

Appendix G: Peer Review (Submitted)

Status: Complete

**Project ID/Title:** NE\_TEMP9: Conservation and Utilization of Plant Genetic Resources

**Rate the technical merit of the project:**

1. Sound Scientific approach:

Approve/continue project

2. Achievable goals/objectives:

Excellent

3. Appropriate scope of activity to accomplish objectives:

Excellent

4. Potential for significant outputs(products) and outcomes and/or impacts:

Excellent

5. Overall technical merit:

Excellent

Comments:

Overall, this is a well written project plan for Conservation and Utilization of Plant Genetic Resources. I only had very minor comments and thoughts as I reviewed this project. These are listed below.

NE\_TEMP9: Conservation and Utilization of Plant Genetic Resources.

The amount (296,488 / year) of plant genetic resources of various plant species that NPGS provides to customers and stakeholders is truly commendable. I do know many researchers at Universities and ARS who place a very high value on the ability of GRIN to provide seeds, clones etc. of high value crops. I too have requested seeds from GRIN-Global over the years for many of my studies and have not been disappointed.

Para 1: However, genetic resources are at risk due to reduced cultivation?? The other part of the statement is conceivable. However, why should reduced cultivation reduce genetic resources? The resources with USDA GRIN should still be there. Please modify this statement if possible.

**Thank you for this helpful comment.**

**We have clarified and removed confusing text, changed the following sentence:**

***However, diverse genetic resources are at risk due to reduced ~~diversity in large-scale~~ cultivation, changes in environmental conditions, degradation of native habitats, and international inaccessibility.***

The four proposed objectives are sound and can be accomplished by the group.

Objective 4: Support development of novel...

I assume that researchers in Universities and USDA ARS will be the ones developing the novel priority vegetable, hemp and fruit germplasm?? The authors do state that these will be done in collaboration with other entities and PGRU will help provide the starting germplasm? Or will PGRU scientists directly work on some of these projects? Importance of Work: There is no doubt that this work is extremely important for a sustainable future.

**This is an important point to clarify. We have changed the Proposed Objectives 4 text to specific the role of the PGRU curatorial staff in ongoing and planned breeding efforts:**

***Actively engage in and support the development of novel priority vegetable, hemp, and fruit germplasm that integrates diverse, useful genes from various resources and breed, release, maintain, and evaluate improved and regulatory compliant germplasm and cultivars. Devise and apply research tools, knowledge of genetics, and of the genetic control of priority traits to broaden the diversity available for agricultural production systems. The role of the PGRU staff in the development of novel priority germplasm will vary across different crops and projects, and can range from providing germplasm resources to projects, advising project planning and implementation, to direct action on data collection and analysis.***

In 2021, the hemp germplasm...

How diverse is the hemp germplasm. Have detailed genotyping (GBS, WGRS) studies of the entire hemp collection been done??

**Wonderful question! Thank you for asking.**

**We have appended the paragraph with text outlining out genotyping plans:**

***“Work is planned for 2023 to genotype the entire collection and to conduct population structure analysis. These genotyping efforts will guide collection and conservation priorities, development of mapping populations, and provide higher stakeholder utility as inputs into breeding programs.”***

Related, current and Previous work: Germplasm maintained at PGRU is currently .....

Several researchers are also working on resistance in tomatoes and other solanaceous crops to ToBrFV which has become a major problem across the world.

**Changed text to include Rs5 bacteria and ToBrFV virus testing.**

Cucurbit Accessions have also been evaluated for resistance to *Phytophthora capsici* by various groups. If there is space these can be mentioned as well.

**Added text: “*Cucurbit accessions have been evaluated for resistance to the oomycete pathogen *Phytophthora capsica*, which result in outbreaks that are challenging to manage and can result in huge yield loss.*”**

Some of the ongoing research cooperation include: Kousik and Ling work on various vegetable crops but not Asparagus according to the USDA ARS website.

**We have been coordinating with Dr. Kousik and Ling at the USDA-USVL in Charleston, SC to plan these efforts, but they have not yet been formally established.**

Is it 2017-2022 or 2018-2022?? In some instances, it is 2017 to 2022 and others it is 2018 to 2022. Please check and modify as needed.

**Thank you for identifying this error. Corrections have been made throughout.**

Methods:

Objective 1: Can the scientists elaborate a little bit more on the exploration part? Specifically, exploration will be carried out for which crops (apart from the one described for apple and *Prunus* species)? Whether such explorations will be national or international and will it be a team travelling through various continents etc.?

**Thank you for this suggestion. We have information regarding upcoming hemp and vegetable exploration efforts:**

***“Cannabis germplasm exploration and collection efforts are challenging due to a suite of complex international relationships. However, there are two hemp germplasm collection efforts in the early stages of planning, in Northwestern Vietnam and Uzbekistan. These regions have been identified by stakeholders as sources of locally adapted germplasm to abiotic stress tolerances and photoperiod insensitivity.***

***A recently funded USDA Postdoc collection and evaluation fellowship was awarded titled “Investigating the utility of feral populations for Brassica crop breeding” which describes a highly valuable and unique approach to address many important questions within the broader domain of crop genetic resource conservation and plant breeding. Specifically, this proposed work will investigate feralization within Brassica crops as a mechanism to both enhance conservation efforts while providing new insight into genetic control of priority traits (e.g., plant architecture, phenological development, yield, and domestication). This work would provide great value to the National Plant Germplasm System by identifying, collecting, and safeguarding vital genetic resources and support of***

***breeding and other improvement efforts. NPGS curators will receive, accession, conserve, and help with characterization of genetic materials gathered during this work and ensure that phenotypic or other associated information generated from this research is associated with relevant accessions within GRIN-Global.”***

Milestones:

A general question: Based on distribution record and accession viability, how long (approx..) does one generation of regenerated seed for 150 vegetable accessions last. The researchers may want to point this out in the text. 150 vegetable accession that will be regenerated? Or this will depend upon the progress that is being made with specific individual vegetable accessions?

**Added additional clarifying text:**

***“The viable lifetime of regenerated seed varies between different crop species, ranging from a few years to ~50 years, and is a major factor in deciding which accessions get regenerated in a given year.”***

2027 Milestone: Will PGRU develop the MAGIC population mor will this be done in collaboration with University or other ARS researchers? Developing large MAGIC populations is a significant endeavor.

**Yes, this work will occur with numerous collaborators. We have changed the milestone text to acknowledge the role of collaborations in this challenging process.**

***Develop parents for hemp MAGIC populations with collaborators.  
Begin development of hemp MAGIC populations with collaborators.***

Table 2.

56% of the seed samples were distributed to foreign entities (26,530 / total: 47,140). The Global impact of USDA GRIN cannot be understated.

Your Recommendation: Approve/continue project

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#### Comments

This proposal leverages decades of germplasm conservation work in a wide variety of crops that provide a broad, durable and high priority impact. NE9's support for the project will enhance this vital long-term work in an area where climate impacts (pathogenic as well as environmental) create uncertainties for the crops involved on a scale rarely seen in recent memory and demonstrates the wisdom of a robust and diverse conservation effort to ensure that germplasm material for such radically and unpredictably changing conditions. The project proposes a comprehensive and strategic approach to high priority areas that will support ongoing collection development, dissemination of material, and information management while also applying genetic analysis to understand the ways in which material in the conservation programs can provide better performance based on highly-heritable traits. With my expertise in malus conservation with specific reference to historical cultivars for both fresh eating and cider, the proposal makes clear both the work that needs to be done with fruit like apples while also serving an incredibly broad set of public constituencies and research communities. It is an elegant and well-conceived approach to pressing problems in each crop area. Knowing in some significant detail the impact the work of the germplasm collections to support research on fruit conservation, plant breeding, and other research with impacts locally, regionally, nationally and internationally, it is easy to see how this project will deepen and expand on previous work in such a vital area. The team's proposal addresses critical needs and provides ways to answer important questions while doing so efficiently and collaboratively. It is clear the team has strong conceptual approaches but even more important is that their proposal reflects very careful coordination and prioritization. I was impressed by that element of the proposal.

Your Recommendation:

Approve/continue project