United States Department of Agriculture

Progress Report

Title:	**Enhancing Educational Outcomes For Plant Genetic Resources Conservation And Use**

Sponsoring Agency	NIFA	**Project Status**	ACTIVE
Funding Source	Non Formula	**Reporting Frequency**	Annual
Accession No.	1021849	**Grants.gov No.**	
		Award No.	2020-70003-30930
Project No.	COL0-2019-04487	**Proposal No.**	2019-04487
Project Start Date	06/01/2020	**Project End Date**	05/31/2023
Reporting Period Start Date	06/01/2020	**Reporting Period End Date**	05/31/2021
Submitted By		**Date Submitted to NIFA**	

Program Code: ER

Program Name: Higher Ed Challenge

Project Director

Patrick Byrne
970-491-6985
patrick.byrne@colostate.edu

Recipient Organization

COLORADO STATE UNIVERSITY
601 S HOWES ST
FORT COLLINS, CO 805212807
DUNS No. 785979618

Performing Department

Soil and Crop Sciences

Co-Project Directors

Volk, Gayle
Zarestky, Jill
Walter, Suza
Gardner, Candice
Kinard, Gary
Morris, Geoffrey

Departments

Plant Germplasm Preservation Research Unit

School of Education
Agronomy
Plant Intro Research Unit
National Germ. Resources Lab.
{NO DATA ENTERED}

Non-Technical Summary

Plant breeding is a key component for meeting future food needs in a world undergoing population growth, a changing climate, and a shrinking land and water resource base. An essential ingredient for breeding progress is the genetic diversity conserved in the USDA-ARS National Plant Germplasm System and similar organizations. Maintaining and utilizing the plant genetic resources (PGR) in these genebanks require a specialized set of skills, but there is a lack of high-quality materials for learning these skills. This project represents a unique collaboration between scientists at Colorado State University, Iowa State University, and USDA-ARS to address this need. The long-term goal of the project is to expand the agricultural workforce that is well trained in subjects relevant to PGR acquisition, preservation, distribution, evaluation, and utilization. We will develop an organized series of learning resources (videos, ebook chapters, images, etc.) covering PGR topics; establish an online repository to host, organize, and track usage of the content; develop and offer three 1-credit graduate-level course modules at Colorado State University on PGR conservation and use in plant breeding and genetics; and disseminate the developed materials broadly to communities of interest, both in the U.S. and globally. Two graduate students will help create and evaluate the effectiveness of the learning resources. We envision that the materials developed in this project will be widely incorporated into graduate and undergraduate agricultural and bioscience courses, thus enhancing the understanding of crop genetic diversity and its importance in global food security. The learning resources will also be used by USDA-ARS, private companies, and non-governmental organizations to improve the abilities of their employees to conserve and use PGR.

Accomplishments

Accession No. 1021849 **Project No. COL0-2019-04487**

Major goals of the project

Our long-term goal is to expand the agricultural workforce that is well trained in subjects relevant to the acquisition, preservation, distribution, evaluation, and utilization of plant genetic resources (PGR). Specific objectives are (1) to create an administrative framework for prioritizing, developing, reviewing, and distributing PGR learning materials; (2) to develop an organized series of learning resources (videos, ebook chapters, images, etc.) covering PGR topics; (3) to establish an online repository to host, organize, and track usage of the developed content; (4) to develop and offer three 1-credit graduate-level modules at Colorado State University on PGR conservation and use in plant breeding and genetics; and (5) to disseminate the developed materials broadly to communities of interest.

What was accomplished under these goals?

(1) An Advisory Council of 10 members representing various target audiences was formed and has met twice virtually. The Council has given us guidance on reaching target audiences and helped us advertise the online courses. The entire group of project personnel have met monthly to report on status of the various components, set priorities, and address problems that have arisen. Subgroups have met as needed to discuss more specific aspects of the project.
(2) In this first year of the project we produced a variety of learning materials and set the stage for developing many more materials in the future. Among the items produced were ebooks, videos, infographics, and a YouTube channel. A research associate and graduate research assistant were hired at CSU, both of whom will contribute to product creation. We initiated a collaboration with CSU's Center for Science Communication to produce six short videos focused on four globally important crops: sorghum, cowpea, potato, and tomato.
(3) A draft version of a repository site (GRIN-U.org) was designed and created, and a number of items uploaded. The site allows searching for materials by format and topic, and includes links to a variety of other training resources. A July 2021 public launch of the site is planned. An evaluation plan has been conceptualized to track usage of the materials on the site.
(4) A new 1-credit graduate level online course was approved at CSU and will be offered in Fall, 2021. This first course will focus on the origin, genetic properties, and geographic patterns of plant genetic resources; crop domestication and diversification; and the role of plant genetic resources in global food systems.
(5) Information on the online course was sent to a large number of relevant mailing lists. Dissemination of the learning materials is awaiting the public launch of the repository site, GRIN-U.org.

What opportunities for training and professional development has the project provided?

Gina Cerimele (Graduate Research Assistant) received training in genetics, plant breeding, and plant genetic resources conservation and use, especially about sorghum. She also has gained experience in conceptualizing and planning educational videos. Katheryn Chen (Research Associate) gained experience in video editing and producing infographics and digital illustrations. Geoff Morris (co-PI) received training in online course design. The undergrad student (Chloe Arduino) received one-on-one mentoring on crop management and plant breeding methods. Ms. Cerimele, Dr. Morris, and the project consultant (Deana Namuth-Covert) received training in research on human subjects.

How have the results been disseminated to communities of interest?

Online presentations about the project were given at annual meetings of the National Association of Plant Breeders and Crop Science Society of America, and to employees of the USDA National Plant Germplasm System, members of several crop germplasm committees, and members of the international genebank community. Details are provided in the Other Products sections of this report.

What do you plan to do during the next reporting period to accomplish the goals?

We will make a public announcement of the GRIN-U repository, where users can access the learning materials produced in this project. We will continue to produce videos, in particular through collaborations with the Center for Science Communication and CSU Online at Colorado State University, and at the USDA Plant Introduction Station at Ames, IA. We will also continue to create other types of learning materials, including ebooks, infographics, and case studies. The project's first online course (entitled Plant Genetic Resources: Genomes, Genebanks, and Growers) will be offered in Fall 2021 with Dr. Geoff Morris as instructor. A graduate research assistant will be hired at Iowa State University in Fall 2021 and will contribute to development of learning materials. The project's evaluation plan will be further developed and data collection will begin.

Participants

Actual FTE's for this Reporting Period

Role	Non-Students or faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	

Accession No. 1021849 **Project No. COL0-2019-04487**

Actual FTE's for this Reporting Period

Role	Non-Students or faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	1.4	0	0.1	0	1.5
Professional	0	0	0.1	0	0.1
Technical	0.2	0.1	0	0	0.30000000000000004
Administrative	0.2	0	0	0	0.2
Other	0	0	0	0	0
Computed Total	1.8	0.1	0.2	0	2.10000000000000004

Student Count by Classification of Instructional Programs (CIP) Code

Undergraduate	Graduate	Post-Doctorate	CIP Code
1	1	0	01.11 Plant Sciences.

Target Audience

Target audiences reached by this project include researchers and educators who have viewed webinars and other presentations about the project at scientific meetings. Others who have benefited are those who have viewed or downloaded the learning materials that have been posted online. Although we have not yet made a concerted effort to advertise the materials, that will change in July 2021 with the planned public launch of the GRIN-U repository site.

Products

Type	Status	Year Published	NIFA Support Acknowledged
Books	Published	2020	YES

Citation

Volk GM, Byrne P (Eds.) Crop Wild Relatives and their Use in Plant Breeding. Fort Collins, Colorado: Colorado State University. Available from: https://colostate.pressbooks.pub/cropwildrelatives/ (8 chapters)

Type	Status	Year Published	NIFA Support Acknowledged
Books	Published	2021	YES

Citation

Volk GM (Ed.) Fundamentals of Plant Genebanking. Fort Collins, Colorado: Colorado State University. Available from: https://colostate.pressbooks.pub/fundamentalsofplantgenebanking/ (1 chapter)

Type	Status	Year Published	NIFA Support Acknowledged
Books	Published	2021	YES

Citation

Volk GM (Ed.) Addressing pathology issues in plant genebanks. Available from: https://colostate.pressbooks.pub/plantgenebankpathology/ (1 chapter)

Accession No. 1021849 **Project No. COL0-2019-04487**

Type	Status	Year Published	NIFA Support Acknowledged
Books	Published	2021	YES

Citation

Volk GM, Preece JE (Eds.) Field tour of the USDA National Clonal Germplasm Repository for Tree Fruit, Nut Crops, and Grapes in Davis, California. Fort Collins, Colorado: Colorado State University. Available from: https://colostate.pressbooks.pub/davisrepositoryfieldtour/ (11 chapters)

Type	Status	Year Published	NIFA Support Acknowledged
Books	Published	2021	YES

Citation

Volk GM (Ed.) Training in Plant Genetic Resources: Cryopreservation of Clonal Propagules. Fort Collins, Colorado: Colorado State University. Date accessed. Available from: https://colostate.pressbooks.pub/clonalcryopreservation/ (10 chapters)

Other Products

Product Type

Audio or Video

Description

Public YouTube channel (GRIN.U.Education) with 30 videos uploaded

Product Type

Other

Description

Byrne PF, Volk GM, Bretting P. 2020. New Learning Materials for Plant Genetic Resources Conservation and Use. Poster presentation at National Association of Plant Breeders annual meeting (virtual). Available at https://drive.google.com/open?id=1VX4f6jfsS5PW_yOM-tlzjjafOSd4X4vs

Product Type

Other

Description

Byrne PF, Volk GM, Bretting P. 2020. Expanding Learning Resources for Plant Genetic Resource Conservation and Use. Oral presentation at Crop Science Society of America Annual Meeting (virtual). Abstract available at https://drive.google.com/open?id=1Cwa1xkDJOKMzpCtmn4pTANm3xzE1anWE

Product Type

Other

Description

Volk GM. 2021. Online Learning: Plant Genetic Resources Management and Use. Oral presentation to the Clonal Curation teams in the NPGS Clonal Seminar Series

Product Type

Other

Description

Volk GM. 2021. Conserving and Using Fruit Genetic Resources in the US (with special reference to cryo). Online presentation for International Panel on Fruit and Vegetable Genetic Resources, sponsored by FAO

Product Type
Other

Description
Volk GM, Byrne PF, Bretting P. 2020. Training Program for Plant Genetic Resources Conservation and Use. Online presentation at Plant Germplasm Operations Committee annual meeting

Product Type
Other

Description
Volk GM. 2020. Plant Genebank Training. Oral presentation at Apple Crop Germplasm Committee

Product Type
Other

Description
Volk GM. 2020. Training program update. Online presentation at Citrus Germplasm Committee

Product Type
Other

Description
Volk GM. 2020. Update on training program. Online presentation to Grape Crop Germplasm Committee

Product Type
Other

Description
Volk GM. 2020. Update on training program. Online presentation to Date Palm Crop Germplasm Committee

Product Type
Other

Description
Walters C, Volk G, Bretting P. NPGS Programs. Online presentation at USDA Inform and Engage webinar series

Product Type
Other

Description
Volk, G, Coyne, C. 2021. The Critical Role of International Collaborations to Improve Conservation and Utilization of Crop Collections. Online presentation at Genetic Resources on the Web (GROW) Webinar

Changes/Problems

There were personnel changes at both universities. At CSU, Dr. Geoff Morris replaced Dr. Maria Munoz-Amatriain as a co-PI due to Dr. Munoz-Amatriain taking a position in Spain. At ISU, Dr. Anthony Assibi Mahama joined the project to assist with development of learning materials, especially for the Plant Breeding eLearning in Africa project, and to supervise the GRA, who is expected to start in Fall, 2021.