2020 Washington State Annual Report to the
W-6 Technical Advisory Committee

Carol Miles (Washington State Representative) and Jacky King, Scientific Assistant

Summary:
In 2019, 128 Washington State residents requested a total of 9,146 germplasm samples from 12 National Plant Germplasm System (NPGS) repositories or stations (Table 1) and received germplasm (in the form of seeds and cuttings) in 234 orders. Recipients were with universities [46 (WSU 35, UW 3, Clean Plant Center 2, PNW Natl. Lab 2, Central WA U 1, Northwest Indian College 1, Skagit Valley College 1, St. Martin's University 1)], USDA (17), private research groups (6), commercial firms, seed companies and nurseries (24), and non-profit organizations (5), as well as 31 private individuals. Of the 128 recipients, 5 email addresses were invalid, so 124 recipients received our notice to report their results. Of these, 45 (37%) provided feedback regarding the germplasm they received.

Most requested materials were *Pisum* (1,429), *Spinacia* (963), *Triticum* (798), *Medicago* (640), *Lactuca* (521), *Citrullus* (477), and *Solanum* (471). 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 (Appendix).

The utilization of the germplasm material from the NPGS in 2019 included: apple identification in the fall at fruit shows, events and farmer's markets (Brakken); study residues in ancient cooking vessels (Brownstein); evaluate the germplasm for resistance (or susceptibility) to the disease spinach Fusarium wilt, caused by the fungal pathogen *Fusarium oxysporum f.* sp. *spinaciae* (Batson); test alfalfa seeds for fall dormancy (Yu); incorporaed material into breeding program (Becker); tested host range of a plant virus in greenhouse settings (Mitra); starting to grow seedlings from crosses (Lee); evaluating germplasm for purpose of breeding new and useful varieties (Frautschi); bioremediaton and erosion control (Hayes); test of known genetic alleles for SNP markers (Mahoney); educating the public of noncommercial and/or uncommon fruit trees for the home orchardist and new rootstock evaluation for local environment with these fruit types (Ritson); anatomical type of C4 synthesis analysis, C4 biochemical subtypes, tolerance to salinity anatomy and ultrastructure of salt glands and non-excreting hairs studied in the *Sporobolus* species (Edwards).

Requestors from the last 6 years totaled 573 individuals, of which 7 (1.2%) had requested material every year, 6 (1.0%) had sent requests 5 years, 27 (4.7%) had reqested material 4 years, 29 (5.0%) had sent in requests 3 years and 93 (16.2%) had sent in requests 2 years. The remaining 411 requestors (71.7%) were one-time-only.

Publications
Germplasm recipients reported the following publications that included materials they received from NPGS in 2019, as well as materials received earlier:

1. Attavar, A., L. Tymon, P. Perkins-Veazie, and C.A. Miles. 2020. Cucurbitaceae germplasm resistance to verticillium wilt and grafting compatibility with watermelon. HortScience *in press*.
2. Brownstein, K. J., Tushingham, S., Damitio, W. J., Nguyen, T., and Gang, D. R. (2020). An ancient residue metabolomics-based method to distinguish use of closely related plant species in ancient pipes. *Frontiers in Molecular Biosciences*. *In review*.
3. Coyne C.J., L. Porter, G. Boutet, Y. Ma, R.J. McGee, A. Lesné, A. Baranger, M.-L. Pilet-Nayel. 2019. Confirmation of Fusarium root rot resistance QTL *Fsp-Ps 2.1* of pea under controlled conditions. BMC Plant Biology 19:98 (ARIS #357586).
4. Greene, S., D. Carver, C.K. Khoury, B.M. Irish, P. Olwell and L. Prescot. 2019. Seeds of Success: Collateral Benefits to Agricultural Crop Improvement, Research, and Education. Crop Sci. 59: 2429-2442. doi: 10.2135/cropsci2019.06.0372
5. Gwayali, S., L. du Toit, A. Shi, and J. Correll. 2019. Genome wide association studies of Fusarium wilt resistance in spinach (*Spinacia oleracea* L.), Phytopathology 109:S2.83-34. Poster 239 P1.
6. Jarolmasjed, S., S. Sankaran, A. Marzougui, S. Kostick, Y. Si, J.J. Quirós, and K. Evans. 2019. Multispectral and hyperspectral sensing for high-throughput phenotyping of fire blight disease symptoms in apple. *Frontiers in Plant Science – Technical Advances in Plant Science* doi: 10.3389/fpls.2019.00576.
7. Kostick, S., J. Norelli, and K. Evans. 2019. Novel metrics to classify fire blight resistance of ninety-four apple cultivars. *Plant Pathology*. doi.org/10.1111/ppa.13012
8. Kreplak J., M.-A. Madoui, P. Cápal, P. Novák, K. Labadie, G. Aubert, P. Bayer, K.G. Kishore, R.A. Symes, D. Main, A. Klein, A. Bérard, I. Fukova, C. Fournier, L. d'Agata, C. Belser, W. Berrabah, H. Šimková, H.T. Lee, A. Kougbeadjo, M. Térézol, C. Huneau, C .J. Turo, N. Mohellibi, P. Neumann, M. Falque, K. Gallardo-Guerrero, R. McGee, B. Tar'an, A. Bendahmane, J.-M. Aury, J. Batley, M.-C. Le Paslier, T.H.N. Ellis, T. Warkentin, C. J. Coyne, J. Salse, D. Edwards, J. Lichtenzveig, J. Macas, J. Doležel, P. Wincker, J. Burstin. 2019. The reference genome of the first model for genetics, *Pisum sativum* L. Nature Genetics 51**:**1411–1422 (ARIS #363738)
9. Marzougui A., C. Zhang, Y. Ma, R.J. McGee, C.J. Coyne, D. Main, S. Sankaran. 2019. Advanced imaging for quantitative evaluation of Aphanomyces root rot disease resistance in lentil. Frontiers in Plant Science 10:383. (ARIS #363744)
10. Miles, C. and P. Devi. 2019. Establishing new tea plants. Report to Washington State Nursery Grant Program.
11. Mndolwa, E., S. Nchimbi-Msolla, T. G. Porch, and P. N. Miklas. 2019. GGE biplot analysis of yield stability for Andean dry bean accessions grown under different abiotic stress regimes in Tanzania. African Crop Science Journal 27:413-425.
12. Montanari, S., L. Bianco, B.J. Allen, P.J. Martinez-Garcia, N.V. Bassil, J. Postman, M. Knabel, B. Kitson, C.H. Deng, D. Chagné, M.W. Crepeau, C.H. Langley, K. Evans, A. Dhingra, M. Troggio, and D.B. Neale. 2019. Development of a highly efficient Axiom™ 70 K SNP array for *Pyrus* and evaluation for high-density mapping and germplasm characterization. *BMC Genomics* 20:331. doi.org/10.1186/s12864-019-5712-3.
13. Mugabe D., C.J. Coyne, J. Piaskowski, P. Zheng, Y. Ma, R.J. McGee, D. Main, G. Vandemark, H. Zhang, S. Abbo. 2019. QTL analysis of cold tolerance in chickpea. Crop Science 59:573-582 (ARIS #359930).

14. Oladzad, A., T. Porch, J. C. Rosas, S. M. Moghaddam, J. Beaver, S. E. Beebe, J. Burridge, C. N. Jochua, M. A. Miguel, P. N. Miklas, B. Raatz, J. W. White, J. Lynch, and P. E. McClean. 2019. Single and multi-trait GWAS identify factors associated with production traits in common bean under abiotic stress environments. G3: Genes, Genetics, Genomics 9: 1881-1892; https://doi.org/10.1534/g3.119.400072
15. Strock, C. F., J. Burridge, A. S. F. Massas, J. Beaver, S. Beebe, S. A. Camilo, D. Fourie, C. Jochua, M. Miguel, P. N. Miklas, E. Mndolwa, S. Nchimbi-Msolla, J. Polania, T. G. Porch, J. C. Rosas, J. J. Trapp, and J. P. Lynch. 2019. Seedling root architecture and its relationship with seed yield across diverse environments in *Phaseolus vulgaris*. Field Crops Research 237:53-64 (LOG 360100)

Table 1. NCGR stations from which material was requested in 2019.

COR	NGRL
DAV	NR6
GEN	NSGC
GSOR	S9
NC7	SOY
NE9	W6

Appendix: Summary of responses.

Emailed Questionnaire

1. ***The samples and their packaging arrived in good condition.***
   ___ Yes ___ No If no, please explain:

2. ***Germination from the seed or growth from plant material was satisfactory.***
   ___ Yes ___ No If no, please explain:

3. ***How did you use or plan to use the materials you received?***
   ___ Research
   ___ Education
   ___ Other
   Please provide details:

4. ***Did you release any plant material(s) to the public in 2019 that was partially or fully derived from any NPGS germplasm(s) that you received in 2019 or previously?***
   ___ Yes ___ No If yes, please provide details about the released plant material(s):

5. ***If you published an article in 2019 that includes NPGS germplasm that you received in 2019 or earlier, please provide the publication citation (authors, title, journal, etc.):***

1. <u>Travis Alexander, Skagit Valley College, 2405 E College Way, Mount Vernon, WA 98273</u>

1. The samples arrived in good condition.
2. Germination from the seed or growth from plant material was satisfactory.
3. Material was used for education. Students were educated on the process of requesting germplasm from NPGS sites. Students utilized germplasm, seed and scion, to learn about various propagation methods. Germplasm was utilized by the instructor to develop a demonstration garden.
4. No plant material was released.
5. No publications.

2. <u>Alex Batson, WSU Mount Vernon NWREC, Mount Vernon, WA 98273</u>

1. The samples arrived in good condition.
2. Germination/growth of the plant material could not be established; I have not yet had the opportunity to test the germplasm I have received. I should have an answer to this question at this time next year.
3. Material was used for research. I received spinach (*Spinacia oleracea* L.) germplasm in December 2019. I plan to evaluate the germplasm I received for resistance (or susceptibility) to the disease spinach Fusarium wilt, caused by the fungal pathogen *Fusarium oxysporum f.* sp. *spinaciae*. The goals of this project are to identify i) sources of resistant germplasm and ii) identify genetic loci that are associated with resistant (or susceptible) germplasm.

4. No plant material was released.
5. No publications.

3. Chris Becker, 400 Dallas St., Mount Vernon, WA 98274

1. The samples arrived in good condition.
2. Germination/growth of the material was satisfactory.
3. Material was used for research; incorporated into the breeding program.
4. No plant material was released.
5. No publications.

4. Michael Bradshaw, University of Washington, Seattle, WA 98195

1. The samples arrived in good condition.
2. Germination was satisfactory.
3. Material was used for research: Echinacea spp., Helianthus spp., Zinnia and other species.
4. No plant material was released.
5. An article is in preparation.

5. Lori Brakken, Seattle Tree Fruit Society, 4719 NE 204th St., Lake Forest Park, WA 98155

1. The samples arrived in good condition.
2. Growth of the scionwood was satisfactory.
3. Material was used for Apple Identification in the fall at Fruit Shows, events and Farmer's Markets. I grow different varieties to get to know the fruit and photograph them for identification.
4. No plant material was released.
5. No publications.

6. Korey Brownstein, Washington State University Dept. of Anthropology, Pullman, WA 99164-4910

1. The samples arrived in good condition.
2. Germination was satisfactory.
3. Material was used for research. The seeds we received from the USDA NPGS are being used to study residues in ancient cooking vessels. We are using a metabolomics-based approach to compare compounds found on these ancient vessels to vessels experimentally cooked with various seeds. We have a publication *in review* using USDA NPGS seeds for our NSF-funded ancient smoke plants project (see citation below). For that project, the plants had been experimentally smoked in pipes and these experimental pipes were then compared to ancient pipes.
4. No plant material was released.
5. See "Publications," above.

7. Elizabeth Byszeski 1280 Curtis Way, Freeland, WA 98249

1. I do not understand the purpose of this. I never received strawberry plants ordered.
2. NA.
3. NA

4. NA
5. NA

8. Wes Cherry, Dragon's Head Cider, 18201 107 Ave SW, Vashon, WA 98070

1. The samples arrived in good condition.
2. Grafts did not take; I made 3-4 grafts and usually get 90% or better take.
3. Material was used for research into red-flesh apple varieties for cider.
4. No plant material was released.
5. No publications.

9. Clarice Coyne, USDA-ARS, Washington State University, Pullman, WA 99164-6402

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research.
4. No plant material was released.
5. See "Publications," above.

10. Brett Despain, Highland Specialty Grains, 2945 Road "N" NE, Moses Lake, WA 98837

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Chenopodium* spp.) was used for research.
4. No plant material was released.
5. No publications.

11. Gerald Edwards, Washington State University, Pullman, WA 99164

1. The samples arrived in good condition.
2. Germination was satisfactory for most species. See below for list of species analyzed, and seed germination rates.
3. Material was used for research: Seeds were germinated and plants grown in WSU greenhouse. Leaves of all species were fixed for light and transmission electron microscopy to determine anatomical type of C4 photosynthesis. Leaf material was collected and frozen in liquid nitrogen for protein extraction, and analysis of key photosynthetic enzymes by Western blotting to study the biochemical subtype of C4 photosynthesis. Additionally, plants were irrigated with 200 mM NaCl to analyze the degree, and mechanisms, of tolerance to salinity. After 30d of treatment, adaxial and abaxial surfaces of the leaves were captured under the low vacuum mode of Scanning electron microscope. About 30 species were found to have salt excretion from leaves which is an important means of tolerating growth in saline soils. The anatomy and ultrastructure of salt glands and non-excreting hairs were studied in detail for the *Sporobolus* species as well as their C4 biochemical subtypes.
4. No plant material was released.
5. No publications, work is still in progress.

Table 1. Species analyzed and seed germination rates.

	Items:		Species	Germination rate

1	PI 229906	W6	Aeluropus littoralis	0 – 2019, 10% - 2020
2	PI 269362	W6	Aeluropus macrostachyus	40
3	W6 13090	W6	Aeluropus pungens	20
4	PI 284733	S9	Astrebla lappacea	60
5	PI 238232	S9	Astrebla pectinata	10
6	PI 383326	S9	Bewsia biflora	0
7	W6 54461	W6	Bouteloua barbata	0
8	PI 309971	S9	Chloris radiata	100
9	PI 279931	S9	Chloris truncata	100
10	PI 369427	S9	Chloris ventricosa	100
11	PI 197534	S9	Coelachyrum piercei	80
12	PI 364502	S9	Coelachyrum yemenicum	30
13	W6 39051	W6	Dasyochloa pulchella	100
14	PI 364782	S9	Dinebra retroflexa	50
15	PI 430568	S9	Diplachne fusca subsp. fusca	50
16	PI 675541	S9	Disakisperma dubium	100
17	PI 226077	S9	Disakisperma obtusiflorum	20
18	PI 238293	S9	Enneapogon avenaceus	0
19	PI 409812	S9	Enneapogon cenchroides	100 two different kind of seeds
20	PI 299901	S9	Enneapogon cenchroides	0
21	W6 54463	W6	Enneapogon desvauxii	100
22	PI 257721	S9	Enneapogon glaber	10
23	PI 257722	S9	Enneapogon gracilis	30
24	PI 238294	S9	Enneapogon nigricans	100
25	PI 238297	S9	Enneapogon oblongus	100
26	PI 409814	S9	Enneapogon scoparius	40
27	PI 238258	S9	Enteropogon acicularis	100
28	PI 364800	S9	Enteropogon macrostachyus	90
29	W6 48332	W6	Erioneuron pilosum	100
30	PI 283208	S9	Eustachys bahiensis	50
31	PI 203850	S9	Eustachys bahiensis	0
32	PI 404614	S9	Eustachys distichophylla	60
33	PI 383330	S9	Eustachys paspaloides	100
34	PI 204168	S9	Eustachys petraea	50
35	PI 309959	S9	Eustachys retusa	20
36	PI 404301	S9	Eustachys uliginosa	0
37	PI 410120	W6	Fingerhuthia africana	30
38	PI 299968	W6	Fingerhuthia sesleriiformis	

39	PI 306275	S9	Gouinia latifolia	0
40	W6 44388	W6	Kallstroemia grandiflora	0
41	W6 48360	W6	Kallstroemia parviflora	0
42	PI 162786	S9	Leptochloa chloridiformis	0
43	PI 213515	S9	Melanocenchris abyssinica	90
44	PI 300028	S9	Microchloa caffra	20
45	PI 238262	S9	Oxychloris scariosa	20
46	PI 216531	S9	Pappophorum bicolor	20
47	PI 477098	S9	Pappophorum mucronulatum	100
48	PI 364995	S9	Perotis patens	50
49	PI 364998	S9	Pogonarthria squarrosa	80
50	PI 409112	S9	Schmidtia pappophoroides	100
51	PI 241073	W6	Sporobolus contractus	60
52	PI 209189	W6	Sporobolus filipes	20
53	W6 48468	W6	Sporobolus flexuosus	0
54	W6 44479	W6	Sporobolus giganteus	10
55	PI 331391	W6	Sporobolus marginatus	0
56	PI 226098	W6	Sporobolus phyllotrichus	100
57	PI 478836	W6	Sporobolus texanus	20
58	W6 54414	W6	Sporobolus wrightii	20
59	PI 404758	S9	Stapfochloa canterae	20
60	PI 404616	S9	Stapfochloa elata	0
61	PI 330683	W6	Tetrachne dregei	100
62	PI 225009	S9	Tragus berteronianus	10
63	PI 365064	S9	Trichoneura grandiglumis	90
64	Ames 33355	NC7	Tridens albescens	50
65	PI 649005	NC7	Tridens flavus	20
66	PI 434479	NC7	Tridens flavus	50
67	PI 669967	NC7	Tridens strictus	10
68	W6 48470	W6	Tridentopsis mutica	100
69	PI 477954	S9	Triraphis schinzii	100
70	PI 665050	S9	Uniola paniculata	Plant was provided
71	PI 216663	S9	Vaseyochloa multinervosa	10

12. <u>Kate Evans, Washington State University, TFRC, Wenatchee, WA 99164</u>

Samples requested in 2019 were *Pyrus* spp. and *Photinia davidiana*. Didn't receive anything last year but you could include the publications (listed above) as we definitely included some NPGS apple and pear germplasm.

13. Hans Karl Frautschi 2120 NE 80th street, Seattle, WA 98115

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used to evaluate germplasm for the purpose of breeding new and useful varieties.
4. No plant material was released.
5. NA

14. Sanjaya Gyawali, WSU Mount Vernon NWREC, Mount Vernon, WA 98273

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research. In the past (2018), I had received 376 accessions of spinach collection of which I used 374 accessions for Fusarium wilt resistance screening trial (2 accessions did not germinate). The phenotyping data from this trial has been used for genome wide association studies. A draft manuscript on phenotyping of Fusarium wilt resistance in spinach has been produced for publication in the journal. Currently, the manuscript is under internal review by co-authors. Two more manuscripts on GWAS of Fusarium wilt resistance and leaf biomass production are under preparation.
4. No plant material was released.
5. A draft manuscript on phenotyping of Fusarium wilt resistance in spinach has been produced for publication in the journal. Currently, the manuscript is under internal review by co-authors. Two more manuscripts on GWAS of Fusarium wilt resistance and leaf biomass production are under preparation.An abstract was published in APS Plant Health 2019 which cites the use of spinach accessions.See "Publications," above.

15. Jason Hayes 31912 Little Boston Road NE, Kingston WA 98346

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research; Bioremediation and erosion control.
4. No plant material was released.
5. No publication..

16. Marcus Alan Hooker, Washington State University, Pullman, WA 99164

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Triticum* spp.) was used for research; we used this material to grow leaf material for DNA extraction to subsequently test a variety of markers we are developing for a genotyping panel.
4. No plant material was released.
5. No publications yet. Research is still ongoing.

17. Takato Imaizumi, University of Washington Dept. of Biology, Seattle, WA 98195-1800

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research.
4. No plant material was released.
5. No publications.

18. <u>Brian Irish, USDA-ARS, Washington State University, Prosser, WA 99350-9687</u>
1. The samples arrived in good condition.
2. Germination was satisfactory, although some accessions had a lower viability than others.
3. Material was used for research: Annual plantings (Spring and Fall) of *Medicago sativa* were made for seed increases/regenerations. Larger collections of *Medicago sativa* and other Medicago spp. are being screened for disease reaction to foliar fungal plant pathogens. Characterization was made in field trials for important phenotypic traits used in estimating genetic diversity estimation and taxonomic identification. Disease resistant material will be selected and made available to plant breeders for incorporation into commercial cultivars which lack these traits.
4. No plant material was released, but probably will sometime in the near future.
5. Still publishing work from PR, but soon we should have a few more from Washington work. A publication that relates to native plant germplasm is a review of the native SOS collections in the NPGS. See "Publications," above.

19. <u>Timothy Knopp 7846 stanley Rd NE, Moses Lake WA 98837</u>
Thank you for he chance but what I received did nothing for me even with temperature control. We were disappointed.
1. The samples did not arrive in good condition. The seeds looked partially crushed. The envelope was damaged and they were sent in the fall.
2. Germination/growth was unsatisfactory. Tried to sprout them but nothing happened.
3. Material was to be used for educational purposes.
4. As nothing grew out of the seeds, there was no plant material to release.
5. No publications.

20. <u>Tyson Koepke, Washington State University, Pullman, WA 99164</u>
1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Triticum aestivum* subsp. *aestivum*) was used for research.
4. No plant material was released.
5. No publications.

21. <u>Mark Lee, 22423 98th Ave W, Edmonds, WA 98020</u>
1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research, education, and plant breeding. I am starting to grow seedlings of pear crosses I have done.
4. No plant material was released.

5. No publications, but I give garden tours to local gardening clubs and talk about germplasm I have received from your collection.

22. <u>Steven Lyon, 11768 Westar Lane, Burlington, WA 98233</u>

The seed we received form the UDA National Plant Germplasm System is vital to the success of our program. Than you for this valuable service.

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was used for research.
4. No plant material was released.
5. No publications.

23. <u>Aaron Mahoney 930 S. Alderwood Dr. Moses Lake, WA 98837</u>

1. The samples arrived in good condition.
2. Germination/growth information is not available; we are still in the developmental stage of our study.
3. Material was used for research. We used the germplasam to test fo known genetic alleles fo ANP markers.
4. No plant material was released.
5. No publications

24. <u>Gillian Martin, Big Bold Health, 115 Hall Brothers Lp, #107, Bainbridge Island, WA 98110</u>

1. The samples arrived in good condition.
2. Germination/growth information is not available; we are still in the developmental stage of our study.
3. Material (*Fagopyrum tataricum*) was used for research. Our goal is to identify the profile of phytochemicals present and at what levels, relating to the part of the plant and the extraction method employed.
4. No plant material was released.
5. No publications.

25. <u>Rebecca McGee, USDA ARS, 305 Johnson Hall, Pullman, WA 99164</u>

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Pisum sativum* and other) was used for research.
4. No plant material was released.
5. No publications.

26. <u>Laura Ann McLoud (Diehl), Sakata Seed America, 16943 Dike Road, Mount Vernon, WA 99164</u>

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Beta vulgaris* subsp. *vulgaris*) was used for research.
4. No plant material was released.

5. A publication was submitted in 2019, but will be published in 2020. I'll include it in next year's report.

27. Phil Miklas, USDA-ARS, 24106 N Bunn Road, Prosser, WA 99350

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material (*Phaseolus vulgaris*) was used for research.
4. No plant material was released.
5. See "Publications," above.

28. Carol Miles, WSU Mount Vernon NWREC, Mount Vernon, WA 98273

1. The samples arrived in good condition. Plant material was healthy; however, tea propagation recommendations are for newly mature red wood and the materials that were sent were mostly green.
2. All cuttings died from both shipments. This is likely a combination of our propagation facilities not optimal for tea, and there may be a physiological barrier to propagating tea cuttings due to the biochemical activity in the stems post-harvest (cuttings were in shipment for several days, and it is not clear how long they were held from cutting to shipping in Hawaii).
3. Material was to be used for research. Our project goal is to establish a tea planting of several varieties, compare their growth and productivity, with the end goal of determining which varieties are best suited for production in our region. However none of the cuttings survived after 2 attempts, and so the project has morphed into one where we are testing methods for rooting cuttings.
4. No plant material was released.
5. See "Publications," above.

29. Rick Misterly, Quillisascut Farm, 2409 Pleasant Valley Rd., Rice, WA 99167

1. The samples arrived in good condition.
2. We received the materials (*Phaseolus vulgaris*) too late to plant last year so will plant in 2020.
3. Material was to be used for education, for cooking at our workshops to feed students, and to share the information about the variety with the NPGS.
4. No plant material was released.
5. No publications.

30. Arunabha Mitra, Washington State University, Prosser, WA 99350

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. Material was to be used for research, to test the host range of a plant virus under greenhouse settings.
4. No plant material was released.
5. No publications.

31. Robin Morgan, WSU NWREC Bread Lab, Unit E, Burlington, WA 98233

1. The samples arrived in good condition.
2. Germination/growth was satisfactory.

3. Material was to be used for research; the NPGS germplasm was screened with the goal of finding potential parents for our wheat breeding program.
4. No plant material was released.
5. No publications.

32. Fred Muehlbauer, WSU Dept. of Crop and Soil Sciences, Pullman, WA 99164
1. The samples arrived in good condition.
2. Germination/growth was satisfactory.
3. We mostly used the material for crossing and observation. Hopefully the crosses made will provide some unique combinations and will be released as new varieties. Thank you for providing the material.
4. No plant material was released.
5. No publications.

33. Nickisha Pierre-Pierre, USDA, 1920 NE Terre View Drive, Pullman, WA 99163
1. The samples arrived in good condition.
2. Germination was satisfactory.
3. Material (*Brassica napus* subsp. *napus, Cicer arietinum, Citrullus lanatus, Helianthus annuus, Phaseolus vulgaris*) was used for research and education.
4. No plant material was released.
5. No publications.

34. Lyndon Porter, 24106 N. Bunn Rd., Prosser, WA 99350
1. The samples arrived in good condition.
2. Germination was satisfactory.
3. Material was used for research. I am screening the Pisum Single Plant Core Collection for resistance to *Fusarium avenaceum* and *Bean leafroll virus*. I am screening the Lentil Single Plant Core Collection for resistance to *Fusarium avenaceum* and *Fusarium oxysporum*.
4. No plant material was released.
5. No publications.

35. Patrick Reisenaur, 7652 Johnson Road, Colton, WA 99113
1. The samples arrived in good condition.
2. Growth or germination was satisfactory.
3. Material was used for research and education involving comparison to currently grown varieties of *Pisum sativum*.
4. No plant material was released.
5. No publications.

36. Adam Remington, A&M Textiles, 117 Hendrick Rd, Omak,, WA 98841
1. The samples arrived in good condition.
2. Germination was not satisfactory. All the seeds I have received in previous years have done well. However, a number of the indigofera seeds I received last year (2019) germinated, but the plants did not grow well. After proper seed treatment germination was OK, but the growth of the

plants was extremely slow and most did not survive, even under ideal growing conditions. I think some of the seed may be reaching the end of its shelf life.
3. Material was used for research: Developing a variety of indigofera more suited to colder, dryer climates.
4. No plant material was released.
5. No publications.

37. Francesca Ritson, South Sound Fruit Society, 2322 West State Rt 108, Shelton, WA 98584

1. The samples arrived in good condition.
2. Growth of the plant material was satisfactory.
3. Material was used for education, mainly through disseminating information about uncommon fruit trees which maybe suited to home orchardists. South Sound Fruit Society (SSFS) hopes to spread more biodiversity and help the public better appreciate rare or non commercial varieties of fruiting plants by teaching grafting and exchanging scionwood. Also informally testing pears' compatibility with Amelanchier as a rootstock. This is interesting as Quince Provence BA 29C has failed in really cold weather in areas of our membership. The Amelanchier rootstock has done quite well, though; it also appears to do much better with an interstem of Comice or Keiffer. Too early and too warm to tell if this is a better rootstock for local area and whether it will yield a smaller tree. It is nice that it is a native to the area, however, in case of failure:
4. The group, SSFS, made scionwood available to attendees of the workshop but did not keep track of how much may have been disseminated to individuals.
5. No publications.

38. Tavin Marie Schneider, Washington State University, Pullman, WA 99164

1. The samples arrived in good condition.
2. Growth or germination was satisfactory.
3. Material was used for research; seeds were used to verify markers that were published in papers referencing specific germplasm.
4. No plant material was released.
5. No publications.

39. Jonathan Schnore, 1325 SE Sunnymead Way, Pullman, WA 99163

1. The samples arrived in good condition.
2. Growth or germination was satisfactory.
3. Material was used for research. We are currently using the material to start a breeding project for making a *Poa arachnifera* by *Poa pratensis* hybrid. The first crosses have been made and are being evaluated for success/germ.
4. No plant material was released.
5. No publications yet.

40. Jon Shannon, PO Box 456, Shaw Island, WA 98286

1. The samples arrived in good condition.
2. Growth was satisfactory.

3. Material was used for research; the material requested was *Malus domestica* and *Malus* hybrids to be evaluated for suitability to local conditions.
4. No plant material was released.
5. No publications.

41. Derek Siver, 113 cherry st #8976, Seattle, WA 98104
1. The samples arrived in good condition.
2. Growth was satisfactory.
3. Material (*Zea mays* subsp. *mays*, *Zea diploperennis*) was used for research; trying to generate aerial roots that can produce mucilage with reduced moisture.
4. No plant material was released.
5. No publications.

42. Kayla Ann Spawton, WSU Mount Vernon NWREC, Mount Vernon, WA 98273
1. The samples arrived in good condition.
2. Materials have not been used yet.
3. Material was used for research; it was ordered to be used in a GWAS study in collaboration with Sanjaya Gyawali on Stemphylium leaf spot of spinach.
4. No plant material was released.
5. No publications.

43. Julie Renee Thayer, WSU Institute of Biochemistry, Pullman, WA 99164
1. The samples arrived in good condition.
2. Germination was satisfactory.
3. Material (*Medicago sativa* subsp. *sativa*, *Puccinellia hauptiana*) was used for research.
4. No plant material was released.
5. No publications.

44. William Whitson, Cultivariable, PO Box 111, Moclips, WA 98562
1. All germplasm arrived in good condition in 2019.
2. Germination is generally good. I have had trouble getting some wild potato accessions to germinate, but I can't rule out incompetence.
3. Use of material: I don't even know how to classify what I am doing anymore. Most materials are ultimately used for breeding or at least evaluated for breeding potential. Some of my work probably also counts under research or education, although not in the traditional sense.
4. In 2019, I released Twanoh, a potato cultivar selected from bulked seed of PI 230495 https://www.cultivariable.com/product/potato/potato-varieties/potato-twanoh/ .
5. Most of my results are published on our website https://www.cultivariable.com/ . Andean potato here:
https://www.cultivariable.com/morphological-observations-of-usda-andigena-accessions/
Wild potato here:
https://www.cultivariable.com/instructions/potatoes/how-to-grow-wild-potatoes/

45. Long-Xi Yu, USDA-ARS, 24106 N Bunn Road, Prosser, WA 99350
1. The samples arrived in good condition.

2. Germination/growth was satisfactory.
3. Material (*Medicago sativa* subsp. *sativa, Medicago sativa* subsp. *caerulea*) was used for research.
4. No plant material was released.
5. No publications.