

W-6 Regional Technical Advisory Committee - Meeting Minutes

Date: Tuesday June 15, 2021 (8:15 a.m. to 4:32 p.m. PST)

Location: a virtual meeting with participation via Zoom (see connecting information below)

WRPIS/PGITRU Station Coordinator/Acting Research Leader – George Vandemark

Facilitator(s) – Brian Irish (TFL Curator) and Carla Olson (Unit PSA)

Join ZoomGov Meeting: the meeting was recorded

<https://www.zoomgov.com/j/1615257741?pwd=c3JHTGo2M0pBbVpKRGRJRnFRVm5VZz09>

Meeting ID: 161 525 7741

Passcode: 820210

W6-RTAC Officers

Chair – Ian Ray; **Vice Chair** – Kevin Jensen; **Secretary** – Amjad Ahmad

2021 W6 RTAC participants

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Scot Hulbert, Washington State University, Pullman, WA. scot_hulbert@wsu.edu

Shawn Mehlenbacher, Oregon State U., Corvallis, OR. shawn.mehlenbacher@oregonstate.edu

Stephanie Greene, ARS NLGRP, Fort Collins, CO. stephanie.greene@usda.gov

Tracie Matsumoto, ARS PBARC. tracie.matsumoto@usda.gov

8:00 a.m. to 8:25 a.m.: Participants call in/connect

Opening remarks:

Ian Ray began opening remarks by mentioning several topics coming up later in the meeting that required input from participants. These topics included the following. Thanking everybody for participating, and resolutions to thank the people who contributed to make the meeting happen considering the Pandemic. Also, correcting the spelling of Carla Olson's name in the previous year meeting minutes, updates on the W6 Multistate Research Project (MRP) renewal, replacement for recently retired WRPIS research leader, Jinguo Hu, and electing new W6 RTAC officers. The new state representative from Colorado, Geoffrey Morris, was recognized. Roll call was conducted of everyone connected at the time (see above list of participants). The meeting was called to order by Chair Ian Ray at 8:29 a.m. The agenda was introduced, with no changes discussed. Carol Miles moved to approve the agenda, Amjad Ahmad seconded, the motion passed unanimously.

Scot Hulbert (WSU W6 Administrative Advisor) - report, remarks, and budget

Scott presented the next 5-year budget for the W6 Multi-State Research Fund MRF that's been approved with minor revisions. The new 5-year budget plan (~\$477,301 FY 2022) covers salaries for six full-time staff, with 3% salary increase annually, and the rest is for other expenses. It was noted that it would be difficult to increase the budget for the next full 5-year plan. The 5-year plan budget was discussed, and Shawn Mehlenbacher moved to endorse the budget. Carol Miles seconded the motion which was approved unanimously.

Search for new Research Leader (RL) is ongoing to replace Jinguo Hu; all interviews have been completed. The W6 2020 Activity Report included new hires needed for year 2022. One of the W6 research scientists, Clare Coyne, was recognized as a AAAS Fellow. A new WSU-ARS building at Pullman campus will be constructed to replace Johnson Hall starting in 2022. So, there will be a need for office space for 3-4 years for multiple faculty, staff, and USDA scientists. André-Denis Wright, Dean of CAHNRS, left WSU to be Provost at the University of Oklahoma. Richard Koenig, Chair of the Department of Crop and Soil Sciences, was appointed as Interim Dean. Washington State University (WSU) is loosening COVID restrictions, especially for vaccinated people.

Peter Bretting (ARS National Program Leader) – NPGS Update

Peter Bretting presented slides entitled: The National Plant Germplasm System: 2021 Status, Prospects, and Challenges. A map of the genebanks nationwide was presented. NPGS accessions have increased over the last several years up to 597,400 in 2020. The number of accessions is flattening, with most additions attempting to fill in gaps of existing collections, including crop wild relatives and genetic stocks. NPGS distributes ~250,000 accessions per year, with the year 2020 down to 188,900 accessions as an abnormal year, mainly due to the Pandemic. In the early 2000s distributions were approximately one half this rate. Land Grant Universities are the largest users of germplasm with an overall 2/3 public, 1/3 ARS and private usage. All NPGS centers are

shipping materials, with ~20% decline in orders in 2020. All genebanks are functioning with variability in capacity, mainly due to hiring ability and COVID restrictions.

Over the past decade, USDA-ARS' lowest budget was 2013, and 2019 saw a significant budget increase with further increases in 2020 and 2021. Budgetary increases were seen in FY 2020-21 for small grain (\$190,000), *Vaccinium* (\$150,000), and industrial hemp genetic resources (\$1.3 M). Challenges faced by NPGS include increased distributions with decreasing purchasing power. In the next few years 1/3 of germplasm managers will likely retire. There's a need for the implementation of new technology and best management practices to protect the germplasm, especially wild relatives. Peter presented PGR management priorities as a foundation for crop innovation strategies. Farewells and welcomes to retired and newly hired personnel were mentioned. Coursework designed by Gayle Volk (ARS Fort Collins, CO) and Patrick Byrne (Colorado State University, Fort Collins, CO) to help train PGR replacement managers will be offered in person at Colorado State University, and also as a distance education course. Development of an NPGS video was led by Barbara Hellier and Peter encouraged sharing/reposting this important video <https://youtu.be/uHOclGNEluw>.

Robert Matteri (Area Director, PWA Area Office) – PWA Update

Pacific West Area (PWA) includes eight states with ARS laboratories (Alaska is also included but does not have an ARS location), a total of 21 locations with 408 Ph.D. Scientists. The PWA budget has increased the last few years to ~\$211 million, with ~\$29.5 million soft funds (14% of base). There are 7 germplasm sites in the PWA. The Consolidated Appropriations Act – FY2022 suggested to allocate for inflation costs increase for salaries.

Anne Stapleton (NIFA National Program Leader) – USDA-NIFA Update

NIFA updates included new Investigator AFRI funding opportunities (<https://nifa.usda.gov/program/farm-future>) with specific webinars for interested parties to attend and learn about the new programs. AFRI Extension, Education, and USDA Climate Hubs funding opportunity with July 22, 2021 application deadline. Also, there are other competitive non-AFRI funding programs that will be posted soon.

George Vandemark (W6 Acting Research Leader) – PGITRU/WRPIS Update

George Vandemark is normally the Research Leader (RL) for Grain Legume Genetics Physiology Research Unit in Pullman, however now he is also Acting RL and Station Coordinator for Plant Germplasm Introduction and Testing Research Unit (PGITRU) which is also known as the Western Regional Plant Introduction station (WPRIS). A new candidate to replace retired RL Jinguo Hu has been identified to take over the WRPIS RL position. A new hire has been selected for temperate grass and safflower position (U. Reddy of WVSU). *Phaseolus* Curator position is being re-advertised. Seed Technician has been hired (Melissa Scholten). Biological Science Technician preliminary hire has been identified. Brian Irish has taken the lead on the 5-year W6 Proposal renewal for 2022-2026, development of 2020 WRPIS W6 Activity Report, development of a PowerPoint presentation for Plant Germplasm Operations Committee (PGOC) and helped organized the W6 RTAC meeting (Thanks, Brian!).

2020 RTAC meeting minutes, changes, discussion, and approval

The floor was opened for any questions or comments about the 2020 meeting minutes. It was pointed out that some participant names were misspelled, and corrections were made. Shawn Mehlenbacher moved that the minutes be approved, and Kevin Jensen seconded the motion. The motion was approved unanimously. Joseph Kuhl was thanked for his awesome services to the committee (Thanks, Joe!). Carol Miles raised a question about availability of funding for new scientist training to help in recruitment to replace the retired scientists within the USDA. Clare Coyne and George Vandemark provided some answers about current opportunities. Anne Stapleton provided additional information about NIFA funding opportunities for graduate students and post-doctoral programs.

9:50 a.m. to 10:10 a.m. (PST): Break

Business meeting: ARS Site reports

WRPIS, Pullman, WA – Brian Irish

Presented a historical and organizational chart showing major areas of research focus at the station. The total funding for the station is above \$3 M. The trend shows an increasing number of accessions (since 2010) at WRPIS with a number oscillating at almost 100,000 accessions in the past few years. The BLM Seeds of Success native plant germplasm accessions account for a significant proportion of these new additions in recent years. However, many of these are being transferred to other curatorial programs in the NPGS, which might be accounting for the dip in accession numbers in 2019. The number of germplasm distributions over the past ten years has shown a steady increase, except 2020 under the Pandemic effect (~40,000 items ordered). In the past two years, Curators have been much more selective in distributions, trying to minimize germplasm going ‘out the door’ to Non-Research Requests (NRR), which might account for the slight dip in the number of orders. Among the Western Region, Washington and California states are the highest in order/use of the germplasm (see Table below). The WRPIS Horticultural Crop and *Phaseolus* program have identified 30 sugar beet accessions with resistance to 6 plant pest/diseases. New funds secured to work on alfalfa for selection in disease resistance, screening genotypes for biotic and abiotic stresses and forage quality. Research is focusing on optimizing tissue culture techniques for disease resistance in garlic.

Number of plant germplasm order items distributed in 2020 to each of the 13 Western States by the NPGS and WRPIS.

State	WRPIS	NPGS	WRPIS %
Alaska	1	79	1.3
Arizona	154	2580	6.0
California	433	5748	7.5
Colorado	661	2270	29.1
Hawaii	42	167	25.1
Idaho	110	1683	6.5
Montana	37	712	5.2
Nevada	24	331	7.3
New Mexico	12	263	4.6
Oregon	206	1276	16.1
Utah	39	424	9.2
Washington	3,726	9,388	39.7
Wyoming	63	201	31.3
Total	5,508	25,122	15.0

*Data provided by Lisa Taylor

NGRL, Beltsville, MD – Gary Kinard

The National Germplasm Resources Laboratory (NGRL) is functioning at partial capacity and personnel are in a teleworking situation, mainly due to the Pandemic. However, the personnel have been very productive, and the new public Germplasm Resources Information Network (GRIN)-Global website has been released with important updates and improvements. Restoration of the plant exploration/collection program is moving forward despite the Pandemic. The NGRL was fortunate to get two new permanent and one temporary position filled in 2020. Currently, three permanent positions are still vacant. The presentation included information on new germplasm collected and new collaborations (including crop wild relatives) within the U.S. and current number of accessions within in the NPGS and information associated with those accessions in GRIN-Global.

NLGRP, Ft. Collins, CO, Stephanie Greene

Presented an overview of the activities at the National Laboratory for Genetics Resources Preservation (NLGRP) in Fort Collins, CO. The laboratory has two major sections for animal and plant germplasm programs. However, the presentation will focus on the plant program only. Five scientists with Christina Walters as a Lead Scientist. Seeds, microbes, and plant propagules are stored at 18°C or in liquid N₂ (or LN₂ vapor). Total accessions held by NLGRP is over one million. Over 10,000 accessions date back to 1950s and earlier. The laboratory serves as a backup/duplicate storage site for certain accessions from other ARS sites. New training program in plant genetic resources management and use being offered at Colorado State University to help in recruiting for future PGR scientists. GRIN-U.org is a new website for online learning for plant genetic resources conservation and use. The developers are looking for others to collaborate with them.

Total NLGRP germplasm collection

Source	Accessions
NPGS-seed	438,995 (81%)
NPGS-clonal	5030 (12%)
NLGRP only	10,522
PVP/JPR	9,747
Blackbox	468,175
Microbe	113,567
Total	1,046,036

NSGC, Aberdeen, ID – Harold Bockelman

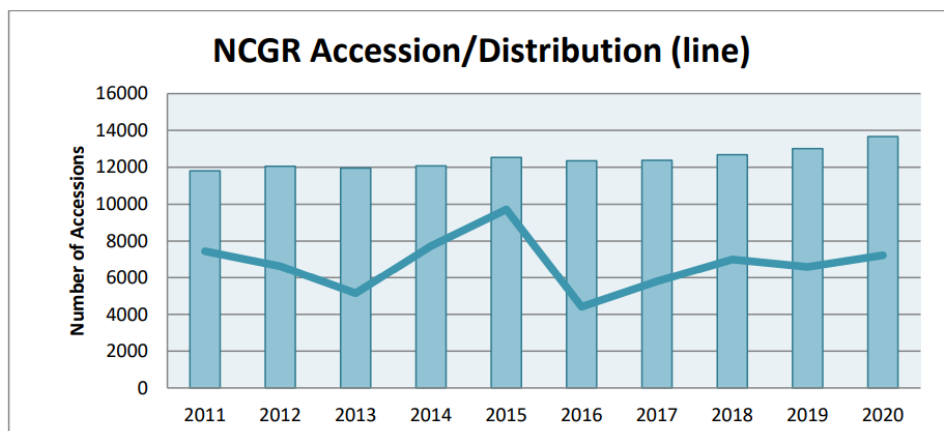
The National Small Grains Collection (NSGC) presently holds 147,996 accessions of the small grains collection (wheat, barley, oat, rye, triticale, rice, and related wild species), a small decrease compared to the past years. This number includes more than 10,000 accessions of mapping populations with GSHO (Genetic Stock – *Hordeum*) and GSTR (Genetic Stock – *Triticum*) numbers, which will not be maintained for perpetuity and will eventually disappear. NSGC distributed 22,230 accession samples in 483 separate requests in the past 12 months. Approximately 35% of the distributions were to foreign scientists. NSGC provided backup samples to NLGRP for the Svalbard Global Seed Vault totaling 5,209 accessions. Also, more than 99% of NSGC accessions have been backed up at NLGRP. They are continuing efforts to capture voucher images of spikes, panicles, and seeds. The images and characterization data provide valuable information to both the germplasm user and for NSGC curation.

Evaluations of NSGC wheat landrace accessions are continuing for reaction to the Ug99 stem rust race in East-Africa. NSGC continues to coordinate the assembly of the Stem Rust Nursery in Kenya in cooperation with the Kenya Agricultural & Livestock Research Organization, CIMMYT, and wheat and barley breeders in public and private programs throughout the U.S. The latest shipment in May included more than 2,400 entries from U.S. public and private breeders and researchers. Staffing has been good and very productive. A research leader retired in early 2020. The hiring process went through, but the candidate accepted another job. So, the hire process will start all over.

NCGR, Corvallis, OR – Kim Hummer

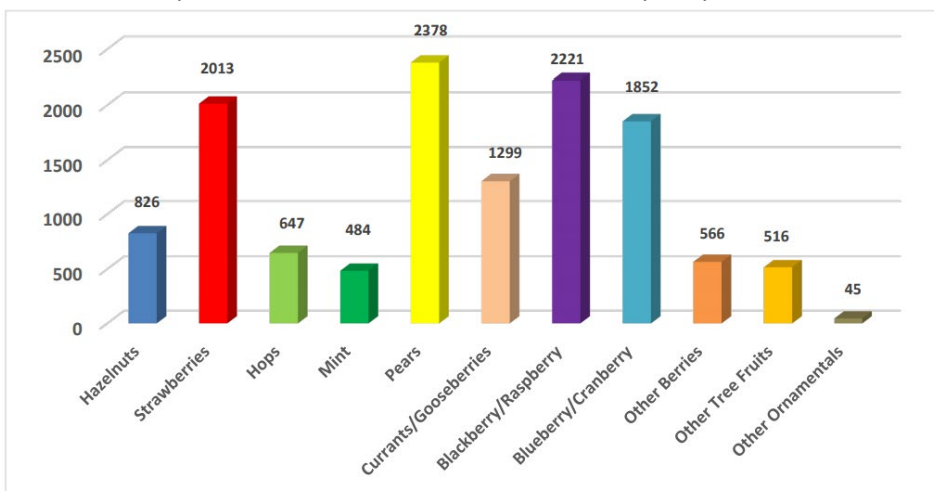
Temperate fruit nuts value in 2020 was over \$6 billion. Hops are increasingly becoming popular among breeders and growers next to hemp in the area. Blueberries, cranberries, and mint germplasms are increasing in popularity. Staff almost all fully vaccinated and things slowly going back to normal. Challenges include three vacant positions: Tree Fruit and Nut Curator, Distribution Manager, and Program Support Assistant. New hires: Gabriel Flores in TC lab. Other staff include Nahla Bassil a scientist in charge of the genetics project, Barb Gilmore field and orchard management, and other temporary technician positions. Received some increases in funding over the past few years. Distribution has been stable (about 7,000 accessions on average). \$13.5 M new funding received to repair greenhouses and screenhouses over the next 5

years. Diseases have been a new challenge in Corvallis, might be due to climate change, including fire and drought as well. New virus been identified in blueberries. Powdery mildew in hops, new viruses in *Rubus*, and eastern filbert blight in Hazelnut.



Bars represent number of accessions in the NCGR Collection. Line represents number of accessions distributed.

Corvallis Germplasm Collections – Accession Counts by Crop – October 2020

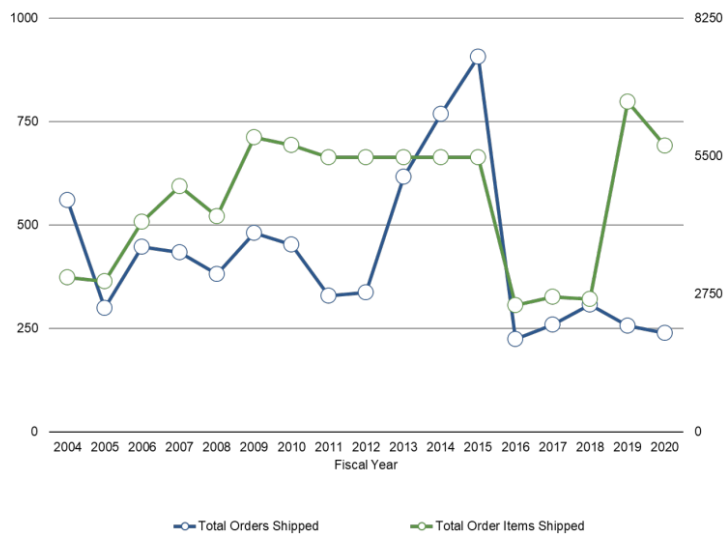


NCGR/NALPGR, UC Davis/Parlier, CA – Claire Heinitz

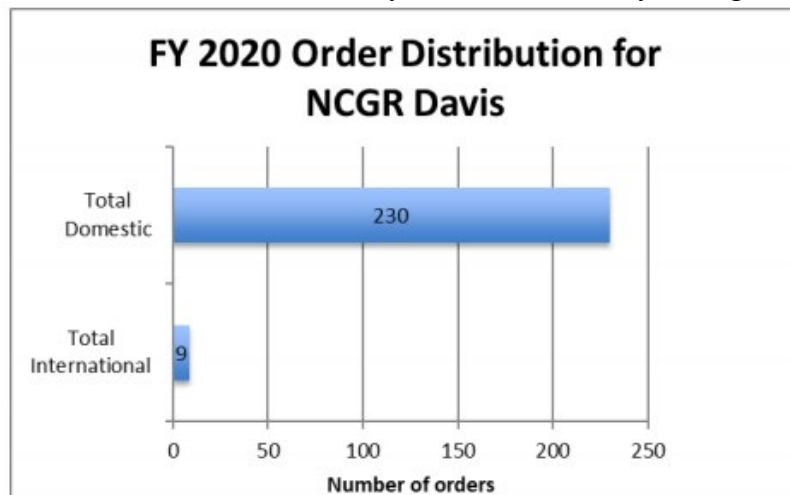
It was Claire Heinitz's first time presenting for the W6 committee since John Preece retired in February 2021. Recruitment for an RL at Davis and Parlier genebanks is ongoing. Approximately 70 acres is used for the repository collection, including 14 crops. Clonal materials are maintained as living plants propagated and distributed as cuttings. One major research area is a WSU collaborative evaluation of the sweet cherry collection for genetic diversity and disease resistance. COVID-19 impacted the flow of work during the lockdowns and teleworking. However, some essential workers were allowed back on sites and that helped in improving work management. The center serves as an active "home" site for emerging arid land crops and service regenerations and backup for other NPGS active sites. Ships about 1,200 accessions annually. Staff change/retirement caused services to dwindle but rehiring and training

has been helpful in getting back to normal. There was a one-year delay on a NIFA project to catch up on activities.

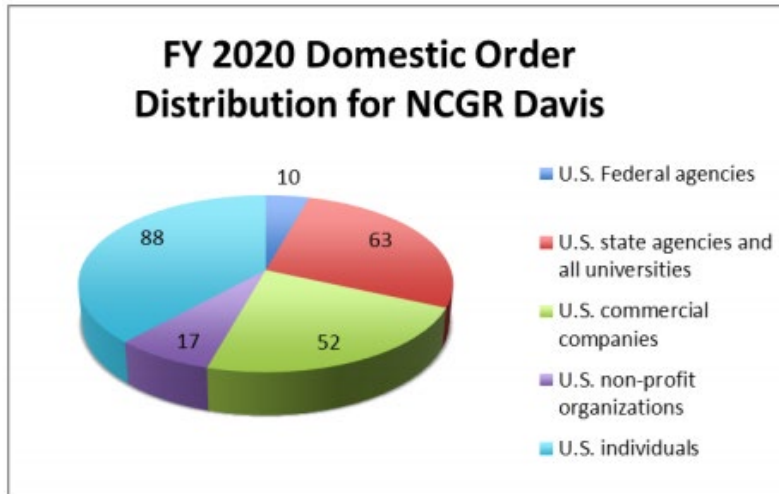
Total orders shipped from 2004 – 2020 (NCGR-Davis). There are 3-5 cuttings/item shipped.



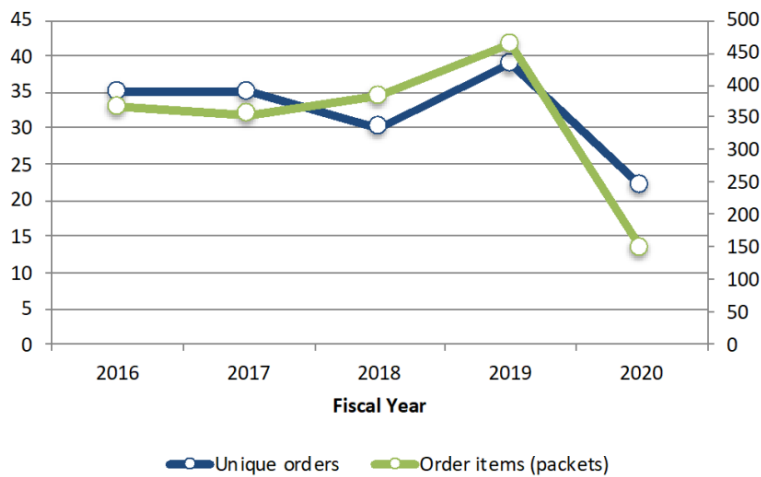
Orders distributed domestically and internationally during 2020.



Orders distributed to domestic customers during 2019.

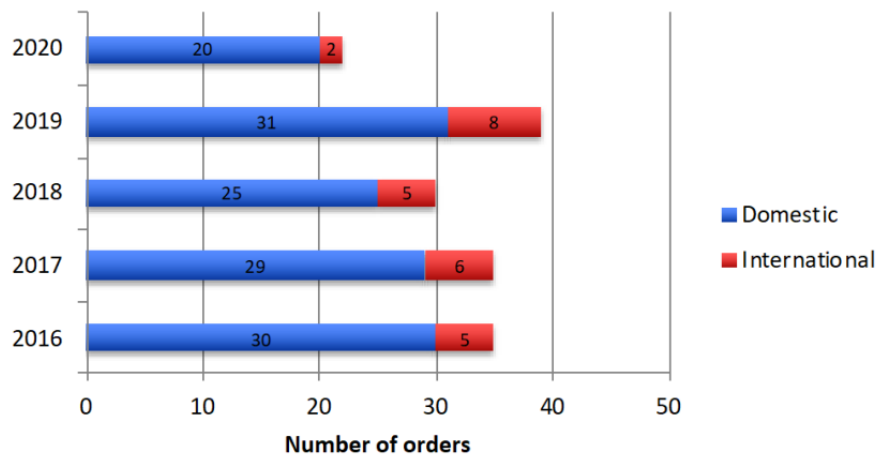


Total NALPGRU orders and order items shipped from FY 2016-2020.



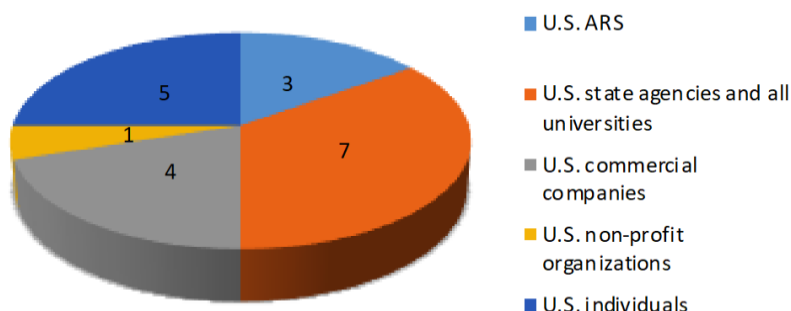
NALPGRU domestic and international distributions from FY 2016-2020.

Order Distribution for NALPGRU



NALPGRU distribution to domestic customers during FY 2020.

FY 2020 Domestic Order Recipients for NALPGRU



NCGRCD, UC Riverside, CA – Robert Krueger

The facility is located on the UC Riverside campus. New funds in 2019-2021 allowed for facility and screenhouse expansion. Eight permanent staff members. Some retirements and moving of staff to pursue their graduate studies in 2020 and 2021. Due to COVID, student employees were not allowed on campus until recently. Total accessions of 2,956 and inventory of 6,139 in 2020. A plant exploration trip to Vietnam is currently on hold due to COVID and may resume in 2022. Cryopreservation was slow in 2020 (6 accessions) due to COVID related lockdowns. Accessions distribution (72 orders and 212 items) was about 50% lower than normal years. New and current projects are on-going; an example is the use of drones for imaging water and nutrient balance in citrus. Due to APHIS and FDA requirements, there's a need for high-capacity autoclaves. A breach in the screenhouses led to the plant materials in those facilities to be destroyed.

Germplasm holdings CY 2020

Location	Accessions	Inventory
Riverside: Givaudan Citrus Variety Collection	1,065	1,939
Riverside: Field Not GCVC	118	201
Riverside: Protected Sanitized	603	1,197
Riverside: Protected Unsanitized	808	1,754
Riverside: Quarantine	69	71
Irvine: UC SCREC	46	79
Thermal: UCR CVARS (Citrus)	78	232
Thermal: UCR CVARS (Dates)	169	666
Total	2,956	6,139

Germplasm distribution CY 2020

Distribution Form	Orders	Accession Items	Count
Budwood	22	68	144 budsticks
Seed Orders	42	99	24,805 seeds
Leaf tissue	3	3	800 mg
DNA	2	10	1,700 μ L
Fruit	2	2	2,280 g
Pollen (date)	1	27	366 g
Total	72	212	

TPGRD, Hilo, HI – Tracie Matsumoto

Staff changes occurred and looking forward to a rehiring process. PhD candidate at UH Manoa is a new Curator recruitment. Land clearing and mobile office is on-going to accommodate the new hires. The site counts on 38 acres at Waieka Research Station of the UH Manoa. Due to threat of diseases, pineapple, avocado, cacao, and guava collections are backed up in the greenhouses. 2020 distribution was for 27 orders and 128 items. Due to COVID restrictions all orders had to be tested through the HDOA or APHIS. New accessions were received in 2020 (coffee, papaya, macadamia, cacao, and avocado). A new pathogen on macadamia (Macadamia Quick Decline; MQD) requires injection of pesticides into the stem and moving the collection to a new field. Coffee has been sourced locally for inclusion in the collection. Unfortunately, coffee leaf rust was found on Maui in 2020 and is spreading throughout the state. So far, Kauai and Kau are the only locations still free of coffee leaf rust.

11:45 a.m.-1:00 p.m. Lunch Break

1:00p.m. State Reports Presentations

California, Charles Brummer

About 300 individuals in California requested germplasm from one or more NPGS repositories in 2020. Replies received from 53 individuals. Overall, recipients of plant materials were very happy with the service from NPGS and are complimentary of the staff, the collections, and the NPGS as a whole. There were 6 publications from the State of California listed in the report. There's concern about the GRIN-Global search engine capacity being poor or having gotten worse over time. Also, concerns were raised about limited funding to replace NPGS staff who will be retiring. This will negatively impact productivity. The general state of the clonal collections is also of concern, and potentially at risk of being lost, due to underfunding.

Finally, Charles raised the issue of the value of these reports. He stated, "As I argued at last year's meeting, it would seem that focusing on those requests from the Western Region, which is the purview of this committee, would be time much better spent. I'm not convinced these reports are that useful in any case, or that the data wouldn't be better collected by each location itself, rather than by state representatives."

Responses to the question of: *How did you use the materials you received?*

Purpose	No.
Variety development	17
Research	38
Education	10
Other	6

Colorado, Geoff Morris

A total of 2,270 germplasm accessions were delivered in Colorado in 2020. This reflects a decrease from the number of orders in 2018 and 2019 (2,718 and 2,475, respectively). In 2020, the orders were shipped from the following locations: W6, COR, NA, NSGC, S9, SOY, COT, NR6, NR6, NSSL, PVPO, DAV, GEN, PARL, and NE9. The NLGRP, an NPGS site within the USDA-ARS, constituted the largest percentage receiving 40.1% of all accessions ordered in 2020. The total of all other Federal Agencies received 1.24% of accessions. The percentage of accessions received by all universities was 6.7%, with CSU receiving the largest percentage (4.3%). Companies received 29.5% with Cargill, Inc. being the largest recipient at 27.2%. Denver Botanic Garden had a slight increase in orders, from 2 accessions ordered in 2019 to 8 accessions ordered in 2020. The institution type could not be determined for 6.8% of the institutions, labeled as “miscellaneous” in the table below:

Institution Type	No. of Items	Percent
Federal Agencies	1292	56.9
USDA, ARS (incl. NLGRP)	1264	55.7
USDA-APHIS-PPQ	27	1.2
USDA Forest Service	1	0.04
Universities	153	6.7
Colorado Mesa University	1	0.04
University of Colorado	54	2.4
Colorado State University	98	4.3
Companies	670	29.5
Cargill, Inc	617	27.2
Other companies	53	2.3
Miscellaneous	155	6.8
Total	2270	100.0

Idaho, Joseph Kuhl

In 2020, 1,683 accessions were requested in Idaho from the NPGS. The total number of accessions was similar to 2018 and 2019 when 1,810 and 1,385 accessions were requested, respectively. A total of 70 orders were placed from Idaho in 2020, similar to the number of

orders placed in 2018 and 2019 (63 and 79, respectively). The major user group (based on the number of accessions requested) in 2020 was once again USDA-ARS scientists accounting for 81% of the total accessions. The number of orders placed in 2020 by private, state, and federal entities was 42, 13, and 15, respectively. A very similar trend to 2019 with 40, 19 and 20, respectively. The top three private requests were from Sid Perry (44 accessions), Bayer Crop Sciences (40 accessions), and Crookham (20 accessions). Overall, USDA-ARS Aberdeen Plant Pathologist, Sidrat Abdullah, placed the largest order with a total of 1,082 accessions (64% of the total accessions), primarily for screening for crown rust resistance. The top 3 genera (total 29 genera in 2020) by number of accessions requested were, *Avena* with 1,103 accessions, *Triticum* with 307 accessions, and *Malus* with 43 accessions requested.

Montana, Michael Giroux

Total of 23 orders with 693 plant germplasm accessions were received in Montana during 2020. The biggest users were the Montana State University wheat and pulse breeding programs. The biggest use by far was for varietal development and for testing to MT growing conditions. Total of 9 publications were listed from Montana State.

NPGS			
Site	Sent	Species	Primary Purposes
COR	13	Apple, blackberry, blueberry, raspberry, strawberry	Adaptation to MT
DLEG	3	Centrosema, Lupine	Adaptation to MT, Seed ID
NC7	63	Corn, squash, sunflower	Adaptation to MT, Seed ID
NE9	8	Tomatoes	Teaching and adaptation to MT
NSGC	508	Barley, wheat	Wheat stem sawfly resistance breeding and adaptation to MT
PARL	2	Physaria	Novel hydroxy fatty acid genes
S9	69	Bean, sorghum, watermelon	Adaptation to MT, Seed ID
W6	29	Beans, bunchgrass, chickpea, dandelion, lentil, pea	Pulse breeding program, MT adaptation
Total	693		

User type	#	Primary uses
Homeowner/unknown	25	Fruit, corn, watermelon, lettuce production
Private company	58	MT adaptation, breeding, barley, corn, beans, quinoa, lupines..
MSU	578	Screening for resistance, varietal development, wheat, oats, pulses
USDA	32	Barley and wheat adaptation to MT conditions.

Nevada, Melinda Yerka

Total of 14 (10 in 2017, 15 in 2018, and 13 in 2019) individuals from Nevada placed 26 orders (17 in 2017, 39 in 2018, and 30 in 2019) and received 331 (91 in 2017, 2,138 in 2018, and 193 in 2019) accessions from the NPGS in 2020. Researchers at UNR continue to be the primary institutional users (215 accessions of 331, 65%). All users were contacted via email and 4 out of 14 responses were received. Users reported 3 manuscripts published in total.

Summary statistics for NV in 2020.							
	Pathology	Genetics	Chemistry	Variety Devo	Education Teaching	Taxonomy	Other
# accessions used for each purpose	15	158	25	84	41	2	6
% accessions used for each purpose	4.5	47.7	7.6	25.4	12.4	0.6	1.8

New Mexico, Ian Ray

Twenty-one individuals from New Mexico placed 40 orders and received 263 accessions from the NPGS in 2020. The general public was the largest user of this germplasm (56% of accessions), followed by New Mexico State University (44%) and Los Alamos National Lab (< 1%). Of these materials, 49% were utilized for research related to crop productivity (e.g., adaptability, heat tolerance, disease resistance) and plant-microbiome interactions, while 27% were used for educational and demonstration programs, and 24% for variety development. Among the 21 germplasm recipients, eight (28%) provided responses to a follow-up email query while 18 (86%) provided some detailed information about intended use when their order was initially placed. There was 1 publication listed in the NM 2020 report. Additional detailed information is available in the state report.

Oregon, Shawn Mehlenbacher

Oregonians continue to use the NPGS system extensively. Users include state and federal researchers as well as private seed companies and private individuals. Oregon is a major user in the western region, along with California and Washington. Total of 11 publications were reported in 2020. Additional detailed information about 23 individual requests and the use/purpose (e.g., plant breeding, evaluation, disease resistance and others) from each were provided in the state report.

Utah, Kevin Jensen

Utah State in 2020 had a total of 15 NPGS orders requested by university personnel and private orders. Details from one of the replies received is below:

Germplasm Activities of Youping Sun - Order # 319094 (*Punica granatum*)

Use: Varietal Development – Breeding. Research use notes - Evaluate and select potential cultivars with high yield, soft seeds, lower acidity, strong cold tolerance, better resistance to abiotic and biotic stresses for commercial production and edible urban landscape in southern Utah region. Additional information is available in the state report.

Washington, Carol Miles

In 2020, 117 Washington State residents requested a total of 9,562 germplasm samples from 12 NPGS repositories or stations and received germplasm (in the form of seeds and cuttings) in 191 orders. Recipients were with universities (26), USDA (10), private research groups (12), commercial firms, seed companies and nurseries (16), non-profit organizations (5), and schools (2), as well as 32 private individuals. Of the 117 recipients, 9 did not give an email address, so

108 recipients received our notice to report their results, and 2 email addresses were invalid. Of these, 30 (26%) provided feedback regarding the germplasm they received.

Significantly fewer requests were submitted in 2020 compared to previous years; this was noted in all categories except for private individuals, where the number of requests was the same (31). University requests were down by nearly half (2019 – 46; 2020 – 26), while requests from commercial firms, seed companies and nurseries went from 24 to 16. Specific requests included 358 individual taxa. Most requested materials were *Medicago* (2,901), *Hordeum* (2,612), *Triticum* (1,189), *Solanum* (456), *Pisum* (335), *Prunus* (286), *Sinapis* (256), and *Malus* (217). The germplasm material was used in diverse scientific disciplines such as agronomy, anthropology, archaeology, botany, genetics, horticulture, plant pathology, entomology, and soil science, and contributed significantly to scholastic and economic activity in the State of Washington.

Table for NPGS genebanks from which material was requested and distributed to in WA in 2020.

Site	Orders	Items
COR	33	246
DAV	7	292
GEN	14	241
NA	3	17
NC7	24	458
NE9	5	78
NR6	12	469
NSGC	24	3,831
NSSL	1	1
S9	18	103
SOY	9	72
W6	41	3,754
Total	191	9,562

The utilization of the germplasm material from the NPGS in 2020 included the colonization of roots by beneficial microorganisms (Aufrecht), identifying heritage apples and finding lost varieties (Benscoter), development and testing of marker databases for *Malus* and *Pyrus* spp. (Cotton), research with specialty grains (Despain), screening for potential sources of resistance or tolerance to little cherry virus-2 and the X-disease phytoplasma (Harper), genotyping and phenotyping sweet cherry cultivars from leaf samples (Johnson), nursery plant breeding and propagation (Kuntz), growing maize samples for college microbiology lab course (Moss), trials of fava beans in search of reliable overwintering varieties for cool climate conditions (Rome), and studying the evolution of a plant immune receptor in legumes (Snoeck). Total of 6 publications were reported in 2020 from Washington State.

Alaska, Danny Barney

Seven individuals from Alaska placed 10 orders and received 79 accessions from the National Plant Germplasm System (NPGS) in 2020. These numbers are down slightly from 2019 in terms

of requests and items shipped. Of the seven individual requestors in 2020, five had also requested NPGS accessions in 2019. No publications are listed in the Alaska state report.

In general, the requested NPGS materials were utilized for varietal evaluations and varietal development with a focus on cold hardiness and adaptability to Southcentral Alaska in the Anchorage, Matanuska-Susitna Valley, and Kenai Peninsula areas and Interior Alaska in the Fairbanks area. Intended applications include small-acreage farms and urban landscaping, both of which experience unique challenges due to Alaskan growing conditions. Two of the above seven germplasm recipients responded to the survey letter and reported being well satisfied with the materials and service provided by NPGS genebanks and personnel.

NPGS genebanks fulfilled the requested materials to Alaska

Stations	Number of requests	number of order items
Corvallis (NCPGR)	4	33
Geneva (NGR)	5	37
Ames (NC7)	1	8
Pullman (W6)	1	1
total	11	79

Hawaii, Amjad Ahmad

In 2020, 168 items were sent to 15 (with 2 recipients placed order twice in 2020) recipients in Hawaii. We received 73% of total responses (11 out of 15). There was a 100% satisfaction in the packaging and germination of the received germplasms. Most of the germplasm received were ordered for research purposes to increase diversity and evaluate suitability to Hawaii's condition. In general, the overarching goal of the germplasm requests were to evaluate them for suitability to Hawaii's micro-climates. However, since its only one year after the request, it seems, nobody has reached the release stage yet (except 1 recipient). Also, the effect of COVID-19 and associated lockdowns was very clear through affecting the evaluation or use of some of the received orders in 2020. One recipient confirmed the release/sale of one germplasm (Puerto Rico Evergreen) or shared with the public through Hawaii Seed Growers Network. For example: The okra reached \$600 from seed sales in first year (mid-2020-mid-2021). As the St Croix Group 3 corn is increased it could produce \$15,000-\$25,000/acre of gross sales as cornmeal (expected future sale). All recipients expected economic benefits (by increasing yield or reducing production cost), but on long-term basis since most of the lines are used in evaluation or breeding trials. Gerry Herbet, a recipient of 14 grapes accessions mentioned that it takes 6-8 years before they can give an evaluation of grapes quality. However, the genotypes are growing well so far. No publications were reported from Hawaii.

Arizona, Lisa Taylor (WRPIS)

For calendar year 2020, 49 germplasm requestors ordered 2,657 items in 86 total orders from Arizona state. The percentage orders from commercial companies were the highest (51%). While 28% were for agricultural research, 14% from state agencies and universities, and 7% from

individuals. The total items requested came from 77 species. Majority of requests (54%) were purposed for research and education (24%). The responses indicated full satisfaction with the germplasm received by requestors. No publications were reported from Arizona state in 2020.

Wyoming, Lisa Taylor (WRPIS)

For calendar year 2020, 18 germplasm requests were submitted from 9 Wyoming-based requestors for 241 order items of 94 species. Of the 241 items requested, 200 items were shipped. Half of the orders were for ‘public education or demonstrations/class instruction’ and the other half listed research and breeding as their intended use. From the individual notes provided during placing an order, we were to gather that the purpose for the genotypes varied (e.g., research, education, breeding, variety selection, site specific testing).

NPGS genebanks fulfilled the requested materials to Wyoming

Site	Orders	Requested Items	Shipped Items
COR	5	116	89
DAV	1	3	3
GEN	1	7	5
NC7	3	39	29
OPGC	1	8	8
S9	2	3	3
W6	5	65	63
TOTAL	18	241	200

W6 RTAC Officers and Nominations for 2022 and 2023

Kevin Jensen (currently Vice-Chair) will take over as Chair of the committee in 2022 and 2023. Amjad Ahmad agreed to continue as W6 Secretary during this time. Mike Giroux was nominated for W6 Vice-Chair, and he indicated a willingness to serve. Shawn Mehlenbacher moved to approve Mike’s nomination and multiple committee members seconded the motion. The motion was unanimously approved by the committee.

Open Discussion/New Business, 2022 Meeting Date/Site, and Resolutions

1) Strategies to distribute NPGS materials to bona fide researchers/educators:

- USDA leadership reports and NPGS site presentations clearly document significant increases in germplasm requests over the past two decades. However, funding to support corresponding increases in germplasm propagation and maintenance activities, order processing and shipment, inventory management, etc., have not kept pace with the growing demand for germplasm.

- Notably, a significant proportion of germplasm requests were categorized as “U.S. individual no affiliation”. Moreover, “intended use” statements provided with such requests frequently do not clearly indicate that the germplasm would be utilized for credible research or educational programs.
- Given NPGS resource constraints noted above, software is being developed to strategically filter germplasm orders so that requests from verified scientists/biologists and educators can be met, while unsubstantiated requests will not be met.

This software is being designed by the NPGS in consultation with the Plant Germplasm Operations Committee (PGOC) and scientific entities.

It was suggested that the following information and guidance might be provided with germplasm requests targeted for rejection to “soften the blow/disappointment”. First, thank everyone for their interest in obtaining plant germplasm while also providing a reminder that germplasm is a limited resource, and costly to produce/maintain/distribute. Second, to encourage those individuals to seek commercially available germplasm adapted to their environment through private seed companies, nurseries, or public institutions/organizations. Such materials will have a very high probability of meeting their needs in a very timely fashion.

The W6 RTAC supports efforts towards developing the above-mentioned software because it appears to have great potential to benefit germplasm distribution efficiency. The committee would appreciate future updates on this endeavor to understand if the new software performs as anticipated.

- 2) Ways to improve efficiency for generating valuable state reports, and strategies for the RTAC to better support activities of W6 and all NPGS sites in the western region. Note: the 2021 discussion was a continuation from the 2020 meeting.
- Background: In the W6 RTAC 2020 meeting, Scot Hulbert (Administrative Advisor) indicated that documentation of germplasm use by the western states is a very important function of the state reports. These reports should demonstrate that the state money going to W6 is well spent (i.e., direct impact to a state’s economy and research).

Several state reps expressed concern that the extensive amount of time required to develop detailed state reports is not sustainable for states that receive large amounts of germplasm. All RTAC members present agreed that streamlining of information provided in reports was needed. Discussion subsequently focused on whether reports should focus more on germplasm requested from W6, or also include western region NPGS sites, and NPGS sites nationwide. All committee members present recognized that the role of the W6 RTAC was to serve in an advisory role to support the WRPIS (e.g., via Multistate Research Funding, MRF). Hence, reports should document beneficial use of WRPIS germplasm. Many committee members felt that the W6 RTAC should also be an advocate/supporter for all NPGS sites in the western region because, in many ways, all the germplasm sites work

together to provide for state needs. Hence, reports should document use of germplasm provided by western NPGS sites.

Several suggestions/ideas are provided below for consideration/discussion towards improving the efficiency of generating state reports that clearly document germplasm usage from the western NPGS sites including W6. As outgoing Chair of the W6 RTAC with 21 years of service on this committee, Ian Ray would like to inquire if it would be possible for USDA NPGS to develop software that can produce concise informative reports for each state that are immediately useful for sharing with AES directors or legislators. If this can be achieved, state reps can strategically follow up with targeted users (e.g., individuals who request numerous accessions) by phone or email to hopefully obtain more detailed information about use of germplasm. Potential information to consider including in a computer-generated report for each state is suggested below.

- Streamlining of information provided in state reports and potential feasibility of developing software for computer-generated state reports.

State reports should not be specifically tasked with following up on germplasm quality. It was suggested that shipped orders should include a “Quality of Goods Statement” along with the packing slip. The quality of goods statement should indicate that if germplasm is in poor condition (e.g., low seed germ or poor health of clonal material) the recipient should directly contact the affiliated germplasm repository.

General summary statement for each state: It is suggested that information related to the total amount of NPGS germplasm received by each state (including all NPGS sites) and total number of recipients be briefly summarized for each state report to document overall germplasm utilization in the state. Specific information about the proportion of germplasm received from only western NPGS sites and WRPIS should also be provided as well as other important metrics.

Action item: Can NPGS staff code software to generate informative summary statements for each state? First, need to summarize total number of NPGS accessions ordered nationwide from each state. Also need total number of unique users/recipients from each state. Provide specific information on number of accessions derived from western NPGS sites. Use this information to generate a summary statement which might look something like this: “In 2020, the NPGS provided 263 accessions to 21 recipients in New Mexico. Forty percent of these accessions were derived from NPGS sites located in the western U.S., including W6. Detailed information affiliated with strategic users of this germplasm for variety development, other scientific research, and public education is provided below.” The summary statement should also provide a breakdown of % accessions requested for: research (varietal development), all other research (plant pathology/ taxonomy/genetic studies/etc.), and public education/demonstrations. The summary should also provide a breakdown of % users affiliated with specific organizations and those with no affiliation (i.e., general public).

Condense NPGS information sent to state reps and restructure state reports to be more concise. It is suggested that germplasm order information provided to state reps via NPGS spreadsheets be streamlined. Based on the current 3 spreadsheets of information provided to state reps in 2021, consider retaining only the following information specified below.

Action item: From “Order Dataview” sheet retain: Order Request ID, Owner Site, Intended Use, Intended Use Note, Final Recipient

Action item: From “Order Address” sheet retain: Last Name, First Name, Organization, Primary Phone, Email, Category

Action item: From “Order Items” sheet retain: “Requested Taxon”. Also, add new data column, “Taxon Item Count” with total number of items shipped within each requested taxon. Add a second new data column, “Total Items Requested by User” and sum the number of accessions requested over ALL orders that were shipped to a given recipient/user. The general idea here is that state reps do not need an itemized/detailed list of all accessions.

Action item: Merge the retained and new information from the above 3 spreadsheets into one spreadsheet. Suggest that this single spreadsheet be the only information sent to state reps. This final spreadsheet information might be organized as: “Final Recipient Last Name“, “Final Recipient First Name“, “Recipient Primary Phone“, “Recipient Email“, “Organization“, “Category“, “Order Request ID“, “Requested Taxon“, “Taxon Item Count - NEW” (see previous paragraph), “Total Items Requested by User - NEW” (see previous paragraph), “Owner Site” for each taxon, “Recipient Intended Use“, “Recipient Intended Use Note“, “Final Recipient Information“. Sort these data by “Total Items Requested by User” and “Recipient Last Name” and Recipient First Name“. This will organize information from the largest germplasm recipients (first), to smallest germplasm recipients (last), and will group all their respective order information and intended use notes as single line items.

Action item: Based on the state rep single spreadsheet information (above), code software to generate informative summary statement for each user – to be provided immediately after the state summary. Perhaps organize user statements from largest to smallest germplasm users. In this regard, the state report does not have to include detailed information for all users – especially for states with a large number of users. Rather, the state rep can determine which users to discuss in greater detail in their report, e.g., large germplasm requests from private industry or public breeding programs, plant science research, or innovative public education/demonstration projects. The general idea is to generate a summary statement for a given recipient, including their affiliated organization name (or “no affiliation/general public”), total number of accessions requested over all orders, followed by a line-item list of intended use notes for each order/taxon.

For example: “Ian Ray (FINAL RECIPIENT) with New Mexico State University (ORGANIZATION or CATEGORY), received 89 accessions (TOTAL ITEMS

REQUESTED BY USER) with the following intended use. 10 *Medicago* accessions (REQUESTED TAXON and TAXON ITEM COUNT for order #1): used as standard checks to determine fall dormancy response and resistance to Fusarium wilt for advanced breeding lines (INTENDED USE NOTES direct copied from order #1 for Ian Ray). 79 *Medicago* accessions (REQUESTED TAXON and TAXON ITEM COUNT for order #2): diploid accessions will be evaluated for biomass productivity and survival relative to commercial tetraploid varieties under deficit irrigation management (INTENDED USE NOTES direct copied from order #2 for Ian Ray).

3) Other strategies to document value/impact of NPGS materials

Implementation of computer-generated state reports would free up state reps so that they can strategically follow up on large users of germplasm, or anyone that indicates intended use as, research-varietal development. Such information could provide valuable supplemental information that can be added to computer-generated state reports. In this regard, what basic information could we request that will benefit the NPGS but not divulge details considered confidential/proprietary? Perhaps the number of NPGS accessions that have contributed towards public or private industry germplasm development? If breeding programs are reluctant to share such information, past data sets could be mined for all germplasm requests from private industry or public breeding programs, or anyone who has indicated research-varietal development. Total germplasm requested/evaluated by private or public breeding programs is a valuable metric in and of itself.

A major problem with documenting value/impact of germplasm is that the data provided to state reps is only affiliated with germplasm ordered in the previous year. However, research and breeding take time to generate new varieties and publications. Hence, we need to continuously follow up with our plant science colleagues at public/private institutions within each state to secure publications and variety development which utilized NPGS germplasm received many years ago.

A key role of the W6 RTAC is to document the needs of W6 and WRPIS and provide justification for individual western states to provide funding to W6 and WRPIS annually. Such funding helps keep WRPIS/NPGS healthy and responsive to state needs. State reports documenting the use of germplasm in the western region plays an important role in achieving this. Developing an impact statement that can be easily updated should also be considered.

Action item: Develop W6-Multistate Research Project (MRP) Impact/Value Statement

Multistate Research Fund Impact statements

<https://www.mrfimpacts.org/impact-statements>

<https://www.mrfimpacts.org/impact-statement-archive>

Example: NC007 Impact Statement on Plant Genetic Resources

[https://782825bf-517f-4465-aff0-](https://782825bf-517f-4465-aff0-8c93ecebdddcc.filesusr.com/ugd/d070cb_60f75c04f20b4631af7784c739699385.pdf)

[8c93ecebdddcc.filesusr.com/ugd/d070cb_60f75c04f20b4631af7784c739699385.pdf](https://782825bf-517f-4465-aff0-8c93ecebdddcc.filesusr.com/ugd/d070cb_60f75c04f20b4631af7784c739699385.pdf)

Considerations: Glean key information from the W6 MRP renewal document to develop a 1-2 page impact statement similar to NC007 impact document link above. Could also integrate one key crop for each state in the western region to highlight production and value. In some cases, one crop is important to many states. Example: In the western region of U.S., alfalfa (WRPIS home repository) was grown in 11 western states on 6.6 million acres (40% of US acreage) and valued at \$4.5 billion in 2020 (Source: Crop Values/Production 2020 Summary; USDA-NASS, see below). Could we also roll in a few crops/fruits/nuts/vegetables from other repositories in the western region to broaden impact beyond W6 MRP? Alternatively, we could develop two separate impact documents, one for W6/WRPIS-related crops and one of broader scope for all western region NPGS sites. This could be broadly useful for sharing with our AES administrators to encourage participation and strengthening of W6. It was recommended that state reps share state reports and impact statements with their AES directors annually in support of W6, WRPIS, and all NPGS sites in western US.

Useful USDA-NASS resources for developing a W6 MRF impact statement
Crop Values 2020 Summary:

<https://downloads.usda.library.cornell.edu/usda-esmis/files/k35694332/348509606/d791t862r/cpvl0221.pdf>

Crop Production 2020 summary:

<https://downloads.usda.library.cornell.edu/usda-esmis/files/k3569432s/w3764081j/5712n018r/cropan21.pdf>

See also: Non-Citrus fruits and nuts 2020 summary:

<https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/sf269213r/6t054c23t/ncit0521.pdf>

Public breeding programs may be one of the best ways to advocate germplasm use/value

Useful Information from National Association of Plant Breeders (NAPB) website:
Sustaining the Future of U.S. Plant Breeding:

<https://www.plantbreeding.org/files/napb/pbcc-national-poster.pdf>

Plant breeding capacity in U.S. public institutions:

<https://acsess.onlinelibrary.wiley.com/doi/pdf/10.1002/csc2.20227>

The Critical Role of the USDA ARS National Plant Germplasm System

<https://www.plantbreeding.org/files/napb/critical.pdf>

Essential Plant Genetic Resources Training Program Components

<https://www.plantbreeding.org/files/napb/survey.pdf>

4) Action item for future meetings:

It was recommended that future meetings of the W6 RTAC should focus on NPGS site reports and discussion, with state reports submitted annually but not discussed to any appreciable extent (unless warranted) during the meeting. This would allow greater opportunities to discuss/develop strategies to strengthen W6 and the NPGS.

2022 Meeting:

Prosser, WA was nominated for the 2022 on-site meeting (pending COVID19 Pandemic developments). Brian Irish agreed to host the meeting and will provide recommended dates during the 3rd week of June 2022 for a 1.5-day event. Comment: Given extensive construction projects that will be impacting USDA and WSU facilities at Pullman, WA during 2022, Prosser was deemed a more suitable choice for an on-site/in-person meeting. Airline access is available through Tri-Cities Airport in Pasco, WA.

W6 2021 Resolution Committee:

- 1: The W6 Technical Advisory Committee (W6 RTAC) highly commends Brian Irish, Carla Olson, Lisa Taylor, and the staff of the USDA ARS WRPIS in Pullman/Prosser, WA for their efforts and activities in coordinating the organization and technical management of the W6 RTAC virtual meeting on 15 June 2021.
2. The W6 RTAC also wishes to extend a special thanks to Brian Irish for leading the efforts over the past year to write/submit/revise the five-year W6 Multistate Research Project renewal documentation for 2022-2027. In addition, the committee sincerely appreciates George Vandemark's efforts to serve as Acting Research Leader and Station Coordinator for PGITRU/WRPIS.
3. The W6 RTAC offers our sincerest gratitude to Carol Miles (WA state representative) and Dan Barney (AK state representative) for their dedicated service and valuable contributions to the committee and their respective states for many years.
4. The members of the W6 RTAC highly commend the committee officers (Amjad Ahmad, Secretary; Kevin Jensen, Vice-Chair and Ian Ray, Chair) for their efforts towards managing and recording discussions affiliated with the W6 RTAC meeting on 15 June 2021.

Meeting adjourned at 4:32 p.m. PST