplasm into cultivated potato gene pool using EBN manipulation and sexual crosses. Proc. Of the 33rd Annual Meeting, NCR-84 Potato Breeding and Genetics Technical Committee Feb. 3-4, 2003, East Lansing, MI.
- Douches, D., K. Felcher, J. Coombs, and W. Kirk. 2003. Field evaluation of foliar resistance to *Phytophthora infestans* in potato. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 51. (Abstract)
- Douches, D.S., J. Coombs, K. Jastrzebski, R. Hammerschmidt, W.W. Kirk, C. Long, R.W. Chase, and S. Snapp. 2003. Boulder: A round white multipurpose potato variety. Am. J. Potato Res. 80:345-352.
- Esplin, D.L. and C.A. Thill. 2003. Selection for cold chipping genotypes in populations derived by sexual polyploidization. Am. J. Potato Res. In press. (Abstract)
- Esplin, Dave L. and C.A. Thill. 2003. Selection efficiency for cold chipping potato genotypes in three populations developed via sexual polyploidization. Proc. Of the 33rd Annual Meeting, NCR-84 Potato Breeding and Genetics Technical Committee Feb. 3-4, 2003, East Lansing, MI.
- Evers, D., M. Ghislain, J.F. Hausman, and J. Dommès. 2003. Differential gene expression in two potato lines differing in their resistance to *Phytophthora infestans*. J. Plant Physiology 160(6):709-712.
- Ewing, E.E., I. Simko, E.A. Omer, and P.J. Davies. 2003. Polygene mapping as a tool to study the physiology of tuberization and dormancy. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 27. (Abstract)
- Fischer, L., A. Lovas, Z. Opatrny, and Z. Banfalvi. 2002. Structure and expression of a hybrid proline-rich protein gene in the Solanaceous species, *Solanum brevidens*, *Solanum tuberosum*, and *Lycopersicon esculentum*. J. Plant Physiology 159(11):1271-1275.
- Flier, W.G., N.J. Grunwald, L.P.N.M. Kroon, A.K. Sturbaum, T.B.M. van den Bosch, E. Garay-Serrano, H. Lozoya-Saldana, W.E. Fry, and L.J. Turkensteen. 2003. The population structure of *Phytophthora infestans* from the Toluca Valley of Central Mexico suggests genetic differentiation between populations from cultivated potato and wild *Solanum* spp. Phytopathology 93(4):382-390.
- Frost, K.E., D.I. Rouse and S.H. Jansky. 2003. Introduction of Verticillium wilt (Vw) resistance into advanced clones via 2x x 4x and 4x x 2x crosses between (2x) *S. tuberosum* – wild species hybrids and (4x) potato. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 78. (Abstract)

- Gao Gang, Qu DongYu, Lian Yong, Jin LiPing, and Feng LanXiang. 2002. A RAPD marker linked to the potato resistance to bacterial wilt. *Acta Phytopathologica Sinica* 32(3):267-271.
- Gillen, A.M. and R. Novy. 2003. Development of molecular markers for introgression of viral resistance genes from *Solanum etuberosum*. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 54. (Abstract)
- Gopal, Jai, Vinod Kumar and S.S. Thakur. 2001. Evaluation of potato germplasm for characters important in true potato seed production. In: National symposium on sustainability of potato revolution in India, Shimla, India, July 31, 2001. (Eds: S.M.P. Khurana, S.K. Pandey). *J. Indian Potato Assn.* 28(1):11-12.
- Grunwald, N.J., M.A. Cadena Hinojosa, O. Rubio Covarrubias, A. Rivera Pena, H. Lozoya-Saldana, C.R. Brown, and W.E. Fry. 2003. Resistance in Mexican potato germplasm to late blight is high and durable. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 77. (Abstract)
- Hane, D.C., A.R. Mosley, S.R. James, K.A. Rykbost, C.C. Shock, S.L. Love, D.L. Corsini, J.J. Pavek, R.E. Thornton, B.A. Charlton, E.P. Eldredge, and S. Yilma. 2003. Wallowa Russet: A full season long russet for processing and fresh market. *Am. J. Potato Res.* 80:289-294.
- Hannapel, D.J., H. Chen, F.M. Rosin, A. Banerjee, and P.J. Davies. 2003. Molecular controls of tuberization. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 26. (Abstract)
- Hayes, R.J. and C.A. Thill. 2003. Genetic gain from early generation selection for cold chipping genotypes in potato. *Plant Breeding* 122:158-163.
- Hayes, R.J. and C.A. Thill. 2003. Selection for late blight tuber resistance within foliar resistant genotypes. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 52. (Abstract)
- Hayes, Ryan J. and C.A. Thill. 2003. Yield, specific gravity and tuber appearance of cold chipping genotypes from 2x x 4x, 4x x 2x, and 4x x 4x crosses using F2 cultivated potato – wild potato species hybrids and elite 4x x 4x crosses. Proc. Of the 33rd Annual Meeting, NCR-84 Potato Breeding and Genetics Technical Committee Feb. 3-4, 2003, East Lansing, MI.
- Haynes, K.G., R.W. Goth, D.H. Lambert, and B.J. Christ. 2003. Late blight resistance in a tetraploid potato population with horizontal resistance. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 77. (Abstract)

- Hosaka, K. 2003. T-type chloroplast DNA in *Solanum tuberosum* L. ssp. *tuberosum* was conferred from some populations of *S. tarijense* Hawkes. *Am. J. Potato Res.* 80:21-32.
- Iovene, M., L. Frusciante and D. Carputo. 2002. Shoot regeneration and chromosome doubling in accessions of 2x(1EBN) and 4x(2EBN) wild *Solanum* species. *J. Genet. Breeding* 56(2):99-105.
- Jansky, S.H. and D.I. Rouse. 2003. Multiple disease resistance in potato interspecific hybrids. *Plant Disease* 87:266-272.
- Jansky, S.H., D.I. Rouse, E. Mauritz, and J. Clark. 2003. Disease resistance in potato haploids. *Acta Horticulturae*. In press.
- Jansky, Shelley, P.J. Kauth and D.I. Rouse. 2003. Inheritance of resistance to potato early dying disease in diploid interspecific hybrids. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 50. (Abstract)
- Johnson, A.A.T. and R.E. Veilleux. 2003. Integration of transgenes into sexual polyploidization schemes for potato (*Solanum tuberosum* L.). *Euphytica* 133:125-138.
- Johnson, A.A.T., B.A. Nault and R.E. Veilleux. 2003. Transmission of a *Bacillus thuringiensis* cry3Aa transgene from diploid to tetraploid potato using 4x-2x hybridization: effect of ploidy increase on transgene expression and implications for TPS hybrid production. *Plant Breeding* 122:223-228.
- Kumar, Raj and Jai Gopal. 2001. Evaluation of *andigena* x *tuberosum* potato progenies for combining ability in early generations. In: National symposium on sustainability of potato revolution in India, Shimla, India, July 31, 2001. (Eds: S.M.P. Khurana, S.K. Pandey). *J. Indian Potato Assn.* 28(1):6-7.
- Lara, Angel and C.A. Thill. 2003. Selection for cold chipping genotypes from three early generations at two temperature storage regimes. Proc. Of the 33rd Annual Meeting, NCR-84 Potato Breeding and Genetics Technical Committee Feb. 3-4, 2003, East Lansing, MI.
- Laurila, J., M.C. Metzler, C.A. Ishimaru, and V.M. Rokka. 2003. Infection of plant material derived from *Solanum acaule* with *Clavibacter michiganensis* ssp. *sepedonicus*: temperature as a determining factor in immunity of *S. acaule* to bacterial ring rot. *Plant Pathology* 52(4):496-504.
- Leite, Daniela Lopes, M. Dibble and J. Lorenzen. 2003. Development of *Solanum berthaultii* cDNA libraries for identification of insect resistance factors. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 59. (Abstract)

- Lightbourn, G., J. Jelesko and R.E. Veilleux. 2003. Retrotansposon based polymorphism between parental monoplloid potatoes and electrofusion derived somatic hybrids to evaluate stability of retroelements Tst1. Presented at 87th Annual Meeting of PAA, Spokane, WA, Aug. 10-14, 2003. p. 33. (Abstract)
- Lorenzen, J.H., N.F. Balbyshev, A.M. Lafta, H. Casper, X. Tian, and B. Sagredo. 2001. Resistant potato selections contain leptine and inhibit development of the Colorado potato beetle (Coleoptera: Chrysomelidae). *J. Economic Entomology* 94(5):1260-1267.
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C. Theses Reporting Research with NRSP-6 Stocks

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7. APPROVED

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Date

S.A. Slack, Lead Administrative Advisor

Date