Mid Term Review(Submitted)

Status: Complete

Project ID/Title: NRSP6: The US Potato Genebank: Acquisition, Classification, Preservation, Evaluation and Distribution of Potato (Solanum) Germplasm

Mission and Relevance

1. Mission:

The activity of an NRSP focuses on the development of enabling technologies, support activities (such as to collect, assemble, store, and distribute materials, resources and information), or the sharing of facilities needed to accomplish high priority research, but which is not of itself primarily research. Ideally, an NRSP would facilitate a broad array of research activities. The primary purpose of NRSPs shall not be solely to conduct research, as there are other available mechanisms for creating these types of projects including the multistate research projects and the National Research Project (NRP) options. Examples of NRSP activities might include collection of data that are widely used by other research groups and efforts; development of databases; or development of critical technologies."

Are the activities of this NRSP consistent with the mission of the NRSP program?

Yes ▼

2. (20 points) Relevance to National Issue:

All NRSPs must involve a national issue, relevant to and of use by most, if not all regions. These projects draw on the best minds and resources within and outside the State Agricultural Experiment Station (SAES) system to address the issues.

Does this NRSP address a national issue?

Yes ▼

Comments

Potato, the top vegetable crop in the USA and world, produces more food per acre than any other major crop, which, along with its unmatched palatability makes it our most valuable resource for feeding an increasing global population. The National Potato Council statistical yearbook for 2016 lists 25 states with over $1M in crop production for a national total of ~$4B farmgate. Of course, with 60% of the potato crop eaten as processed foods, the value of NRSP6 germplasm magnifies and extends to all states' food economies as value-added potato products. This prominence also makes potato germplasm an important factor in issues of major social concern, like nutrition, health, and healthcare costs, pesticide impact on people and environment, and climate change. Germplasm of potato is of particular value, since potato has more useful related exotic species and allele diversity than any other major crop. The job of mining the benefits of potato germplasm is certainly not winding down. On the contrary, new challenges to the crop continue to arise, and form the basis of vital and vigorous research efforts by SAES, USDA/ARS, and industry research and breeding. Additionally, new techniques for trait evaluation, and especially germplasm selection and enhancement through DNA technology greatly increase our power to deploy germplasm. A need exists for new techniques for germplasm uses, for example to improve seed germination, long-term storage, and interspecific crossability—the kind of things genebank staff are particularly well-suited to advance. This situation has resulted in many professional researchers and breeders who require access to potato germplasm resulting in demand for NRSP6 germplasm to be increased over 25% from the previous 5-year project term. Since potato is "prohibited" for import except with special quarantine permit, scientists depend on the NRSP6 germplasm already in the USA.

NRSP6 provides critical support to the USDA Potato Genebank, enabling it to provide high-impact enabling technologies, germplasm and associated information readily available to researchers and breeders to facilitate genetic improvement and research. The Genebank accomplishes this by acquiring new useful germplasm, classifying it, multiplying it in vigorous, disease-free form, evaluating it for useful traits, and distributing it free to researchers across the USA and abroad. The genebank collection contains over 5,000 seed populations of about 100 species, and 1,500 clonal varieties and genetic stocks. Demand for these materials continues to steadily increase to over 10,000 units (seed or tuber samples) per year. These stocks, many collected from

now inaccessible wild lands in Latin America over the past 75 years, thus represent an irreplaceable and well-curated genetic resource. Scientists cannot access them from any other source in the US, and importation from other genebanks or re-collecting is impractical or impossible. These living collections require constant curation and will be lost forever without reliable long-term, continual, and persistent funding for their maintenance. The Genebank makes full and effective use of technology to enhance access to the germplasm and associated documentation. All available information on the materials—origin, taxonomy, useful traits, how to order-- is maintained fully on-line. The Potato Genebank maintains a complete website with contact information, new germplasm offerings, germplasm news, technical tips, and administrative reports. All of these efforts promote the use of the germplasm resource to improve the potato crop in ways that directly benefit the nation's farmers and consumers.

Total Points

20

3. (20 points) Relevance to Stakeholders:

Is there evidence of stakeholder use of project outputs?

Yes

Are there project outcomes that aide in development of or contribute to the discussion of public policy?

Yes

If so, please describe

In the past couple of years, breeders achieved a revolutionary remaking of potato as a diploid inbred crop using haploidizing technology and selfing mutants discovered in NRSP6 germplasm-- by NRSP6 staff. NRSP6 further supported the effort in the current project term by importing valuable new stocks and testing techniques. The ploidy manipulation technique that resulted in Yukon Gold was also developed with NRSP stocks--by NRSP6 staff. Wisconsin collaborators isolated and incorporated the gene providing durable resistance to late blight from a wild species collected in Mexico, preserved and studied in the genebank long before its potential was recognized. Washington state collaborators incorporated potent nematode resistance. In 2017, Idaho collaborators reported incorporation of resistance to greening (responsible for 10-15% waste) -- discovered by NRSP6 staff. Collaborators used NRSP6 stocks to develop breeding stocks resistant to verticillium and scab, and donated those back to the genebank. NRSP6 staff helped Oregon State researchers identify germplasm with high folate and resistance to nematodes. NRSP6 staff produced custom hybrids and propagules to help industry partners breed lines with much greater levels of an anti-appetite compound aimed at reducing obesity. At least 70% of named US cultivars contain exotic germplasm from the genebank in their pedigrees. For example, in Wisconsin, of the past 8 cultivar releases from the breeding program, 6 have wild species germplasm as parents obtained directly from NRSP6. NRSP6 staff bred cold tolerant families from which two new cultivars were selected for release in 2018 in Peru. Sequencing the potato genome depended on the use of genetic stocks from NRSP6 developed by collaborators at Virginia Tech. The revolutionary intragenic Innate potato lines from Simplot in Idaho were developed through the use of exotic germplasm from NRSP6. Two new potato pests—Zebra chip and Dickeya-- have become very serious in recent years. In the current NRSP6 project, we are cooperating with state and federal scientists in Colorado, Texas, New York, and Washington, screening for and finding potent resistance in exotic germplasm from NRSP6. All these advances would not have been possible using germplasm in the common breeding pool. They needed to be accessed from exotic germplasm. And that exotic germplasm is only available in the USA from NRSP6. The use of NRSP6 germplasm by stakeholders has been very robust in the past, increasing knowledge and breeding products that have had a great positive impact on the crop-- and this process is increasing in the current project term.

Yes, ready access to this large genetic resource primarily contributes to basic knowledge and provides resilience to potato as a food source. Improved varieties result in better nutrition, thereby improving quality of life and lowering healthcare costs. Increased potato productivity lowers costs, resulting in more disposable income and a raised standard of living. Natural genetic resistances to crop pests and diseases reduces the need for pesticides, thus lower impact on farm workers, consumers, and the environment. Improved efficiency of water and fertilizer use further reduces environmental impact. A potato crop more tolerant to environmental stresses is able to better adapt to climate change. In addition to these scientific advances, genebank staff contribute to discussion of public policy by hosting tours of students and faculty and via invited lectures in the US and abroad during which national policy issues related to conserving germplasm are discussed.

Total Points

20

Implementation of the NRSP

1. (15 points) Management and Business Plan:

Each NRSP must have a well-developed business plan that describes how the project will be managed and funded for a five-year period. This plan includes a management structure to adequately integrate the efforts of multiple participants. The plan should include provisions for linking multiple sources of funding and leveraging those sources with the limited off-the-top research funds. The plan should demonstrate that alternative funding sources have been sought. This plan should include efforts to bring in new agencies, organizations, industry, foundations, etc. to help address the issues and provide funding for the project. All project proposals must provide evidence of contributions from experiment stations across the nation beyond what is available through off-the-top funds.

The midterm review must reflect progress toward meeting funding expectations. Failure to meet funding goals may result in alterations to the off the top budget contribution provided by the SAES system.

Comments

Management, Budget and Business Plan – NRSP6 -- $150K/yr.
Midterm assessment comments follow the approved FY16-20 project outline's Management and Business Plan narrative.

"'Genetic diversity management. DNA-marker-based studies will show us where genetic diversity is concentrated and vulnerable to loss, so we can prioritize stocks for preservation and optimize techniques as needed. [We will continue to test methods of selecting core collections for more efficient germplasm sampling. We will continue DNA-marker-based studies aimed at understanding relative genetic heterogeneity of germplasm subgroups and how this impacts sampling when collecting, preserving and evaluating the germplasm. We will continue studies on efficiency of rapid visual categorization (cogs) for partitioning diversity within taxa.]. "
"Technical research. Studies will be done to improve the efficiency of growing, mating, and storing the stocks, providing results that help the genebank and our clients. [We will investigate more porous potting medium for over-watering protection, techniques for promoting flowering, systems for training plant canopy for better growth, fine tune fertilization and germination methods. We will test fertilization effect on long-term germination. We will use our tissue culture facilities and expertise to start working on use of microbes for bioassays and as selection agents. We will systematically test bridge-crossing techniques to bring S. jamesii and similar primitive diploids into the breeding pool. We will continue breeding toward an ideal universal diploid cultivated tuberosum parent for introgressing diploid exotic wild germplasm.] "
Comments:

Staff met the first goal through accelerated work during the first two years of the FY16-20 project. In the past two years, US Potato Genebank staff:
• performed systematic tests to optimize media and watering.
• made a good start in converting a specialty potato to an inbred diploid.
• created and tested the fourth backcross generation of an optimized bridge species line to make exotic species with high insect and disease resistance accessible to cultivar breeding.
• obtained a UV scope and mainstreamed microscopic verification of pollen quality.
• made a breakthrough in seed germination technology, finding that some seedlots germinate much better in alternating temperature.
"Records. Maintain local data records and those on-line in GRIN and Intergenebank databases [We will transition to the new GRIN. We will make photographs and tissue samples of the field tubers of the cultivar collection and post them online. We will digitize PTIS herbarium records and link them to GRIN provenance records. We will keep the PCGC Vulnerability Statement document updated and revise the NRSP6 Procedures Manual.]."
These yearly goals were accomplished, except that the PTIS herbarium was moved to UW-Madison in summer 2017. In the first two years of the current project, Potato Genebank staff also created high quality scans of representative plants, flowers and tubers from each accession in the species boliviense (223) and microdontum (114). These will be attached to the on-line accession record in GRIN. Staff will continue scanning all accessions.
"Human resources. Project direction will be accomplished through a Technical Advisory Committee and USDA/ARS National Plant Germplasm System leadership. Local administration is by the ARS Project Leader, ARS and UW staff and associated ARS scientists and administration at Madison. We will: Manage staff time and budget to maximize efficiency and flexibility. Strive to make prudent decisions on what we should do in-house and what should be contracted or purchased. Direct experienced base staff to tasks requiring technical expertise and reserve routine work for part-time staff. Hold regular group meetings to make sure the team is working together cooperatively and safely. Conduct annual self-review of overall project progress each year with local staff, and individual staff performance evaluations. Hold TAC meeting on-site every other year to report, tour facilities, provide "face time" with

all local staff, and solicit management input from national experts. Each year prepare the Annual Report, UW Department of Horticulture Professional Activity Report, and ARS Performance Plan Appraisal, as ways to invite feedback on methods, focus and management. “
Two primary formal evaluations provide a summary assessment of the project’s general accomplishments: USDA/ARS annual performance rating for the Project Leader, and the review of the past and future project plan for the corresponding 5-year USDA/ARS federal genebank CRIS. The Project Leader’s annual progress report got a rating of “Superior” and for FY16, and “Outstanding” (the highest possible) for FY17. Review of the past performance and plan for new federal genebank 5-year CRIS project starting in FY18 recently received a perfect score (24 of 24 possible points) by outside peer reviewers.
“ARS contributions. Associated base research budgets from ARS scientists and various sources of outside grant funds also support technical research, labor, supplies and equipment that directly enhance NRSP6 service. See Appendix E and F for details of structure and contributions. ARS administration costs at the Midwest Area and National Levels are also significant. USDA/ARS and USDA/APHIS also provide data management services through GRIN, and for quarantine, respectively.”
The NRSP investment in NRSP6 leverages significant additional federal resources, as USDA/ARS provides $665K support for the federal genebank CRIS.
“University of Wisconsin contributions. The University of Wisconsin Department of Horticulture (HORT) will provide lab and office space for on-campus R&D that supports the NRSP6 service, with administrative and secretarial support for Madison personnel provided jointly by ARS and HORT. The University of Wisconsin Peninsula Agricultural Research Station at Sturgeon Bay (PARS) will continue to be the headquarters of NRSP6. PARS will contribute much of the needed facilities and associated resources: 10 greenhouses, 5 large screen houses, office and storage buildings, two labs, field plots, travel and farm vehicles, security and maintenance, utilities (including the major input of heat and light for greenhouses), plus some secretarial service. We will also use greenhouse and field resources at remote locations with cooperators at the UW-Hancock field station. HORT also provides administration of personnel for local state employees and graduate students associated with the genebank. UW provides accounting services for the NRSP6 budget.”
The UW-Madison CALS continued these home-state contributions. In response to significant reductions in state support for the UW-Madison, USDA agreed to contribute $35K/y beginning in FY17 at the PARS. This represents a reallocation of current funding, rather than new monies. New charges of $900/acre for plot land began in FY15, and totaled $1200 and $1395 for 2016 and 2017, respectively.
“Grants and Collaborators. ARS scientists will continue to seek grants and engage numerous state, federal, international, and industry collaborators who contribute expertise, facilities, equipment and funds to joint projects of mutual interest. Project Leader will continue as chairman of the Crop Germplasm Committee, which provides ~$10K in germplasm evaluation funds each year, expressly intended for evaluation of NRSP6 genebank stocks.”
US Potato Genebank staff solicited and received a $13K CGC grant for potato in 2016, and one for $20K in 2017. The work for the 2017 grant attracted matching contributions from industry, and more than matching contributions in kind from other SAES scientists who also wanted to screen the tubers prepared by NRSP6 staff.
“No fees for service. Charging fees for services has been suggested several times in the past, but always determined to be impractical and counterproductive because implementation would be costly and complicated, it would depress germplasm distribution and use, and, it would contradict USDA policy of free exchange and perhaps inhibit donations of germplasm to NRSP6. “
Staff continue to oppose implementing a charge system for genebank accessions, but this idea should be carefully evaluated. No USDA policy proscribes the practice, and reasonable cost recovery fees for users would bring additional resources to the project.
“MRF contributions. NRSP6 is the NPGS working genebank for the top vegetable, so is perpetual in nature and national in scope. Over 25% of germplasm distributions go to ESCOP scientists. For over 65 years, the important elements of funding and administration for NRSP6 have developed as a partnership of SAES, USDA/ARS, and UW. Continued significant funding and technical/administrative inputs on a multistate basis are seen as necessary to keep this partnership healthy and maintain this project’s impact and efficiency.”
Two University of Wisconsin professional staff with over 25 years in highly-experienced linchpin positions currently provide staff support in tissue culture to the NRSP6 program. It is critical that NRSP6 continue to provide support for these employees, so they can keep working and serving the germplasm needs of SAES potato researchers.

As detailed in the section “Relevance to Stakeholders”, potato is a major crop with many researchers and breeders who spend several millions of dollars each year doing germplasm research and are wholly dependent on availability of the stocks provided by NRSP6.
“Industry contributions: Gifts from private companies prove the practical value of NRSP6, and keep us tuned to the needs of the industry. Such gifts totaled over $45K in each of the past two years. Robust support of this kind will continue to be sought.”
NRSP6 garnered over $45K from industry in both FY16 and FY17. We hope to expand this private sector support. However, national germplasm leaders caution that expecting industry to assume major support for basic public genebank services is problematic for these reasons: Private companies can drop projects and come back to them later, but germplasm needs unbroken commitment or will be lost forever. Potato germplasm is almost exclusively sourced from Latin America, where germplasm ownership issues have blocked sharing. Any stocks imported must go through years of US quarantine testing. So NRSP6 collection built up over the past 65 years represents the only practical source of exotic potato germplasm for US scientists. Industry focuses on the most profitable products and projects in the short-term, while germplasm seeks diversity with a view to long-range benefits. Industry restricts access to germplasm and information, and directs research (that they are paying for) toward their own narrower interests, while national genebanks aim to maximize germplasm study and use by free and broad access.
“NRSP Review Committee approved recommendation to approve NRSP6 proposal and budget with the requirement that the committee look at alternative funding models (e.g., increase ARS budget; look for support from key institutions) and report back to the NRSP RC at the mid-term review on progress toward the goal of eliminating or significantly reducing NRSP funding at the end of this cycle.”
Each year since 2010, NRSP6 staff successfully attracted private sector financial support from both major commercial potato breeders in the amount of $45-50K/yr. Cutbacks in Wisconsin state support for their Agricultural Research Station system, borne in

part by the Peninsular Agricultural Research Station, eroded the value of these private sector investments, however. Little activity has occurred to expand the support network to other industrial sectors, grower groups, or foundations. This situation, exacerbated by a change in Lead AA at the University of Wisconsin, is currently being addressed. A group of NCRA and other allied parties are currently formulating a plan with options to seek support from users and beneficiaries of the potato scientific research and commercial ecosystem. Irrespective of the success of enhanced efforts to build support, we recommend continuation of the current NRSP6 budget. The above midterm assessment shows the essential and successful program enjoying strong and increasing need for germplasm services. Increasing opportunities to leverage the $150K outlay with USDA/ARS, SAES, and industry investment exist and have not been adequately explored. Current efforts to reevaluate current practices and engage stakeholders will yield a stronger and more effective foundational resource for potato science and its associated industries.

Total Points

5

2. (15 points) Progress Toward Objectives and Projected Outcomes:

a. Objectives, milestones and deliverables should be described in sufficient detail such that progress can be measured.

b. The midterm review of the project must demonstrate productivity, progress toward original objectives and the relationship between projected goals, actual accomplishments and any impacts to date. As appropriate, this assessment must include an evaluation of stakeholders' use of project outputs to date.

Comments

The latest distribution statistics (for FY 2017) demonstrate strong and increasing productivity and demand for NRSP6 services with 12,101 units of germplasm in 246 orders sent to 35 states and 9 foreign countries. NRSP6 staff added valuable new cultivars and breeding and genetic stocks. Staff continued annual collecting expeditions to the southwestern USA to study and collect the two wild potato species native to the United States. Maintenance of germplasm continued with botanical seed increase of about 200 families. This involves hand pollinating 20 parent plants of each family in the greenhouse, harvesting fruit; extracting, processing and storing seeds. Maintenance of clonal stocks required about 3,150 tissue culture transfers. Normal greenhouse tuber increase of about 100 cultivars were made available to requesters. Almost two acres of small field plots were planted for numerous studies related to germplasm use and evaluation. All these efforts require monitoring of disease free status and viability of the germplasm, so over 800 virus assays were done as well as 1,600 duplicate germination tests. As detailed elsewhere, NRSP6 continued a very active program in basic research and evaluation, both in-house and with specialist collaborators in numerous states.

The section on relevance of the project noted several current examples of direct use of NRSP6 resource by multiple state and federal users to breed advanced lines and cultivars. A recent example demonstrates the coordinating and promotion function of the genebank: The Potato Crop Germplasm committee was invited to recommend a grant project for evaluation. NRSP6 staff solicited candidate grants, organized voting to prioritize them, and managed the paperwork to administer the funding. The selected grant to screen for a serious new tuber rot disease was awarded to a state researcher in Colorado. NRSP6 staff also engaged a second expert pathologist at Cornell to conduct advanced screening on remnant tubers of a spectrum of species available at Sturgeon Bay. Thus, some species with promising resistance were identified in advance of the actual award of the grant. A consortium was organized to multiply the useful information this study would yield. NRSP6 staff negotiated the agreement of an industry partner to GBS genotype 50 populations of the promising species. They also obtained an additional $20K in outside support from industry to grow replicated tuber samples of these populations in two greenhouse locations, in specialized commercial tuberizing growth chambers, and in the controlled environment Biotron facility at UW Madison. In the end, NRSP6 staff coordinated state and industry scientists at CO, NY, and WI to screen the germplasm for the most potent sources of tuber rot resistance, assessed the interaction and variability of growing environment, assessed the interaction with supplemental applied calcium fertilizer, and provided precise genetic characterization. In addition, NRSP6 staff already made successful crosses between the resistant wild species and commercial cultivars.

Total Points

15

3. (15 points) Integration:

a. Project proposals should indicate how efforts are integrated with extension or academic

programs and how results might be of use by other potential stakeholders.

b. In the midterm review, the project must address actual collaborations and any new partnerships built during the project period. The report should address the degree to which the full team is engaged in project planning and implementation. Discuss plans to correct any weaknesses that may have been identified

Comments

The UW-Madison CALS fields a strong interdisciplinary team of potato scientists in the Departments of Entomology, Horticulture, and Plant Pathology, with related research across four agricultural research stations. The project leader, an ARS employee, holds a zero-dollar faculty appointment in the UW-Madison Department of Horticulture, participates in graduate training, and is well integrated into the local potato research milieu. Summer interns undertake short term research projects, often resulting in peer reviewed journal publications. NRSP6 staff attend and participate in professional meetings, and provide service leadership (for example, the project leader is the chairman of the Potato Crop Germplasm Committee). The project leader is the Editor and Chief of the American Journal of Potato Research, thus keeping NRSP6 aware of the topics and people doing the latest potato research. The project leader personally reviews every germplasm order, often contacting the requester to make sure the most appropriate materials will be delivered. This often leads to cooperation in which NRSP6 synthesizes custom propagules and hybrids.

In addition to the already-mentioned longstanding relationships with many research collaborators around the country and abroad, USDA/ARS provides a supporting team of federal scientists at UW Madison. Thus, NRSP6 leverages input from a taxonomist, a germplasm pre-breeder, a pathologist, and a physiologist who advise and assist with the NRSP6 germplasm mission.

Total Points

15

4. (15 points) Outreach, Communications and Assessment:

All project proposals must have a sound outreach, communications and an assessment plan that seek to communicate the program’s goals, accomplishments and outcomes/impacts. The communication plan must detail how results will be transferred to researchers and other end users and contain the following elements:

a. Clear identification of the intended audience(s) of the NRSP. Since this is a Research Support Project, in most instances the primary beneficiary of the results will be other scientists. However, careful consideration should be given to other possible users of the information (such as consumers, producers, governmental agencies (local, state and federal), general public, etc.)

Yes

b. Clear description of the engagement of stakeholders in the definition and/or conduct of the research support project.

Yes

c. Thorough description of the methodology to measure the accomplishments and impacts of the National Research Support Project and effectiveness of the communication plan. Methods such as surveys, town meetings, conferences, analyses of reference data (e.g. citation index, etc.), and use of professional evaluators should be considered.

Yes

d. Specific description for development of communication pieces describing the activities, accomplishments, and impacts of the NRSP. The communication pieces will be used with SAES/ARD directors, stakeholders and their organizations, funding sources and agencies, and congressional delegations.

Yes

e. Suggested mechanisms for distribution of the results of the research support project. Examples include sharing the results at annual meetings of stakeholders, providing material to the Budget and Advocacy Committee of the APLU Board on Agriculture Assembly and other appropriate committees within the SAES/ARD organization, and assisting NIFA is preparation of appropriate documents highlighting the impacts of the project.
The midterm review must demonstrate the extent to which the NRSP is working to effectively communicate project results to those who need them and their use by target audiences

Yes

Comments

NRSP6 staff have well-established relationships with national breeders and researchers as long-term colleagues and actively participate in potato research meetings. For example, Project leader Bamberg has attended and presented research at each of the 35 past annual meetings of the Potato Association of America since 1983, and 33 of the annual meetings of the North Central Regional Potato Genetics Technical meeting. Staff member del Rio was invited to be on the organizing committee at the joint meeting of professional potato research and industry groups in Cusco, Peru in 2018. Project Leader Bamberg serves as the Editor in Chief of the world's premier research journal, American Journal of Potato Research and chairman of the federal Crop Germplasm Committee, and genebank staff member Jansky is the current President of the nation's professional potato research society, The Potato Association of America. In the past two years, the staff (not counting the associated germplasm programs at Madison) published 9 peer reviewed papers, one book chapter, and 2 invited reviews.

NRSP6 makes effective use of technology, maintaining a website (https://www.ars-grin.gov/nr6/) with a page "In the News" that documents all its media exposure. For example, see https://www.ars-grin.gov/nr6/press2/1708_interview.pdf It also provides a portal to GRIN, USDA's Germplasm Resources Information Network, providing a customer on-line access to all germplasm data, and a platform for ordering stocks. NRSP6 announces new materials three times per year to an email list of over 300 customers. NRSP6 established close communication and cooperative projects with the private sector -- SeedSavers potato collection in Kenosha, WI, and industry—Kemin, Simplot, Pepsico-FritoLay, CETS. The NRSP6 Technical Advisory Committee, consisting of the nation's top experts in potato germplasm technology, breeding, and administration meets annually to advise genebank staff. Staff fully mesh their germplasm activities with the federal national programs for germplasm acquisition (PEO), quarantine (APHIS), germplasm databasing (GRIN), and long-term germplasm backup in Ft. Collins, CO. NRSP6 staff meet annually with all other national curators and USDA/ARS genebank administrators as the Plant Germplasm Operations Committee.

Assessment takes several forms. Formal staff reviews are conducted each year by UW and USDA. The corresponding USDA/ARS genebank CRIS also goes through peer review every five years as does NRSP6. Prior to the annual NRSP6 technical committee meeting, a list of germplasm orders from each region is provided to the corresponding technical rep, who solicits remarks about the quality of service from the recipients.

Total Points

15