

NRSP/IR BUDGET REQUESTS -- ATTACHMENT I
ACCOMPLISHMENTS CY1999

**NRSP-6: Introduction, Classification, Preservation, Evaluation and Distribution of
tuber-bearing *Solanum* species germplasm.**

Introduction: Important progress was made in building the collection. Another successful expedition to Peru was conducted by D. Spooner, collecting taxa for which no live germplasm had previously existed in genebanks. J. Bamberg and S. Kiru, a visiting scientist from Russia (VIR), discovered and collected from new sites in northern Arizona.

Classification: Dr. Spooner continues to resolve problems in taxonomic classification that impede efficient documentation and use of the germplasm. Insights gained from these studies will allow accessions to be assigned stable species names based on empirical differences.

Preservation: The usual work for maintenance of top quality *Solanum* germplasm at NRSP-6 was continued. Germination tests were done on new seed and on others on a 5-year rotation. Virus tests were done on new seeds and the in vitro clonal stocks. Seed increases were done in the spring, fall and summer. RAPD markers were used to assess several aspects of the status and dynamics of genetic diversity in the genebank. Work was started on some long overdue remodeling of the seed and order processing lab.

Evaluation was continued in house or with collaborators specializing in the particular trait: Combining frost tolerance with good tuber type, selection for plants fertile in heat stress, tuber calcium, tuber and foliar glycoalkaloids, late blight and hormone mutants.

Distribution: A total of 6,121 units of germplasm were distributed in 101 orders, ¼ of which were foreign. A new global database was released on the Internet. A popular brochure on potato genetic diversity in the US was produced and distributed. Genebank personnel presented at the Potato Association of America 1999 annual meeting symposium "Potato Genetic Resources".

Intergenebank Collaboration: A meeting of the Association of Potato Intergenebank Collaborators (APIC) was held in conjunction with the Global Conference for Potato, Dec. 6-11, New Delhi, India. APIC members largely organized and presented the papers for the session: "Genetic Resources and Crop Improvement".

For specific areas of accomplishment, see Appendix IV listing recent publications and presentations.

NRSP/IR BUDGET REQUESTS -- ATTACHMENT II
GOALS CY2000

**NRSP-6: Introduction, Classification, Preservation, Evaluation and Distribution of
tuber-bearing *Solanum* species germplasm.**

Introduction: We will continue efforts to identify elite late blight breeding stocks and test genetics of resistance. We will strengthen our collaborative ties with other genebanks. The second of five yearly collecting expeditions in Peru will be conducted.

Classification: Experiments to better understand species boundaries will continue.

Preservation: Efforts to identify less expensive, easier, and more reliable ways to grow and increase potato germplasm will continue. Samples of new germplasm will be transferred to NSSL and/or the University of Wisconsin for backup. Rigorous disease prevention and monitoring practices (mainly for viruses) will be continued. We will continue bacterial ring rot screening as a health monitoring protocol for the in vitro collection.

Evaluation: We will continue evaluating potato germplasm for frost tolerance, glycoalkaloids, tuber calcium accumulation, hormone mutants, late blight, aphid resistance and other characteristics that impact the continued success of the potato crop. Evaluation is a high priority for the genebank, since it is the key to mining the value of the germplasm in which we have invested so much effort for preservation.

Distribution: Potato is the world's most important vegetable crop, and the genebank at Sturgeon Bay is the world's most comprehensive and accessible collection. Germplasm and technical assistance for researchers and breeders will continue to be rapidly and impartially available here.

Intergenebank Collaboration: The cooperative intergenebank project will continue to use RAPDs to assess the dynamics of genetic diversity in model US species. See Appendix for specific projects in progress.

NRSP-6 Appendix
JUSTIFICATION
For 5% increase in FY 2001

Over the past decade we have received budget increases equivalent to 1% per year.

The size of the collection, costs per unit of labor, supplies and upkeep are increasing much more rapidly than this.

This situation means that in lieu of extraordinary increases in efficiency, the project's ability to support potato research will necessarily decline.

We propose a **5% increase in FY 2001**. This will make total allocations for the period FY92-01 (the past decade) equivalent to a steady increase of only 1.8% per year. This will not solve the problem, but will help.

NRSP/IR BUDGET REQUESTS

SUMMARY

NRSP-6: Interregional Potato Introduction Project

Description	Multistate Research Funding						Other Sources of Funding			
	Authorized ^a FY 1999		Authorized FY 2000		Proposed ^b FY 2001		Authorized FY 2000		Proposed ^c FY 2001	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	87,102	3.3	87,102	3.3	91,458	3.3	122,267	3.1	128,380	3.1
Fringe Benefits (Salary Only)	27,324		27,324		28,690		39,140		41,097	
Wages (+ wage fringe)	8,915		12,000		12,600		0		0	
Travel	4,078		4,014		4,215		8,250		8,663	
Supplies	19,000		20,000		21,000					
Maintenance	8,143		11,491		12,065		0		0	
Equipment/Capital Imp. ^d	7,369		0		0		0		0	
UW Contribution (est.)	0		0		0		60,500		63,525	
TOTAL	161,931		161,931		170,028		230,157		241,665	

^a actual spending. Overspent for Project needs and paid by other accounts: \$1,205

^b overall 5.0% base increase over FY2000 -- see Appendix: JUSTIFICATION

^c estimated 5% increase

^d In FY99: Replace 1981 field sprayer that was inefficient and unsafe

NRSP-6 BUDGET REQUEST**NRSP-6: Interregional Potato Introduction Project**

DETAILED INFORMATION ON POSITIONS, SALARIES, AND FRINGE BENEFITS

SALARIES	Multistate Research Funding						Other Sources of Funding			
	Authorized ^a FY 1999		Authorized FY 2000		Requested FY 2001		Authorized FY 2000		Requested FY 2001	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Admin. Project Assistant	21,336	0.6	21,336	0.6	22,403	0.6	14,224	0.4	14,935	0.4
Technician (Specialist)	26,616	1.0	26,616	1.0	27,947	1.0	0		0	
Technician	16,379	1.0	16,379	1.0	17,198	1.0	0		0	
Gardener	5,512	0.2	5,512	0.2	5,788	0.2	22,048	0.8	23,150	0.8
½ Research Assistant	17,259	0.5	17,259	0.5	18,122	0.5	0		0	
Secretary / Clerical	0		0		0		15,335	0.6	16,102	0.6
ARS Research Leader	0		0		0		7,000	0.1	7,350	0.1
ARS Geneticist / Proj. Leader	0		0		0		39,081	0.8	41,035	0.8
ARS Research Botanist	0		0		0		24,500	0.4	25,725	0.4
Total Salaries	87,102		87,102		91,458		122,188		128,297	
Fringe Benefits (Salaries only)	27,324		27,324		28,690		39,140		41,097	
TOTAL	114,426	3.3	114,426	3.3	120,148	3.3	161,328	3.1	169,394	3.1

FY 2000 % Salary increase estimate..... %

FY 2001 Anticipated (requested) RRF Salary increase.... 5%

^a actual spending

APPENDIX IV
Recent Publications and Presentations of Project Personnel
(examples of subject areas in which we are active)

Bamberg, J.B., A.H. del Rio, and M.W. Martin. 1997. Expanding the geographical representation of *ex situ* germplasm samples of wild *Solanum jamesii* and *S. fendleri* from the USA. *Am. Potato J.* 74(6):416-417. (Abstract).

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

Bamberg, J. Germination of gibberellin sensitive *Solanum* (potato) botanical seeds soaked in GA₃ and re-dried. *Am. J. Potato Res.* (Accepted).

Bamberg, J. 1999. Screening for gibberellin deficiency mutants in *Solanum tuberosum* ssp. *andigena* *Am. J. Potato Res.* 76:321,

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

Bamberg, J. and A. del Rio. Sampling considerations when assessing genetic diversity of potato germplasm populations with RAPDs. (Manuscript in preparation).

Bamberg, J. and A. H. Del Rio. Vulnerability of alleles in the US Potato Genebank extrapolated from RAPDs (PAA 1999 published abstract).

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

Bamberg, J., A. H. del Rio & Z. Huaman. Intergenebank Cooperation in Genetic Diversity Conservation Research. Proceedings of the Global Conference on Potato, New Delhi, India, Dec. 6-12, 1999.

Bamberg, J., A. H. del Rio and Max Martin. Expanding The Geographical Representation of *ex situ* Germplasm Samples of Wild *Solanum jamesii* And *S. fendleri* from the USA. (PAA 1998 published abstract).

Bamberg, J., C. Singsit, A. H. del Rio and E. B. Radcliffe. RAPD Analysis of Genetic Diversity in *Solanum* Populations to Predict the Need for Fine Screening. Am. J. Potato Res. (Manuscript).

Bamberg, J., Max Martin and J. P. Palta. Segregation of tuber calcium in an F2 family of extreme parents. Bamberg, (Astr.: NCR-84, 1998) .

Bamberg, J.B., D.J. Ormrod, and W.E. Fry. 1997. Screening wild *Solanum* germplasm for resistance to late blight. Am. Potato J. 74(6):417. (Abstract).

Bamberg, J.B., J.P. Palta, L.A. Peterson, M.W. Martin, and A.R. Krueger. 1998. Fine screening potato (*Solanum*) species germplasm for tuber calcium. Am. J. Potato Res. 75(4):181-186.

Chen, Y-K, J. Bamberg & J Palta. Expression of Freezing Tolerance in the Interspecific F₁ and Somatic Hybrids of Potatoes. Theor Appl Genet. (Accepted).

Chen, Y-K., J. Palta & J. Bamberg. 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. (Accepted).

Chen, Yu-Kuang, J.B. Bamberg, and J.P. Palta. 1997. Cold hardiness and tuber production in progeny derived from somatic hybrids between *Solanum tuberosum* and *S. commersonii*. Am. Potato J. 74(6):422. (Abstract).

Chen, Yu-Kuang, J.B. Bamberg, and J.P. Palta. 1998. Incorporation of freezing tolerance and tuber traits in sexual progeny derived from *Solanum tuberosum* (+) *S. commersonii* somatic hybrids. Am. J. Potato Res. 75(6):273. (Abstract).

Clausen, A.M. and D.M. Spooner. 1998. Molecular support for the hybrid origin of the wild potato species *Solanum x rechei*. Crop Sci. 38:858-865.

del Rio, A., and J. Bamberg. Genebank seed increase does not significantly change the RAPD fingerprints of wild *Solanum* (potato) species. (manuscript).

del Rio, A H, JB Bamberg, Z Huaman, A Salas, SE Vega. Association of eco-geographical variables and genetic variation in native wild US potato populations determined by RAPD markers. (manuscript).

- del Rio, A.H. and J.B. Bamberg. 1997. Use of rapid markers to optimize potato genebank management: Identification of a "mystery" *Solanum sucrense* accession. *Am. Potato J.* 74(6):461-462. (Abstract).
- del Rio, A.H. and J.B. Bamberg. 1998. Effects of sampling size and RAPD marker heterogeneity on the estimation of genetic relationships. *Am. J. Potato Res.* 75(6):275. (Abstract).
- del Rio, A.H. & J. Bamberg. RAPD markers efficiently distinguish heterogenous populations of wild potato (*Solanum*) *Gen. Res. & Crop Evol.* (In press).
- Douches, D., J. B. Bamberg, W. Kirk, K. Jastrzebski, B. A. Niemira, J. Coombs, D. A. Bisognin, K. Walters-Flecher. Fine Screening Wild *Solanum* Species For Resistance To The US-8 Genotype of *Phytophora infestans*. *Am J. Potato Res.* (manuscript)
- Douches, D.S., W.W. Kirk, and J.B. Bamberg. 1997. Fine screening wild *Solanum* species for resistance to late blight. *Am. Potato J.* 74(6):426. (Abstract).
- Errebhi, M., C.J. Rosen, F.I. Lauer, M.W. Martin, J.B. Bamberg, and D.E. Birong. 1998. Screening of exotic potato germplasm for nitrogen uptake and biomass production. *Am. J. Potato Res.* 75(2):93-100.
- Errebhi, M., Rosen, C., Lauer, F., Martin, M., Bamberg, J. 1999. Evaluation of tuber-bearing *Solanum* species for nitrogen use efficiency and biomass partitioning. *Am J. Potato Res.* 76:143-152.
- Huaman, Z., R. Hoekstra, and J. B. Bamberg. The Inter-genebank Potato Database and the dimensions of available wild potato germplasm. *Am Potato Journal* (submitted).
- Huaman, Z., R. Hoekstra, and J. Bamberg. History of APIC and the initiative to create comprehensive databases. Presented: Symposium of Potato Assn. of America Annual Meeting, 1999.
- Lozoya-Saldana, H., A. Hernandez, R. Flores, and J. Bamberg. 1997. Late blight on wild *Solanum* species in the Toluca Valley in 1996. *Am. Potato J.* 74(6):445. (Abstract).
- Palta, J., J. Bamberg, Y. Chen, L. Weiss, B. Karlsson. Understanding Genetic Control of Freezing Stress Resistance using Potato Species as a Model System. *Proceedings of the Cold Hardiness Symposium*

Rivera-Pena, A., D.M. Spooner, R.G. van den Berg, and K. Schuler. 1998. Wild tuber-bearing species of *Solanum* hosts of *Phytophthora infestans* (Mont.) De Bary in natural habitat in Mexico. *Am. J. Potato Res.* 75(6):294. (Abstract).

Spooner, D.M., A. Rivera-Pena, R. Grandenberg, and K. Schuler. 1998. Wild potato collecting expedition in Mexico in 1997. *Am. J. Potato Res.* 75(6):300. (Abstract).

Spooner, D.M., R. Hoekstra, R. van den Berg, and V. Martinez. 1998. *Solanum* sect. *Petota* in Guatemala: Taxonomy and genetic resources. *Am. J. Potato Res.* 75(1):3-17.

Spooner, D.M., V. Martinez, R. Hoekstra, and R.G. van den Berg. 1997. Collecting of potato wild species in Guatemala. *Agro. Mesoamericana* 8(2):59-66.

Thill, C., E. Radcliffe, D. Ragsdale, R. Hanneman, Jr., J. Bamberg. The identification of aphid resistant 4x potato germplasm for use in breeding. (PAA 1999 published abst.)

Van den Berg, R.G., J.T. Miller, M.L. Ugarte, J. Kardolus, J. Villand, J. Nienhuis, and D.M. Spooner. 1998. Collapse of morphological species in the wild potato *Solanum brevicaule* complex (sect. *Petota*). *Am. J. Bot.* 85:92-109.

Vega, S., J. Palta & J. Bamberg. Variability in the Speed of Cold Acclimation and Deacclimation among Tuber-bearing *Solanum* (Potato) Species. *Environmental Stress Physiology* (submitted).