ANNUAL REPORT

Calendar Year 1999

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

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

2. COOPERATIVE AGENCIES AND PRINCIPAL LEADERS

State Agricultural Experimental Stations		**Representative**
Southern Region	Secretary (2000)	J. C. Miller, Jr.
Western Region		A. R. Mosley
North Central Region	Vice Chairman (2000)	D. S. Douches
North Eastern Region		A. F. Reeves

United States Department of Agriculture		
Agricultural Research Service		
Technical Representative	Chairman (2000)	C. R. Brown
National Program Staff		P. K. Bretting
Area Director, Midwest Area		A. Hewings
Cooperative States Research Education & Extension Service		M. Fitzner
Animal and Plant Health Inspection Service		A. T. Tschanz
Inter-Regional Potato Introduction Project	Project Leader	J. B. Bamberg

Agriculture Canada	T. R. Tarn

Administrative Advisors		
North Central Region	Lead	R. L. Lower
Western Region		M. J. Burke
Southern Region		E. Young
North Eastern Region		D. R. Mackenzie

3. PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of New Stocks

Dr. Spooner, in collaboration with Alberto Salas (CIP, Peru), Zozimo Huaman (CIP, Peru), and Rafael Vinci (INIA, Peru) participated in a successful expedition to collect wild species of potato in Peru from March 8th to April 25th, 1999. This collection trip resulted in 101 new accessions of *Solanum* species.

Dr. Bamberg, in collaboration with Charles Fernandez (US Potato Genebank), Stephen Kiru (VIR, St. Petersburg, Russia), Joseph Pavek (ARS Potato Breeder, Aberdeen, Idaho), and Sylvia Pavek (wife of ARS potato breeder), participated in a successful expedition to the southwest United States to obtain new materials for the collaborative intergenebank research project.

A total of 145 accessions were assigned PI numbers in 1999, and are now available from the NRSP-6 *Solanum* germplasm collection: 80 in vitro clones, 58 quarantine clones, and seven accessions from the southwest United States.

In 1999, 91 new accessions were planted out in the spring quarantined increase. Of the 91 accessions, 62 germinated. Fifty-eight of these were released and added into the collection (four were virus suspect and not released). Of the 58 accessions, 41 were from Spooner's 1997 Mexico collection, 16 were from Spooner's 1998 Peru collection, and one from the 1992 Columbia collection trip.

A total of 88 clones were added to the in vitro collection in 1999 as foreign varieties or genetic stocks.

B. Preservation and Increase of Stocks

In 1999, 178 accessions were increased as botanical seed populations.

This year a total of 720 potato spindle tuber viroid (PSTV) tests were performed on seed increase parents, seed lots and research materials. Germination tests were performed on 993 accessions, and ploidy determinations were done on 97 accessions.

C. Classification

Dr. Spooner continues to resolve problems in taxonomic classification which impede efficient documentation and use of the germplasm. This year an extensive study was conducted which suggests several species in the series Longipedicellata are not actually significantly different. Insights gained from this and similar studies will allow accessions to be assigned stable species names based on empirical differences.

D. Distribution

NRSP-6 distributed 5,132 units of seed, 21 tuber families and 809 in vitro stocks to clientele in 18 states of the United States and 10 other countries. Internally, NRSP-6 used 9,931 units of seed for 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

	Units[1]					
Category	S	TF	IVS	FSG	TOTAL	PIs
Domestic	3,689	18	563	51	4,321	2,616
Foreign	1,443	3	246	108	1,800	1,177
NRSP-6[2]	9,931	0	0	0	9,931	1,388
Total	15,063	21	809	159	16,052	5,181

[1] Types of stocks sent/(number of seeds, tubers or plantlets per standard shipping unit):
S= True Seeds/(50), TF= Tuber Families/(10), IVS=In Vitro Stocks/(1), FSG=Fine Screening Genotypes/(1).

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

E. Evaluation of Stocks

Mission

The project's mission with respect to evaluation is to locate and characterize useful traits so that the best materials and most efficient approaches are available for subsequent germplasm enhancement.

1. Late Blight Screening

New forms of the late blight pathogen have developed into a severe threat to the US potato crop. In 1999 we continued four cooperative projects:

1) BC, Canada with Dr. Ken Ng: This project characterized segregation for extreme LB resistance in a family of the South American Series Tuberosa member *S. okadae.*
2) Cornell, New York: Dr. Fry characterized segregation for extreme LB resistance in a family of the South American Series Tuberosa member *S. microdontum*.
3) Lansing, Michigan with Dr. Douches: This project involves inoculated greenhouse testing of selected late blight resistant genotypes.
4) Toluca, Mexico with Hector Lozoya: This project did field screening for resistance in various South American and Mexican species, as well as Russian elite breeding families.

2. Tuber Traits

Wild species do not produce tubers in the long days of Sturgeon Bay summers, so their tuber traits cannot be assessed in the field. A project was initiated in 1993 in which wild accessions are being systematically crossed with adapted (cultivated) forms to produce F_2 true seed families. We also found and successfully tested a site for wild species tuber production at Weslaco, TX (in cooperation with TAES). This will allow more efficient production of tubers and allow evaluation under field conditions (for such traits as calcium accumulation potential).

3. Frost Hardiness

In cooperation with Dr. J. Palta and YuKuang Chen, work was continued on recurrent selection for earliness, good tuber characteristics, and frost resistance. Progress was made in generation of substitution backcross families with cold sensitive genomes within cold hardy cytoplasm.

4. Tuber Calcium

Tuber calcium has been shown to be closely associated with resistance to important storage rots and other tuber quality traits. F_2 hybrids between clones which accumulate very high calcium in a high calcium environment and clones which accumulate very little calcium in the same environment were analyzed. High calcium accumulation and cold sprouting vigor were found *not* to be well correlated. Tuber calcium segregation within the family was continuous between the parental levels. These materials should be a valuable tool for investigating the physiology and genetics of tuber calcium.

5. RAPDs to estimate vulnerability of alleles in the genebank

RAPDs were used to characterize populations of two very heterogeneous wild potato species. About 25 plants in each population were individually tested to reveal "allele" frequencies. Allele frequencies less than 25% were not uncommon, but these markers were almost always fixed or nearly fixed in another population. Therefore, vulnerable alleles (i.e., ones which have a good chance of being lost from the genebank using current seed increase methods) appear to be very rare.

6. Screening the Wild Species for Root Mass

The mini-core collection was screened for root mass in the screenhouse in Perlite. Significant differences were found which parallel those of previous work. This information may provide insights into breeding for water and fertilizer use efficiency.

7. Characterization for Utility Traits

The success of using *Solanum* germplasm for breeding is influenced by relative plant vigor, flowering, pollen shed and pollen viability. Characterization of the collection for these traits continued in 1999.

F. Inter-genebank Collaboration

The Association of Potato Intergenebank Collaborators (APIC) has initiated a joint research project to investigate the effects of seed increases on the genetic integrity of germplasm conserved *ex situ*, and whether germplasm in genebanks still represents the *in situ* populations from which they were collected. Work on the final phase, finding factors which predict the patterns of diversity among accessions, has been submitted for publication. Some findings defy conventional wisdom, such as the idea that genetic diversity is correlated with spacial separation of collections. Results from this work will guide collection methods to maximize diversity. New samples of *S. jamesii* were collected in New Mexico and Arizona, expanding the range of our research samples and adding unique germplasm to the genebank. The 8th meeting of APIC was held in conjunction with the Global Potato Conference in New Delhi, December, 1999. APIC members largely organized and presented the papers for the session: "Genetic Resources and Crop Improvement".

G. Visitors From Other Countries

Dr. Peter Dolnicar	Ljubjana, Slovenija
Dr. Janet Seabrook	Fredricton, New Brunswick, Canada
Dr. Lin Gau	Fredricton, New Brunswick, Canada
Dr. Quin Chen	Lethbridge, Alberta, Canada
Dr. Ana Peralta	Uruguay
Dr. Beatriz Melcho	Uruguay
Dr. Luis Curbelo	Uruguay
Dr. Carlos Colafranceschi	Uruguay

4. USEFULNESS OF FINDINGS

NRSP-6's purpose is to provide a ready source of raw materials, technology and information which 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.

Two cultivar releases were published in the American Journal of Potato Research in 1999: ‘Quaggy Joe’, and ‘Reba’. Both are known to have wild species in their pedigrees.

Section 6 lists 89 papers, 30 abstracts, and 3 theses which report the use of NRSP-6 *Solanum* introductions this year.

5. WORK PLANNED FOR 2000

Dr. Spooner will participate in a third collecting expedition to Peru .

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

The general objective of NRSP-6 to promote and facilitate potato research and breeding will be pursued by 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.

We will continue APIC intergenebank research projects determining the cause of observed differences *in situ* and genebank accessions, and correlations of geographic/habitat data with partitioning of diversity.

6. PUBLICATIONS ISSUED DURING THE YEAR

A. Publications issued by NRSP-6 Personnel

Bamberg, J.B. 1999. Dependence on exogenous gibberellin for seed germination in *Solanum acaule* Bitter and other *Solanum* (potato) species. Am. J. Potato Res. 76(6):351-355.

Bamberg, J.B. 1999. Screening for gibberellin deficiency mutants in *Solanum tuberosum* ssp. *andigena*. Am. J. Potato Res. 76(5):321-322.

Bamberg, J.B. 1999. Wild potatoes on public lands of the Southwest. NRSP-6 brochure.

Bamberg, J.B. and A.H. del Rio. 1999. Vulnerability of alleles in the US Potato Genebank extrapolated from RAPDS. Am. J. Potato Res. 76(6):363-364. (Abstract)

Bamberg, J.B., A. H. del Rio and Z. Huaman. 1999. Intergenebank Cooperation in Genetic Diversity Conservation Research. Presented: Symposium of Potato Assn. of American Annual Meeting, 1999.

Bamberg, J.B., A. H. del Rio and Z. Huaman. 1999. Intergenebank Cooperation in Genetic Diversity Conservation Research. Presented: Global Conference on Potato, New Delhi, India, December 6-12, 1999.

Chen, Y.-K., J.B. Bamberg and J. Palta. 1999. Expression of freezing tolerance in the interspecific F_1 and somatic hybrids of potatoes. Theor. Appl. Genet. 98(6/7):995-1004.

Chen, Y.-K., J. Palta and J.B. Bamberg. 1999. Freezing tolerance and tuber production in self and backcross progenies derived from somatic hybrids between *Solanum tuberosum* L. and *S. commersonii* Dun. Theor. Appl. Genet. 99:100-107.

Chen, Y.K.H., J.P. Palta, J.B. Bamberg, Kim HeiYoung, G.T. Haberlach, and J.P. Helgeson. 1999. Expression of nonacclimated freezing tolerance and cold acclimation capacity in somatic hybrids between hardy wild *Solanum* species and cultivated potatoes. Euphytica 107(1):1-8.

Del Rio, Alfonso H. and John B. Bamberg. 1999. Association of ecogeographical variables with patterns of genetic variation in native wild US potato populations determined by RAPD markers. Am. J. Potato Res. 76(6):367-368. (Abstract)

Errebhi, M., C.J. Rosen, F.I. Lauer, M.W. Martin, and J.B. Bamberg. 1999. Evaluation of tuber-bearing *Solanum* species for nitrogen use efficiency and biomass partitioning. Am. J. Potato Res. 76(3):143-151.

Huaman, Z., R. Hoekstra and J.B. Bamberg. 1999. History of APIC and the initiative to create comprehensive databases. Presented: Symposium of Potato Assn. of America Annual Meeting, 1999.

Miller, J.T. and D.M. Spooner. 1999. Collapse of species boundaries in the wild potato *Solanum brevicaule* complex (*Solanaceae*, S. sect. *Petota*): molecular data. Plant Systematics & Evolution 214(1/4):103-130.

Salas, A., D.M. Spooner, Z. Huaman, R.V. Torres, R. Hoekstra, K. Schuler, and R.J. Hijmans. 1999. Report of wild potato collecting expedition to Peru, 1999. Report to NCR-84, December 6-7, 1999, Minneapolis, Minnesota.

Spooner, D.M. 1999. Plant genetic resources for food and agriculture in situ and ex situ: Where are the genes of importance for food security likely to come from? Pp. 133-164. Proceedings of an International Workshop, Inter-Dependence and Food Security: Which List of Plant Genetic Resources for Food and Agriculture for the Future Multilateral System?, Ministero Affari Esteri, Instituto Agronomico per L'Oltremare, Florence, Italy, October 1-3, 1998.

Spooner, D.M., A.S. Lopez, Z. Huaman, and R.J. Hijmans. 1999. Wild potato collecting expedition in Southern Peru (Departments of Apurimac, Arequipa, Cusco, Moquegua Puno, Tacna) in 1998: Taxonomy and new genetic resources. Am. J. Potato Res. 76(3):103-119.

Spooner, D.M., R.M. Olmstead, and L.A. Bohs. 1999. Current data on the systematics of the solanaceae, with a focus on tomatoes and potatoes. IV Plant and Animal Genome Conference Proceedings Abstract: 67.

Spooner, D.M., A. Salas, Z. Huaman, R.V. Tores, and R. Hijmans. 1999. Report of wild potato collecting expedition to Peru, 1999. Report to NCR-84, December 6-7, 1999, Minneapolis, Minnesota.

Spooner, D.M. and R.G. van den Berg. 1999. Species boundaries in Central American members of Solanum series Conicibaccata.

Thill, Christian A., E.B. Radcliffe, D.W. Ragsdale, R.E. Hanneman, Jr., and J.B. Bamberg. 1999. The identification of aphid resistant 4X potato germplasm for use in breeding. Am. J. Potato Res. 76(6):385-386. (Abstract)

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

Alfano, F., M. Cammareri, A. Errico, L. Frusciante, and C. Conicella. 1999. 2n gametes in *Solanum tuberosum* dihaploids. Am. J. Potato Res. 76(5):281-285.

Alfano, F., M. Cammareri, D. Carputo, A. Errico, and C. Conicella. 1998. The role of the cytoskeleton in potato meiosis. In: Breeding research on potatoes. Proceedings of an international symposium, June 23-26, 1998, Gross Lusewitz, Rostock, Germany. (Ed: K. Peter). 4(2):1-2.

Anjum, M.A., A. Muhammad, and T.A. Villiers. 1996. Growth of potato axillary bud cultures *in vitro*. Pakistan J. Ag. Sci. 33(1/4):6-8.

Araji, A.A. 1999. The benefit of public investments in potato research. Am. J. Potato Res. 76(6):363. (Abstract)

Aziz, A.N., J.E.A. Seabrook, and G.C.C. Tai. 1999. Amplification of RAPD markers from single pollen grains of diploid (2N=2X=24) potato. Am. J. Potato Res. 76(4):179-182.

Aziz, A.N., J.E.A. Seabrook, G.C.C. Tai, and H. DeJong. 1999. Screening diploid *Solanum* genotypes responsive to different anther culture conditions and ploidy assessment of anther-derived roots and plantlets. Am. J. Potato Res. 76(1):9-16.

Bains, P.S., V.S. Bisht, D.R. Lynch, L.M. Kawchuk, and J.P. Helgeson. 1999. Identification of stem soft rot (*Erwinia carotovora* subspecies *atroseptica*) resistance in potato. Am. J. Potato Res. 76(3):137-141.

Banfalvi, Z., A. Molnar, L. Lakatos, H. Hesse, and R. Hofgen. 1999. Differences in sucrose-to-starch metabolism of *Solanum tuberosum* and *Solanum brevidens*. Pl. Sci. 147(1):81-88.

Barone, A., A. Sebastiano, and D. Carputo. 1999. Chromosome pairing in *Solanum commersonii-S. tuberosum* sexual hybrids detected by *commersonii*-specific RAPDs and cytological analysis. Genome 42(2):218-224.

Basile, B., D. Carputo, A. Zoina, L. Monti, and T. Cardi. 1998. *Solanum commersonii* (+) *Solanum tuberosum* somatic hybrids: fertility in inter-EBN backcrosses and evaluation of progenies. In: Breeding research on potatoes. Proceedings of an international symposium, June 23-26, 1998, Gross Lusewitz, Rostock, Germany. (Ed: K. Peter). 4(2):14-15.

Bastiaanssen, H.J.M.; P.M.M.M. van den Berg, P. Lindhout, E. Jacobsen, and M.S. Ramanna. 1998. Postmeiotic restitution in 2n-egg formation of diploid potato. Heredity 81(1):20-27.

Brown, C.R., M. McNabnay, and B. Dean. 1999. Genetic characterization of reduced melanin formation in tuber tissue of *Solanum hjertingii* and hybrids with cultivated diploids. Am. J. Potato Res. 76(1):37-43.

Boluarte, Tatiana and Richard E. Veilleux. 1999. Molecular markers linked to anther culture response and leptine content in three backcross families derived from *Solanum phureja* and *S. chacoense*. Am. J. Potato Res. 76(6):365. (Abstract)

Bradeen, James M., S. Kristine Naess, Susan M. Wielgus, Geraldine T. Haberlach, and John P. Helgeson. 1999. Late blight resistance from *Solanum bulbocastanum*: Towards fine mapping and BAC clone isolation. Am. J. Potato Res. 76(6):365. (Abstract)

Brown, C.R., H. Mojtahedi, and G.S. Santo. 1999. Genetic analysis of resistance to races 1 and 2 of *Meloidogyne chitwoodi* derived from the Mexican wild species *Solanum hougasii*. Am. J. Potato Res. 76(6):365-366. (Abstract)

Buso, J.A., L.S. Boiteux, and S.J. Peloquin. 1999. Multitrait selection system using populations with a small number of interploid (4*x*-2*x*) hybrid seedlings in potato: degree of high-parent heterosis for yield and frequency of clones combining quantitative agronomic traits. Theor. Appl. Genet. 99(1/2):81-91.

Buso, J.A., L.S. Boiteux, and S.J. Peloquin. 1999. Comparison of haploid Tuberosum *Solanum chacoense* versus *Solanum phureja* haploid Tuberosum hybrids as staminate parents of 4x-2x progenies evaluated under distinct crop management systems. Euphytica 109:191-199.

Buso, J.A., L.S. Boiteux, G.C.C. Tai, and S.J. Peloquin. 1999. Chromosome regions between centromeres and proximal crossovers are the physical sites of major effect loci for yield in potato: Genetic analysis employing meiotic mutants. Proc. Natl. Acad. Sci. 96:1773-1778.

Buso, J.A., F.J.B. Reifschneider, L.S. Boiteux, and S.J. Peloquin. 1999. Effects of 2*n*-pollen formation by first meiotic division restitution with and without crossover on eight quantitative traits in 4*x*-2*x* potato progenies. Theor. Appl. Genet. 98(8):1311-1319.

Carputo, D. 1999. Post-zygotic gametic selection due to endosperm balance number explains unusual chromosome numbers of 3*x* x 2*x* progeny in *Solanum*. Sexual Pl. Repro. 12(1):27-31.

Carputo, D., A. Barone, T. Cardi, P. Garreffa, and L. Frusciante. 1997. True potato seed (TPS) as an alternative technique for potato production in the Mediterranean area. (En, it, 15 ref.) Dept. Agronomy and Plant Genetics, University of Naples, Portici, Italy. 31:29-37.

Carputo, D., L. Monti, J.E. Werner, and L. Frusciante. 1999. Uses and usefulness of endosperm balance number. Theor. Appl. Genet. 98(3/4):478-484.

Carputo, D., P. Garreffa, M. Mazzei, L. Monti, and T. Cardi. 1998. Fertility of somatic hybrids *Solanum commersonii* (2*x*, 1EBN) (+) *S. tuberosum* haploid (2*x*, 2EBN) in intra- and inter-EBN crosses. Genome 41(6):776-781.

Carputo, D., T. Cardi, L. Frusciante, P. Sirianni, S. Vega, and J.P. Palta. 1998. Transfer of resistance genes from *Solanum commersonii* (2*n*=24, 1EBN) to *S. tuberosum* (2*n*=48, 4EBN) through ploidy and EBN manipulation. In: Breeding research on potatoes. Proceedings of an international symposium, June 23-26, 1998, Gross Lusewitz, Rostock, Germany. (Ed: K. Peter). 4(2):16-21.

Carrera, E., S.D. Jackson, and S. Prat. 1999. Feedback control and diurnal regulation of gibberellin 20-oxidase transcript levels in potato. Pl. Phys. 119(2):765-773.

Chacon, M.G., R.L. Plaisted, and B.B. Brodie. 1999. Inheritance of the resistance to *Globodera rostochiensis* pathotype Ro2 in potato. Am. J. Potato Res. 76(6):345-349.

Corsini, D., J. Pavek, C. Brown, D. Inglis, M. Martin, M. Powelson, A. Dorrance, and H. Lozoya-Saldana. 1999. Late blight resistant potato germplasm release AWN86514-2. Am. J. Potato Res. 76(1):45-49.

DeJong, H., L.M. Kawchuk, and V.J. Burns. 1998. Inheritance and mapping of a light green mutant in cultivated diploid potatoes. Euphytica 103(1):83-88.

Dong, F., R.G. Novy, J.P. Helgeson, and J. Jiang. 1999. Cytological characterization of potato - *Solanum etuberosum* somatic hybrids and their backcross progenies by genomic in situ hybridization. Genome 42(5):987-992.

Dong, Fenggao, Junqi Song, and Jiming Jiang. 1999. Development of chromosome-specific cytogenetic DNA markers in potatoes. Am. J. Potato Res. 76(6):368. (Abstract)

Douches, D.S. and D.L. Maas. 1998. Comparison of FDR- and SDR-derived tetraploid progeny from 2*x* x 4*x* crosses using haploids of *Solanum tuberosum* L. that produce mixed modes of 2*n* eggs. Theor. Appl. Genet. 97(8):1307-1313.

Ermishin, A.P., and E.V. Voronkova. 1998. Indicators of fertility of hybrid progeny of potato secondary dihaploids. Seriya Biyalagichnykh Navuk 3:45-52.

Estrada, Nelson, R. Pineda, A. Rodriguez, and Sonia Tinjaca. 1999. Crossability between *Solanum stoloniferum* and *Solanum palustre*, two wild potato species. Am. J. Potato Res. 76(6):368-369. (Abstract)

Estrada, Nelson and Sonia Tinjaca. 1999. Crossability between *Solanum palustre* and *Solanum etuberosum*, two non-tuber-bearing potato species. Am. J. Potato Res. 76(6):369. (Abstract)

Ewing, Elmer E., Ivan Simko, Christine D. Smart, Merideth W. Bonierbale, Eduardo S.G. Mizubuti, Gregory D. May, and William E. Fry. 1999. An *R*-gene from *Solanum berthaultii* for resistance to *Phytophthora infestans* maps to chromosome 10. Am. J. Potato Res. 76(6):369. (Abstract)

Genualdo, G., A. Errico, Z. Tiezzi, and C. Conicella. 1998. Tubulin and F-actin distribution during microsporogenesis in a 2*n* pollen producer of *Solanum*. Genome 41(5):636-641.

Glass, Jenny Rebecca, K.B. Johnson, and M.L. Powelson. 1999. Barriers to potato tuber infection by *Phytophthora infestans*. Am. J. Potato Res. 76(6):369-370. (Abstract)

Hanneman, Robert E., Jr. 1999. Techniques to transfer germplasm from 2X(1EBN) Mexican species to 2X(2EBN) material via hybridization. Am. J. Potato Res. 76(6):371. (Abstract)

Hanneman, Robert E., Jr. 1999. Reproductive biology of the potato. 14th Triennial Conf. Eur. Assoc. Potato Res. Pp. 14-17. (Abstract)

Hanneman, R.E., Jr. and M. Ramon. 1999. Evaluation and pre-breeding with new sources of resistance to Colorado potato beetle and late blight. Am. J. Potato Res. 76(6):371-372. (Abstract)

Hanneman, R.E., Jr., M. Ramon, and J.C. Kuhl. 1999. Potato genetics and enhancement project. pp. 14-21. K.G. Haynes (ed.). National Potato Germplasm Evaluation and Enhancement report, 1998. USDA, ARS, Beltsville, Maryland.

Haynes, K.G., D.P. Weingartner, D.S. Douches, C.A. Thill, G. Secor, W.E. Fry, D.H. Lambert, B.J. Christ, and R. Voss. 1999. Foliar resistance to late blight in potato clones evaluated in national trials in 1998. Am. J. Potato Res. 76(6):370. (Abstract)

Helgeson, John P., S. Kristine Naess, James M. Bradeen, Susan M. Wielgus, and Geraldine T. Haberlach. 1999. Availability of somatic hybrids between potato and wild *Solanum* species for obtaining new disease resistant breeding lines. Am. J. Potato Res. 76(6):370. (Abstract)

Horvath, S., I. Wolf, and Z. Polgar. 1998. Results and importance of resistance breeding against viruses in Hungary. In: Breeding research on potatoes. Proceedings of an international symposium, June 23-26, 1998, Gross Lusewitz, Rostock, Germany. (Ed: K. Peter). 4(2):75-80.

Hosaka, K. and R.E. Hanneman, Jr. 1998. Genetics of self-compatibility in a self-incompatible wild diploid potato species *Solanum chacoense*. 2. Localization of an *S* locus inhibitor (Sli) gene on the potato genome using DNA markers. Euphytica 103(2):265-271.

Hosaka, Kazuyoshi. 1999. A genetic map of *Solanum phureja* clone 1.22 constructed using RFLP and RAPD markers. Am. J. Potato Res. 76(2):97-102.

Jackson, S.A. and R.E. Hanneman, Jr. 1999. Crossability between cultivated and wild tuber-bearing Solanums. Euphytica 109:51-67.

Jakuczun, H. 1998. Diploid breeding of potato for quality traits. In: Breeding research on potatoes. Proceedings of an international symposium, June 23-26, 1998, Gross Lusewitz, Rostock, Germany. (Ed: K. Peter). 4(2):81-82.

Jansky, S.H., S. Austin-Phillips, and C. McCarthy. 1999. Colorado potato beetle resistance in somatic hybrids of diploid interspecific *Solanum* clones. HortScience 34(5):922-927.

Johnson, Alexander, A.T., A. Raymond Miller, and Richard E. Veilleux. 1999. Agronomic, leptine and fertility analysis of a potato somatic hybrid and first generation progeny. Am. J. Potato Res. 76(6):373. (Abstract)

Johnston, S.A. and R.E. Hanneman, Jr. 1999. The nature of the genetic control of Endosperm Balance Number based on aneuploid analysis of Datura. Sexual Plant reprod. 12:71-75.

Kardolus, J.P. and N. Bezem. 1998. The floral abscission zone in Series *Acaulia* and related taxa of *Solanum* section *Petota*. Canadian J. Bot. 76(8):1424-1432.

Karlsson, B.H. and J.P. Palta. 1999. Expression of heat-stable and putative dehydrin proteins during nonacclimated and cold-acclimated conditions in several tuber-bearing S*olanum* species. J. Am. Soc. Hort. Sci. 124(3):245-251.

Kiru, Stefan and N.I. Vavilov. 1999. *Solanum andigenum* Juz. et Buk. as basic material for high starch potato breeding. Am. J. Potato Research 76(6):375. (Abstract)

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7. APPROVED

C. R. Brown, Chairman, Technical Committee — Date

R. L. Lower, Lead Administrative Advisor — Date