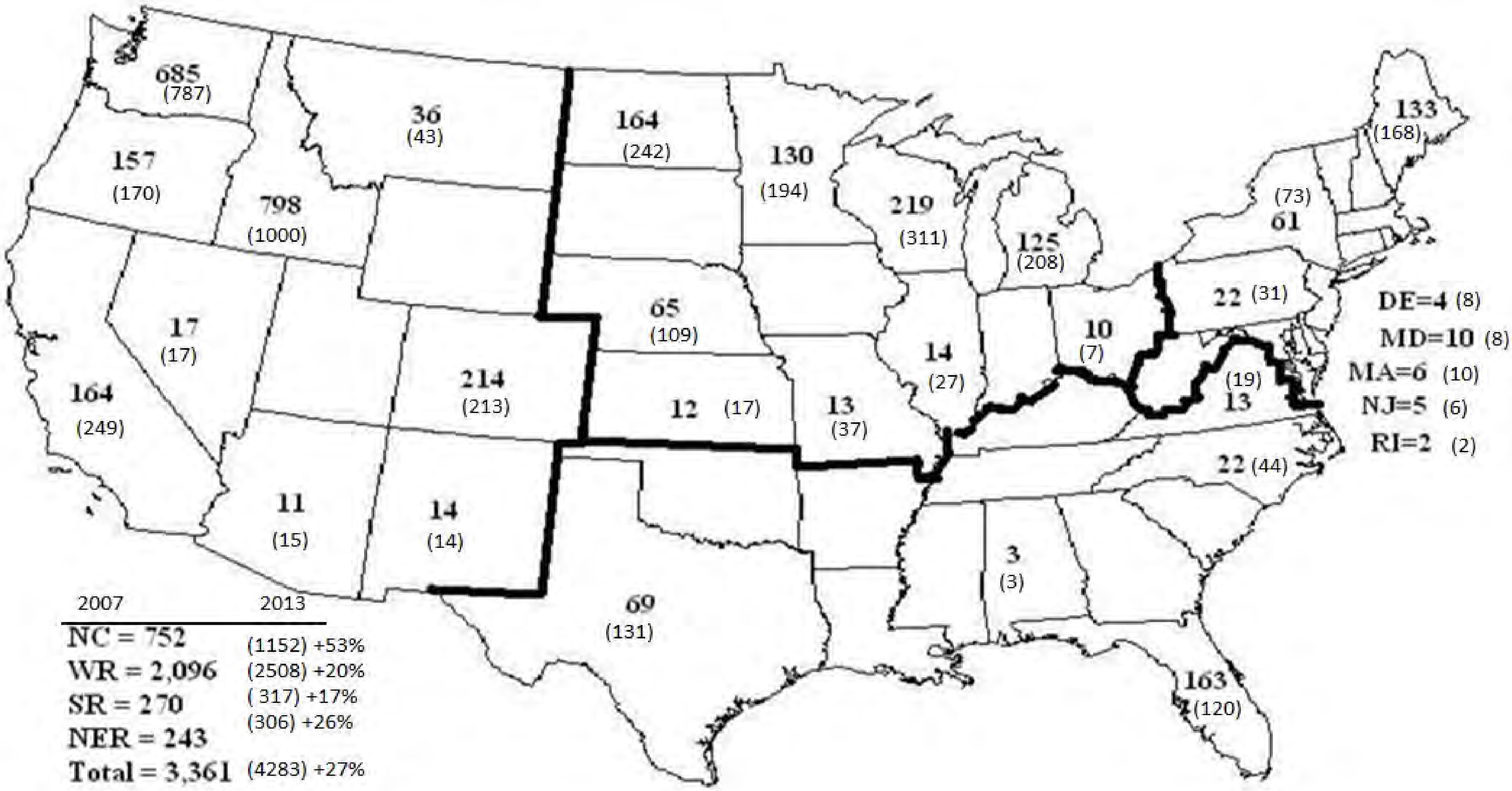
APPENDIX -- Figure 1.

How does NRSP6 pertain as a national issue?

Potato production value in $M for states with data, 2007 and (2013)



APPENDIX A. Enabling Technologies and services accomplished in the past project term

A1. Acquire new germplasm (including five collecting trips to southwest USA organized and led by Project staff)

Foreign donated clones	62
USA wild species collections	114
	total 176

A2. Classify: Streamlining NRSP6 potato taxonomy

Abr.	Current recognized Species	Authority	Previous synonyms
abz	albornozii	S. albornozii Correll	
acg	acroglossum	S. acroglossum Juz.	
acl	acaule	S. acaule Bitter	acaule subsp. acaule, acaule subsp. palmirense, acaule subsp. punae
acs	acroscopicum	S. acroscopicum Ochoa	
adr	andreanum	S. andreanum Baker	paucijugum, solisii, tuquerrense
aem	x aemulans	S. x aemulans Bitter & Wittm.	acaule subsp. aemulans
agf	agrimonifolium	S. agrimonifolium Rydb.	
ajh	ajanhuiri	S. ajanhuiri Juz. & Bukasov	
alb	albicans	S. albicans (Ochoa) Ochoa	
ber	berthaultii	S. berthaultii Hawkes	tarijense
blb	bulbocastanum	S. bulbocastanum Dunal	bulbocastanum subsp. bulbocastanum, bulbocastanum subsp. dolichophyllum, bulbocastanum subsp. partitum
blg	blanco-galdosii	S. blanco-galdosii Ochoa	
blv	boliviense	S. boliviense Dunal	astleyi, megistacrolobum subsp. megistacrolobum, megistacrolobum subsp. toralapanum, sanctae-rosae
brc	brevicaule	S. brevicaule Bitter	alandiae, avilesii, gourlayi subsp. gourlayi, gourlayi subsp. pachytrichum, gourlayi subsp. vidaurrei, hondelmannii, hoopesii, incamayoense, leptophyes, oplocense, sparsipilum subsp. sparsipilum, spegazzinii, sucrense, ugentii
brk	burkartii	S. burkartii Ochoa	irosinum
bue	buesii	S. buesii Vargas	
chc	chacoense	S. chacoense Bitter	arnezii
chl	chilliasense	S. chilliasense Ochoa	
chm	chomatophilum	S. chomatophilum Bitter	pascoense

chq	chiquidenum	S. chiquidenum Ochoa	
cjm	cajamarquense	S. cajamarquense Ochoa	
clr	clarum	S. clarum Correll	
cmm	commersonii	S. commersonii Dunal	commersonii subsp. commersonii
cnd	candolleanum	S. candolleanum P. Berthault	abancayense, achacachense, ambosinum, aymaraesense, bukasovii, canasense, chillonanum, multidissectum, orophilum, pampasense, velardei
col	colombianum	S. colombianum Dunal	moscopanum, orocense, otites, subpanduratum, sucubunense, tundalomense
cop	coelestipetalum	S. coelestipetalum Vargas	
cph	cardiophyllum	S. cardiophyllum Lindl.	cardiophyllum subsp. cardiophyllum
crc	circaeifolium	S. circaeifolium Bitter	capsicibaccatum, circaeifolium subsp. circaeifolium, circaeifolium subsp. quimense, soestii
ctz	contumazaense	S. contumazaense Ochoa	
cur	curtilobum	S. curtilobum Juz. & Bukasov	
dcm	dolichocremastrum	S. dolichocremastrum Bitter	
dds	doddsii	S. doddsii Correll	
dms	demissum	S. demissum Lindl.	
edn	x edinense	S. x edinense P. Berthault	edinense subsp. edinense, edinense subsp. salamanii
ehr	ehrenbergii	S. ehrenbergii (Bitter) Rydb.	cardiophyllum subsp. ehrenbergii
etb	etuberosum	S. etuberosum Lindl.	
flh	flahaultii	S. flahaultii Bitter	neovalenzuelae
frn	fernandezianum	S. fernandezianum Phil.	
gab	garcia-barrigae	S. garcia-barrigae Ochoa	
gnd	gandarillasii	S. gandarillasii C rdenas	
grr	guerreroense	S. guerreroense Correll	
hcb	huancabambense	S. huancabambense Ochoa	
hcr	hypacrarthrum	S. hypacrarthrum Bitter	
hjt	hjertingii	S. hjertingii Hawkes	matehualae
hnt	hintonii	S. hintonii Correll	
hou	hougasii	S. hougasii Correll	
ifd	infundibuliforme	S. infundibuliforme Phil.	
imt	immite	S. immite Dunal	
iop	iopetalum	S. iopetalum (Bitter) Hawkes	brachycarpum
jam	jamesii	S. jamesii Torr.	
juz	juzepczukii	S. juzepczukii Bukasov	
ktz	kurtzianum	S. kurtzianum Bitter & Wittm.	
lbb	lobbianum	S. lobbianum Bitter	

les	lesteri	S. lesteri Hawkes & Hjert.	
lgc	longiconicum	S. longiconicum Bitter	
lgl	lignicaule	S. lignicaule Vargas	
lmb	limbaniense	S. limbaniense Ochoa	
lxs	laxissimum	S. laxissimum Bitter	santolallae
mag	maglia	S. maglia Schltdl.	
mcd	microdontum	S. microdontum Bitter	
mch	michoacanum	S. michoacanum (Bitter) Rydb.	
mcq	mochiquense	S. mochiquense Ochoa	chancayense
med	medians	S. medians Bitter	medians subsp. autumnale, sandemanii, weberbaueri
min	minutifoliolum	S. minutifoliolum Correll	
mlm	malmeanum	S. malmeanum Bitter	commersonii subsp. malmeanum
mrl	morelliforme	S. morelliforme Bitter & G. Muench	
mrn	marinasense	S. marinasense Vargas	
mtp	multiinterruptum	S. multiinterruptum Bitter	
ncd	neocardenasii	S. neocardenasii Hawkes & Hjert.	
nrs	neorossii	S. neorossii Hawkes & Hjert.	
oka	okadae	S. okadae Hawkes & Hjert.	
oxc	oxycarpum	S. oxycarpum Schiede	
pcs	paucissectum	S. paucissectum Ochoa	
pld	polyadenium	S. polyadenium Greenm.	
pls	palustre	S. palustre Schltdl.	brevidens
pnt	pinnatisectum	S. pinnatisectum Dunal	
pur	piurae	S. piurae Bitter	
rap	raphanifolium	S. raphanifolium C rdenas & Hawkes	
rch	rechei	S. x rechei Hawkes & Hjert.	
scb	scabrifolium	S. scabrifolium Ochoa	
sgr	sogarandinum	S. sogarandinum Ochoa	
smb	sambucinum	S. sambucinum Rydb.	
snk	schenckii	S. schenckii Bitter	
sph	stenophyllidium	S. stenophyllidium Bitter	brachistotrichum, nayaritense
sto	stoloniferum	S. stoloniferum Schltdl. & Bouchet	fendleri subsp. arizonicum, fendleri subsp. fendleri, leptosepalum, papita, polytrichon, stoloniferum subsp. stoloniferum
tbr	tuberosum	S. tuberosum L.	

tbr adg	tuberosum subsp. andigenum	S. tuberosum subsp. andigena Hawkes	paramoense, phureja subsp. phureja, stenotomum subsp. goniocalyx, stenotomum subsp. stenotomum
tbr tbr	tuberosum subsp. tuberosum	S. tuberosum L. subsp. tuberosum	
trf	trifidum	S. trifidum Correll	
trn	tarnii	S. tarnii Hawkes & Hjert.	
undet	undetermined	undetermined	
ver	verrucosum	S. verrucosum Schltdl.	macropilosum
vio	violaceimarmoratum	S. violaceimarmoratum Bitter	
vnt	venturii	S. venturii Hawkes & Hjert.	
vrn	vernei	S. vernei Bitter & Wittm.	vernei subsp. ballsii, vernei subsp. vernei

A3. Preserve seed populations and *in vitro* clones

Botanical seed populations	
90 wild species	3,942
3 cultivated species	1,060
total	5,002
In vitro clones	
Named commercial cultivars	284
Primitive Andean cultivars	64
Genetic Stocks	280
Breeding Stocks	181
total	809
Grand total	5,811

Seed Increases (grow families of 20 parents in greenhouse, hand intermate 6-8 times, harvest berries, process and store seeds) = 1,030

Tissue culture maintenance transfers (take a nodal cutting from stock tube, transfer it to a tube with new media to revitalize) = 37,080

Supporting quality tests: ID growouts (field plants to confirm offspring are true to parental type) = 964, Virus and viroid tests = 3,963, Germination = 7,003, Viability (Tetrazolium) = 199, Ploidy = 245, Field plots characterization = 9,659.

A4. Distribute: Number of units and orders by state and region[1]

State	Region	Units	Orders	Regional Summary
Illinois	NC	40	9	
Indiana	NC	63	10	
Iowa	NC	7049	72	
Kansas	NC	14	3	
Michigan	NC	767	34	20,983 units = 65%
Minnesota	NC	894	18	474 orders = 47.4%
Missouri	NC	235	23	
North Dakota	NC	32	5	
Ohio	NC	31	15	
Wisconsin	NC	11858	285	
Connecticut	NE	27	3	
Delaware	NE	3	1	
District of Columbia	NE	30	2	
Maine	NE	199	13	

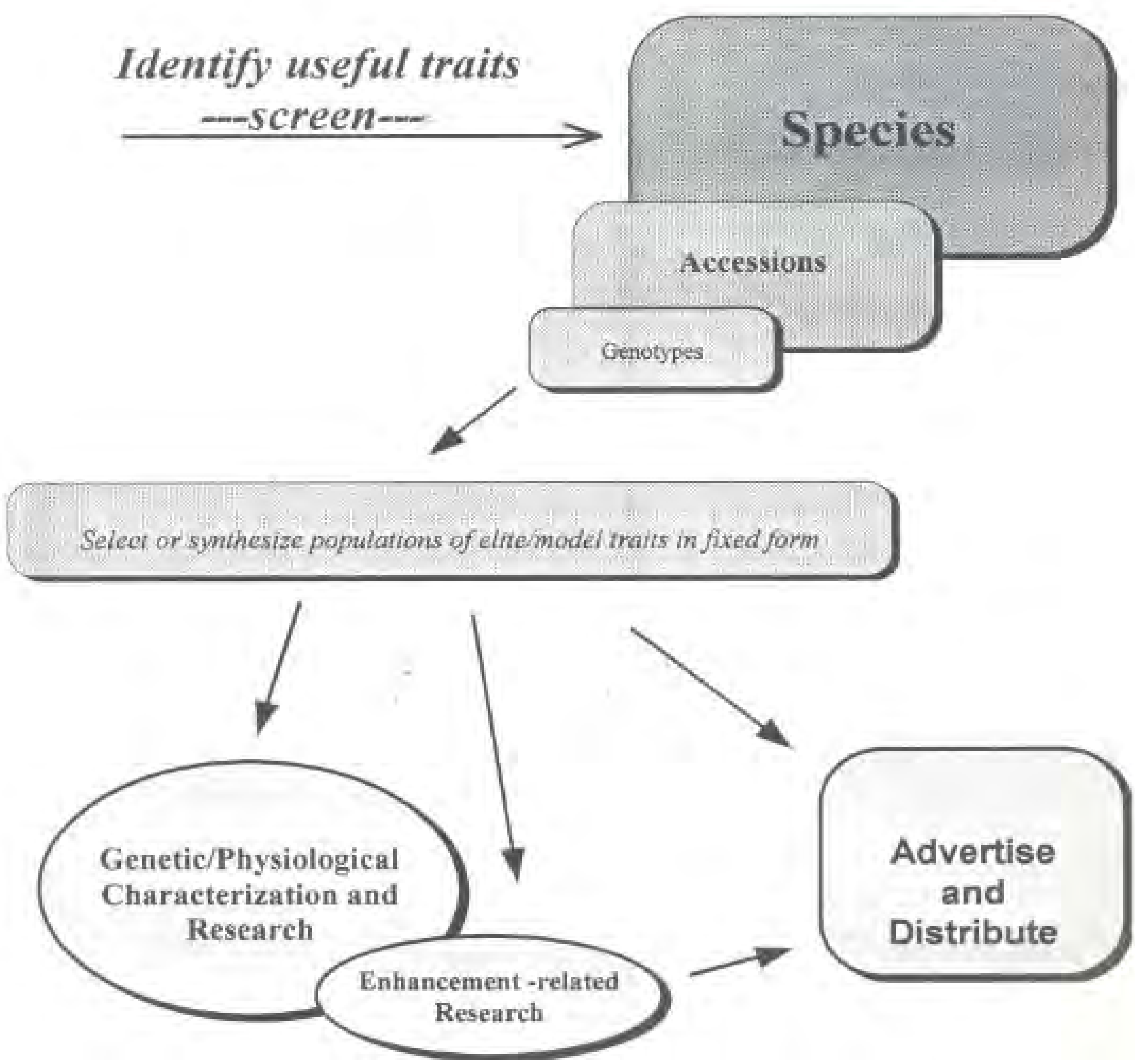
Maryland	NE	450	17	2300 units = 7% 113 orders = 11.3%
Massachusetts	NE	287	5	
New Hampshire	NE	36	5	
New Jersey	NE	12	4	
New York	NE	1015	29	
Pennsylvania	NE	226	30	
Rhode Island	NE	3	1	
Vermont	NE	12	3	
Alabama	S	58	7	1220 units = 4% 144 orders = 14.4%
Arkansas	S	104	9	
Florida	S	187	25	
Georgia	S	45	10	
Kentucky	S	93	11	
Louisiana	S	48	7	
Mississippi	S	21	3	
North Carolina	S	320	16	
Oklahoma	S	1	1	
Puerto Rico	S	37	8	
South Carolina	S	6	4	
Tennessee	S	101	13	
Texas	S	124	19	
Virginia	S	69	9	
West Virginia	S	6	2	
Alaska	W	3	1	7587 units = 24% 269 orders = 26.9%
Arizona	W	60	7	
California	W	1890	81	
Colorado	W	303	22	
Hawaii	W	233	6	
Idaho	W	552	38	
Montana	W	352	8	
Nevada	W	1	1	
New Mexico	W	292	3	
Oregon	W	1505	33	
Utah	W	11	4	
Washington	W	2385	65	

US Total 32,090 1000

[1]Plus 29 foreign countries receiving a total of 5,128 units in 106 orders.

A5. Evaluate: General approach to mining the NRSP6 germplasm

Program for Progressive Fine Screening and Utilization of *Solanum* species germplasm at NRSP-6.



APPENDIX B. Outreach accomplished in past project term

Kept NRSP6 genebank website, GRIN database, Intergenebank Database up to date
Annual Technical Committee meetings organized = 5
Led *American Journal of Potato Research* as Editor in Chief
Led Potato Crop Germplasm Committee as Chairman including organizing grants
Foreign visitors hosted = 53, Domestic visitors hosted = many
Undergrad Summer Student Interns trained = 5

Information dissemination = 50 scholarly publications below from NRSP6 staff. An additional 624 publications by other users of NRSP6 stocks were cited in the annual reports of the past project term.

Bamberg del Rio, Martin, Suriano and coauthors: Five journal articles now available online will be documented in this report when in print: AFLP core set of microdontum, Zebra chip resistance screening in bulbocastanum, New Matryoshka floral mutant, Selection for tuber quality in a Superior x Atlantic hybrid population, History and origin of Russet Burbank.
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Bamberg, JB and JC Miller, Jr. Comparisons of ga1 with other reputed gibberellin mutants in potato. American Journal of Potato Research 89:142-149.
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Cai, X.K., D.M. Spooner and S.H. Jansky. 2011. A test of taxonomic and biogeographic predictivity: Resistance to potato virus Y in wild relatives of the cultivated potato. Phytopath 101:1074-1080.
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Impact of breeding with NRSP6 stocks

A total of 16 cultivars and advanced lines were published in *American Journal of Potato Research* in the past 5 years:

Yukon Gem, Classic Russet, Clearwater Russet, Alta Crown, Cooperation-88, Alpine Russet, Sentinel, Huckleberry Gold, Teton Russet, Elkton, M7 Germplasm Release, AmaRosa, Purple Pelisse, Owyhee Russet, Palisade Russet, Saikai 35.

All of these have NRSP6 exotic germplasm in their pedigrees, including species *S. andigena, acaule, chacoense, demissum, infundibuliforme, phureja,* and *vernei*.

APPENDIX C. Sample (2013) Annual Report (without title page or publications)

Other Annual Report found at http://www.ars-grin.gov/nr6/admin.html

PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

A. Acquisitions and associated work

In 2013, we collected 16 germplasm accessions from the southwest USA under the BdRFK (Bambergs, del Rio, Fernandez, Kinder) prefix. Another major accomplishment was to collect DNA samples from *S. jamesii* Mega-populations at the top and bottom of the range, especially the huge population at Mesa Verde. We are using DNA markers to find out if such populations are such incubators for diversity that they are the only place one needs to collect. We also tested new ideas for collecting when propagules are poor: 1) collecting in *vitro* in PPM medium needs no sterile hood and rescues clones that will not root in soil, 2) AFLP data has shown that collecting pollen captures unique alleles, 3) simple insecticide application to collected fruit prevents fruit fly grubs from destroying seeds. We made the first reported discovery and collection of potato from the Dragoon mountains. We confirmed that *jamesii* still exists at the historic Faraway Ranch site, despite being unable to find it there since 1995. USDA/ARS/Plant Exploration Office supplied $5K and has again in 2014. Detailed trip report for 2013 and plan for 2014 are available on request.

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Mesa Verde *jamesii* mega-population-- millions of plants over 100+ acres

The genebank imported 7 elite breeding stocks from other countries and accepted 7 elite "M" clones from the Shelley Jansky program.

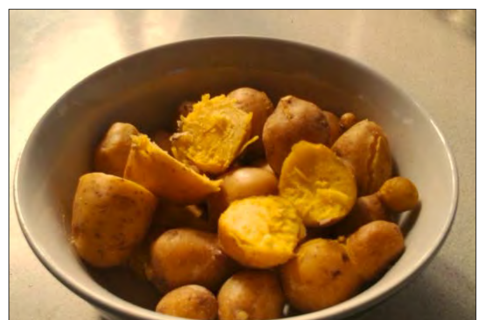
The NRSP-6 web page (http://www.ars-grin.gov/nr6) was updated to include all new stocks and screening information. Clients who have ordered from NRSP-6 within the past four years were contacted three times in 2013, informing them of new stocks of true seed, tubers, in vitro plantlets, or other samples. We used email and the website to extend technical instructions of various types. For example, a technique for breaking tuber dormancy was fine tuned to give reliable and uniform results, even for very deep dormancy tubers.

Better dormancy breaking techniques

B. **Preservation and Evaluation**

A total of 170 accessions were increased as botanical seed populations and 1900 clonally. Over 720 potato virus tests were performed on seed increase parents, seedlots and research materials. Germination tests were performed on 1489 accessions, ploidy determinations were made on 60 accessions, and tetrazolium seed viability tests were done on 50 seedlots. Taxonomic status was assessed on all stocks grown. A total of 7122 units of germplasm were distributed in 249 orders. Orders were filled within one week of receipt. Nearly 200 field plots were planted to verify that seed multiplication efforts last year resulted in offspring seedlots that matched their parents. We used SNPs (cooperator Douches from MI) to assess partitioning of genetic diversity in model potato species with a view to understanding their best management.

With help of cooperators, we made progress evaluating and improving germplasm on several ongoing projects. Over 1800 field plots at USPG, about 1500 seedlings tuberized in two sites in CA (cooperators Serimian and Pearson), and 4 large screenhouses at USPG full of stocks supporting screening for improved *Criolla* or "egg yolk" style specialty potato with golden flesh (cooperator Douglass from FL), folate (cooperator Goyer from OR), glycoalkaloids (cooperator Navarre from WA), anti-obesity (cooperator Kemin from IA), greening, K-screening, new *Coronita* fruit mutant (extra pistils in place of anthers), Zebra Chip resistance in *bulbocastanum* (cooperator Cooper in WA).



Improved *Criolla* selections

We detected a significant association of tuber pH (very fast, cheap and easy to screen) with glycoalkaloids and folate (much harder to screen) and organized an experiment to test this more systematically.

Coronita male sterile mutant

Zebra Chip resistance in *bulbocastanum*

This year, work with J. Palta (UW), International Potato Center (CIP), and colleagues in the Peruvian national potato program (INIA) progress was made in the frost hardiness breeding project with *S. commersonii*. An elite selection was informally named *"Cola de gato"*. We also initiated a program to re-breed the non-bitter, frost hardy *S. ajanhuiri*, a primitive cultivated species with reputed progenitor *S. megistacrolobum* native to the Puno Altiplano.

Bamberg, Palta, del Rio, Gomez and locals at Potato Park near Cusco, Peru

Frost hardy *cola de gato*

Dr. Jansky's Enhancement:

The germplasm release of clone M6 was published in the Journal of Plant Registrations. M6 is an inbred line derived from seven generations of self-pollination. It is homozygous for the Sli gene that confers self-compatibility, and it is male and female fertile.

Jansky, S.H., Y.S. Chung, and P. Kittipadukal. 2014. M6: A diploid inbred line for use in breeding and genetics research. Journal of Plant Registrations. doi: 10.3198/jpr2013.05.0024crg.

Yong Suk Chung completed his Ph.D. thesis entitled "Bacterial soft rot resistance and calcium enhancement in wild and cultivated potato." A polymorphism in the *CAX3-like* candidate gene for calcium uptake by roots was found to be associated with tuber calcium levels. An additional 12 SSR markers also co-segregated with calcium in tubers. SSR4743 is located near the *CAX3* homolog on chromosome 7.
Predictivity of taxonomy and biogeography for late blight resistance was completed (Alexander Khiutti, visiting scientist, St. Petersburg, Russia).A collection of 143 accessions representing 34 wild *Solanum* species was screened for foliar late blight resistance using whole plants and for tuber late blight resistance using greenhouse-generated tubers. A manuscript is in preparation.

Recombinant inbred lines are being developed in populations derived from wild species carrying resistance to early blight (*S. raphanifolium*) and common scab (*S. chacoense*). In addition, an F2 population derived from self-pollinating a clone from a cross between DM1-3 and M6 is segregating for a number of agronomic and disease resistance traits. It is being genotyped using the SolCAP SNP array and will be used for trait mapping. RILs are also being developed in this population.

A population derived by crossing US-W4 with M6 has been grown in replicated field trials for three years. Yield comparable to that of cultivars is common among clones in this population. Phenotyping (tuber yield, size set; chip color) and genotyping are underway.

C. Classification

Dr. Spooner is working on monographs that will fully document the taxonomic reduction of the genebank's species to about 100 species.

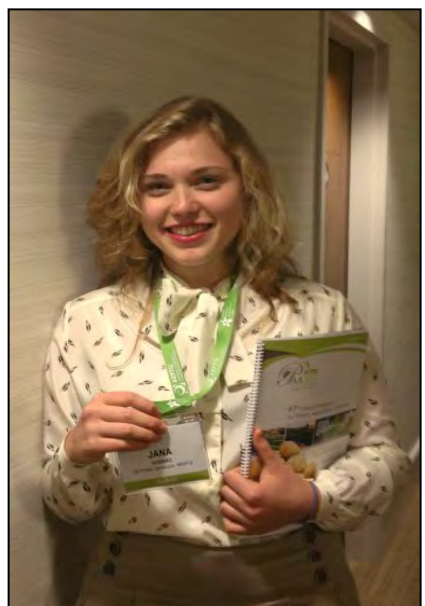
D. Distribution service

Distribution of germplasm is at the heart of our service. The volume and types of stocks sent to various consignee categories are summarized in the table below. **We filled almost 1/3 more orders in 2013 than 2012**: 230 domestic orders to clients in 39 states of the USA and 19 foreign orders to 10 other countries. About ½ of domestic orders are for breeding and genetics, about ¼ for home gardeners, and the remaining ¼ for pathology, physiology, entomology, taxonomy, and education. In 2013 we maintained the popular offering of 100 cultivars as tubers by devising and implementing an iron-clad disease control and quarantine program for their production (full details available at our website).

	Units of Germplasm Sent[1]								
Category	Seed	TU	TC	IV	DNA	Plants	Herb	Total	PIs
Domestic	2,762	71	2,484	1,181	50	2	0	6,550	4,688
Foreign	480	0	12	80	0	0	0	572	501
Total	3,242	71	2,496	1,261	50	2	0	7,122	5,189

[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



Undergrad intern
Jana Suriano, presenter at
2013 PAA

<u>Media coverage, Tours, Teaching, TechTran and Trips with presentations done</u>

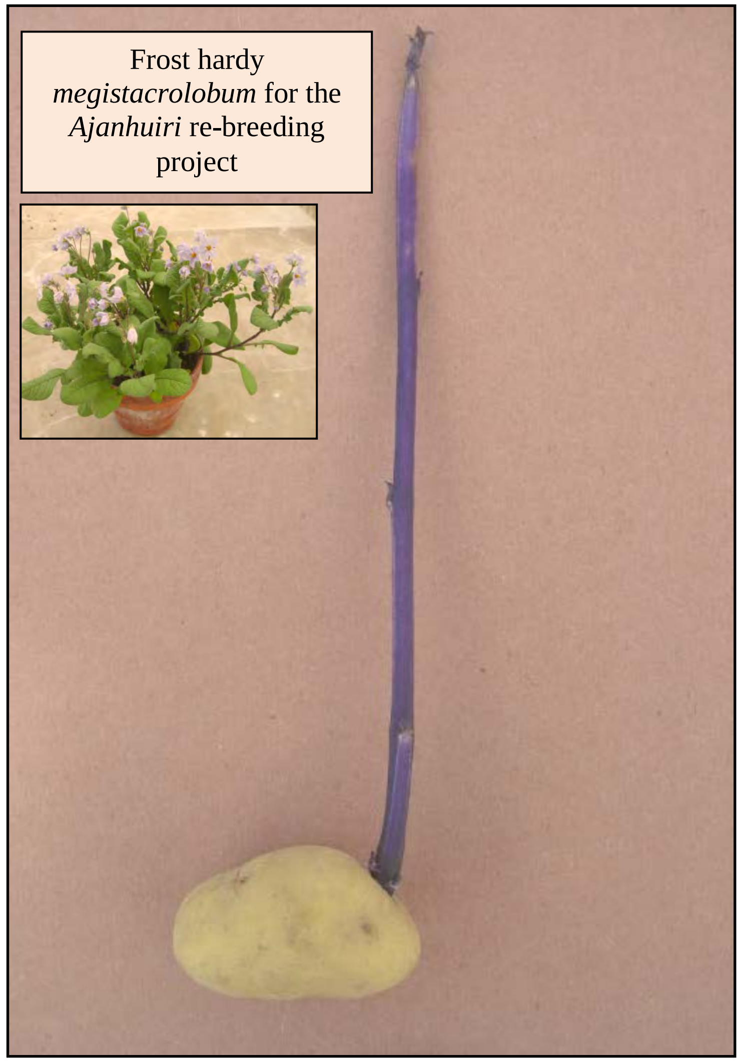
Bamberg served as PhD committee member for Cinthya Zorrilla-C, and Yong Soek Jung.

Summer student interns participated in experiments: Ahna Keilar (seed germ and seedling transplant tech), Abe Keilar (crossing tech for jam and blb), Hannah Haight (prebiotic assay and nutrient microbial bioassays), Jana Suriano (*Matryoshka* floral mutant and tuber greening with publication authorship, attended and made formal presentation at PAA, participated in Arizona collecting).

NCR potato genetics group in Chicago presentations; Potato Association of America meeting in Quebec-- four research presentations/abstracts.

Chinese, Russian, and Japanese potato scientists, UW River Falls Horticulture students, and Southern Door HS Spanish class tour genebank.

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



Frost hardy *megistacrolobum* for the *Ajanhuiri* re-breeding project

Reports & Plans: ARS: PGOC, CGC, CRIS, Annual Performance, Budget. NRSP6: Annual Report, TAC meeting minutes. PAA: AJPR Editor in Chief report, Outstanding Paper. UW-Hort: Annual Performance. PARS: Tour guide & field book.

Management of Grants & Awards: Potato CGC grants, AJPR Outstanding Paper

IMPACT STATEMENT

In 2013, seed increase success was steady, and number of germplasm orders increased substantially, supporting the needs of the nation and world for resources to genetically improve the potato crop.

The payoff in funding the genebank is in discovering and deploying traits that are useful to the public and the industry. We participated in successful selection of better stocks for golden flesh, frost resistance in Peruvian highlands, folate, potassium, resistance to tuber greening, glycoalkaloids, and a natural appetite suppressing protein.

We continued work on improving germplasm management. We again collected germplasm in-country, finding and making available populations at sites never before reported or collected, and developing novel technology to improve the genebank's representation of diversity in the wild.

Salary and travel support plus cash gifts from industry totaled $45K in 2013.

The ability to efficiently evaluate traits is rapidly improving. We are on the brink of a leap forward in breeding through molecular markers and genetic technology. Potato is an increasingly important world food. Climate is changing, and health issues and their economic impact are increasing in our aging population. Because of these factors, there has never been a more important (or exciting) time to be involved in improving potato through mining the rich deposits of traits in the US Potato Genebank.

WORK PLANS / STAFF & FUNDING / ADMINISTRATION

In FY15, we plan to continue the service program to acquire, preserve, classify, and promptly distribute high quality germplasm and data to all requesters. We will endeavor to say "yes" to requests for custom service and advice whenever we are able.

We plan to restore the ½ position of A. del Rio that was cut due to funding shortfalls in recent years, thus rebuilding our program in the area of genetic diversity management research (making use of the new, more powerful DNA markers now available), collecting research (predicting sites likely threatened by climate

change), and benefit sharing collaborations with Andean germplasm donor countries (in particular, the successful frost resistance breeding effort in Puno described above).

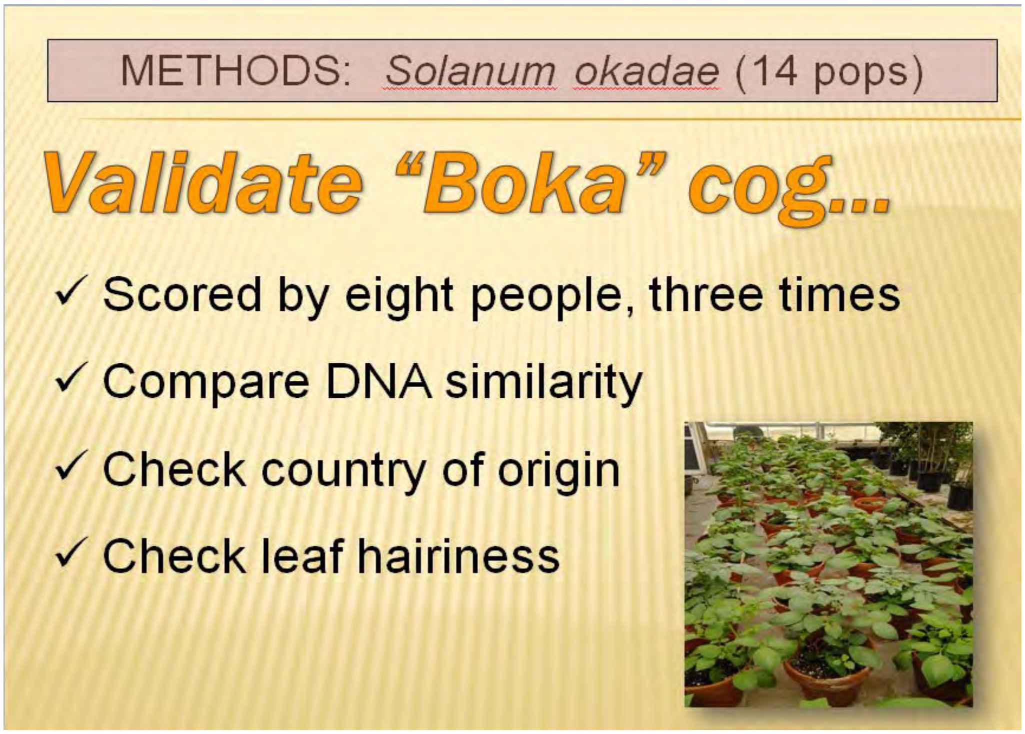
We expect to continue participation in "teaching" activities by hiring summer student interns who learn about potato science and help us explore promising new research and technology ideas (this has resulted in students participating in germplasm collecting, formal presentations at PAA, and authorship on peer reviewed publications). Rapport with potato science and scientists will be maintained by service as editor of American Journal of Potato Research, and participation in the Potato Association of America.

We expect to continue the service to industry partners that has been attracting their strong support, and similarly maintain strong ties with our sister genebanks around the world.

We intend to seek opportunities to evaluate and deploy germplasm in ways that impact the consumer, notably with respect to nutritional traits, thus enhancing the reputation, demand, and positive health and economic impact of the potato crop on society.

We expect to continue and expand approaches to evaluation and technology that multiply information gathering:

1) Multiple data collection schemes for a single grow-out
2) Synergistic cooperation with specialists in various disciplines
3) Testing for links between easily assessed traits and more difficult traits
4) Making use of our *in vitro* facilities and expertise to investigate microbial bioassays and selecting agents.
5) Characterizing visual (cog), genetic, geographic, and trait differences within species as predictors of germplasm application



S. okadae visual "cog" exercise demonstrates method for initial detection of difference within species (slide of presentation at PAA2013)

APPENDIX D. Executive 3-year summary for NRSP6 Midterm Review, CY2010-2012

A. Acquisition. A total of 74 new germplasm stocks were collected in the wild and 33 more imported from cooperators.

B. Preservation schedule was maintained and **Evaluation** was successful for many useful traits: Seed populations multiplied = 660, germination tests = 4014, virus tests = 2110. Over 3000 field plots were grown for evaluation and taxonomy. We worked with numerous cooperators, providing germplasm handling technology, custom samples and hybrids resulting in identification of elite new materials for antioxidants, anti-appetite proteins, orange flesh, folate, thiamine, starch balance, low acrylamide, anti-cancer, resistance to greening, frost tolerance and calcium use efficiency. We discovered a new floral mutant. We demonstrated that hotspots of genetic diversity can be identified in the wild for collecting, and that an AFLP-based core collection of model species will capture all of the known useful traits. We showed that pesticide overspray of wild populations near farmers' fields in Peru may reduce fecundity, but probably not genetic diversity of the wild populations.

C. Classification reduced the number of species to about 100, for a more stable and predictive taxonomy.

D. Distribution totals were strong showing continued interest and value in our germplasm:

Category	Seed	TU	TC	IV	DNA	Plants	Herb	Total	Populations
Domestic	6,709	13	7,681	4,435	123	586	11	19,558	13,236
Foreign	2,537	0	0	1,578	3	0	0	4,118	2,460
Total	9,246	13	7,681	6,013	126	586	11	23,676	15,696

[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. A robust website including access to all NRSP6 stock data, ordering information, technology tips, mapping features, publications, and complete reference to administrative reports was maintained. We hosted numerous visiting scientists, were featured in two documentary films and a syndicated article by the Milwaukee Journal Sentinel, gave invited keynote lectures at the US Botanic Gardens (DC), and Latin American Potato Association (Cuzco); served as Editor in Chief for American Journal of Potato Research and chairman of the Potato Crop Germplasm Committee. We returned benefits to Peru by cooperatively selecting and testing productive frost hardy and calcium responsive lines in the highlands. We trained two summer interns attending UW-Madison and Princeton.

F. Impact. Ten cultivar releases were published, each having at least one of nine different exotic potato species in their pedigrees. No other crop matches potato in use of exotics in practical breeding. Staff published 55 scholarly research papers, and nearly 400 more were cited by others using NRSP6 species.

Work Plans / Staff & Funding / administration / Integration

Acquire wild germplasm in southwest USA and valuable germplasm from other genebanks and/or scientists
Preserve/multiply 200 populations per year, with associated maintenance of purity, germination, and health
Classify in a way that maximizes the groupings of germplasm by genetic value
Distribute germplasm and info rapidly to clients in a way that maximizes their research and breeding success
Evaluate traits already under study and engage new traits, especially nutritional ones (like anti-diabetes)
Publish results of evaluation and technical research (see above)
Lead Crop Germplasm Committee and American Journal of Potato Research
Maintain integration with UW-Madison as full professor in Dept of Horticulture
Maintain >$45K level of 2012 industry support and $150K maintenance level of Multistate Research Funds

APPENDIX E. Administration, NRSP6 staffing, Participation

COOPERATIVE AGENCIES AND PRINCIPAL LEADERS*

State Agricultural Experimental Stations		Representative
Technical Representatives		
Southern Region		C. Yencho
Western Region	Chair (2015)	D. Holm
North Central Region		D. Douches
Northeastern Region	Secretary (2015)	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

ARS		
Technical Representative	Vice Chair (2015)	C. Brown
National Program Staff		P. Bretting
		G. Wisler
Midwest Area		R. Matteri & P. Simon
NIFA		A. M. Thro
APHIS		J. Abad
NRSP-6 Project Leader		J. Bamberg
Agriculture & Agrifood Canada		B. Bizimungu

*Full contact information at: http://www.ars-grin.gov/nr6/techlst.html

Participation

Administrative and technical participation in NRSP6 is configured as per the first section of this appendix. Those individuals represent all of their respective SAES directors and germplasm users, as well as USDA/APHIS, -ARS, -NIFA, and Canada. Although not official participants, private industry is always represented at annual meetings and communications to the TAC. In addition, the RESOURCES and INTEGRATION sections of this document detail how local USDA/ARS and University of Wisconsin staff play a special participatory role in enhancing NRSP6 service. Concerning international support, NRSP6 partners with foreign scientists and foreign genebanks in various contexts like collecting; technical exchanges, training & research; data management. Finally, the multitude of germplasm users (represented in the distributions and publications data presented in Appendix A) may be considered participants since they use raw NRSP6 germplasm to create new breeding stocks and publish results of studies, all which eventually cycle back through NRSP6 to enable and inform germplasm use by future germplasm users.

APPENDIX F. Budget Request with History and Status details

a. History and status -- staff.

It is difficult to objectively apportion contributions from various associated programs, so this section presents only resources under the direction of the Project Leader.

Staff	Historic FTE	FY16-20 plan FTE
Lead & other SY Scientists	0.40 F	1.30 F
Research support	0.40 F	0.50 M
Project Assistant	1.00 W&M	0.80 M
Seed tech	1.00 M	0.75 F
IT tech	1.00 M	1.00 F
Gardener	1.00 W&M	1.00 F
Grad Student	0.50 M	
Labor & other Tech	0.80 M	0.80 M
Subtotals	5.30 W&M	2.10 M
	0.80 F	4.05 F
Total	6.10	6.15

NOTES

1. Employer: F=Fed, M=MRF, W=UWisc
2. In several pre-FY90 years, two Techs, two Grad Students, and Equipment were funded by NRSP6.
3. Since FY90, research support for Lead Scientist has not been provided by ARS as appointed TY, but paid by NRSP6 Grad student funds, grants, and ARS discretionary. In FY04, switched this research support position's employer with federal IT Tech for no net gain. ARS increased staff support represented in 0.75 Seed Tech.
4. In FY09, 1.2 FTE (0.40 Proj Asst + 0.80 Gardener) UWisc salary support lost.

Note that USDA also devotes substantial resources through USDA/APHIS quarantine services for potato imports, and development and maintenance the GRIN national germplasm data computerization system. Both of these are critical to NRSP6 success.

c. BUDGET REQUESTS SUMMARY
FY16-20

NRSP6 - the US Potato Genebank:
Acquisition, classification, preservation, evaluation and distribution of potato (*Solanum*) germplasm

NRSP-6 US Potato Genebank Project FY16-20										
MRF (in $K)										
MRF inputs	Proposed FY16 (year 1)		Proposed FY17 (year 2)		Proposed FY18 (year 3)		Proposed FY19 (year 4)		Proposed FY20 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES & Sal Fringe	116.0	1.30	116.0	1.30	116.0	1.30	116.0	1.30	116.0	1.30
WAGES & WageFringe	27.0	0.80	27.0	0.80	27.0	0.80	27.0	0.80	27.0	0.80
TRAVEL	2.0		2.0		2.0		2.0		2.0	
SUPPLIES & Maintenance	5.0		5.0		5.0		5.0		5.0	
EQUIPMENT/ CAPITAL IMPROVEMENT										
TOTAL	**150.0**	**2.10**	**150.0**	**2.10**	**150.0**	**2.10**	**150.0**	**2.10**	**150.0**	**2.10**

NRSP-6 US Potato Genebank Project FY16-20										
USDA/ARS (in $K)										
ARS inputs	Proposed FY16 (year 1)		Proposed FY17 (year 2)		Proposed FY18 (year 3)		Proposed FY19 (year 4)		Proposed FY20 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
ARS employee SALARIES & Sal Fringe	284.0	4.05	284.0	4.05	284.0	4.05	284.0	4.05	284.0	4.05
Other SALARIES & Sal Fringe	0.0		0.0		0.0		0.0		0.0	
WAGES & WageFringe	0.0		0.0		0.0		0.0		0.0	
TRAVEL	10.0		10.0		10.0		10.0		10.0	
SUPPLIES & Maintenance	28.0		28.0		28.0		28.0		28.0	
Extramural Evaluation Contracts	125.0		125.0		125.0		125.0		125.0	
EQUIPMENT/ CAPITAL IMPROVEMENT	10.0		10.0		10.0		10.0		10.0	
TOTAL	**457.0**	**4.05**	**457.0**	**4.05**	**457.0**	**4.05**	**457.0**	**4.05**	**457.0**	**4.05**

NOTES

Resources directed by Project Leader given here. Contributions by cooperating fed and state projects are extra.
Industry: $45K
UW to continue contributions of facilities, utilities & related services, at least $50K.
Direct input proportions: MRF = 21%, ARS = 65%, UW = 7%, Industry = 6%.