Report of NPGS Germplasm Distribution

Washington

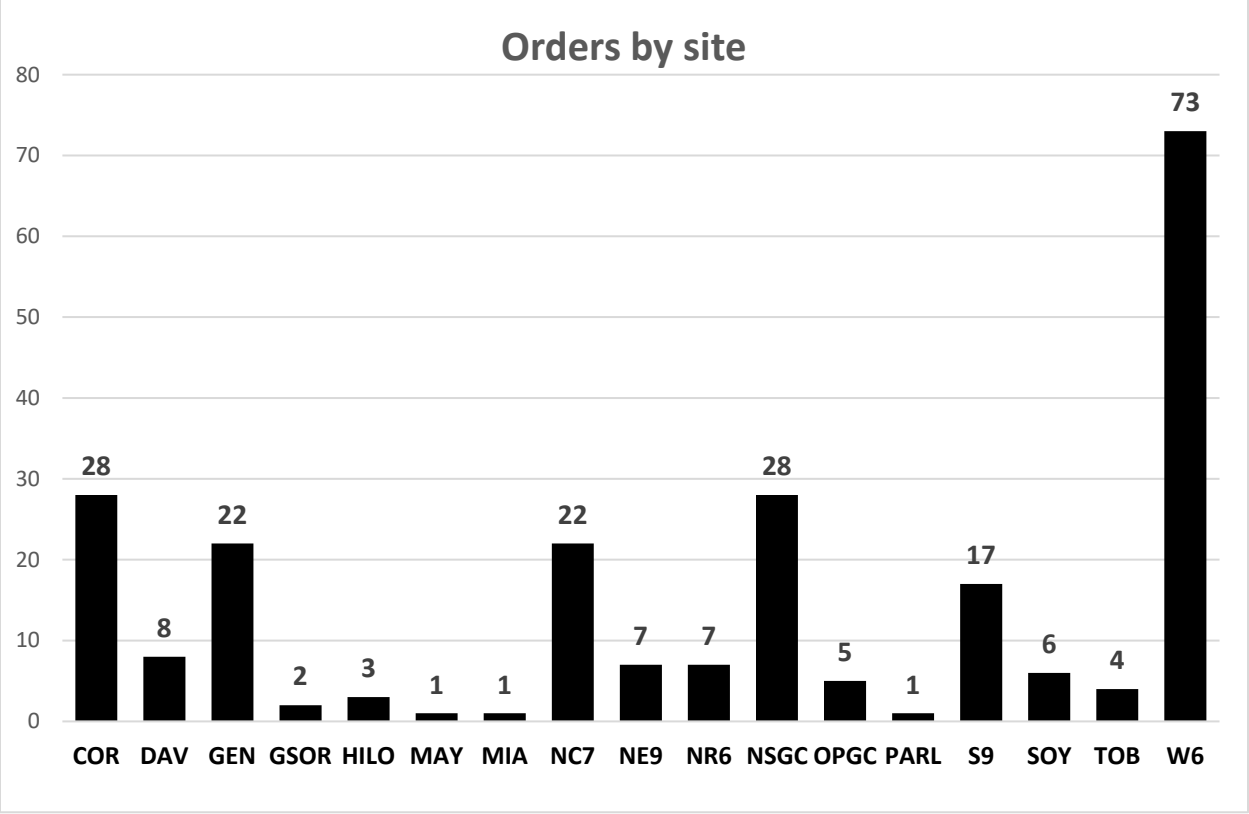
Representative: Per McCord

2019 Report

Overview

- Number of requestors: 130
- Number of responders: 54 (42%)
  - Bad email addresses: 11
- Representation:
  - US State agencies and all universities: 39 (22 responses)
  - Federal[1]: 18 (11 responses)
  - US Commercial Company: 38 (14 responses)
  - Individual/non-profit: 36 (7 responses)
- Total publications: 8 (including 1 Ph.D. thesis and 1 non-refereed publication)

[1]USDA-ARS (15), PNNL (2), Tribal (1)



PI: Michael Bradshaw

Representation: University of Washington

Species: *Abelmoschus caillei, A. esculentus, A. manihot, Acamtopappus sphaerocephalus* var. *hirtellus*, *Achillea alpina, Agoseris grandiflora, Ambrosia dumosa, Anaphalis margaritacea, Anisocarpus madiodes, Artemisia borealis, A. frigida, A. ludoviciana, A. tilesii, A. tridentata* subsp. *wyomingensis, Astragalus asclepiadoides, A. filipes, A. lonchocarpus, A. oxyphysus, A. purshii* var. *purshii, Baccharis sarothroides, Baileya multiradiata, B. pleniradiata, Balsamorhiza hookeri, Bebbia juncea, Brickellia betonicifolia, Chaenactis carphoclinia, C. douglasii, C. stevioides, Chrysothamnus viscidiflorus, Coreopsis callipsidea, C. delphiniifolia, C. gladiata, C. leavenworthii, C. major, C. palmata, C. pubescens, C. pulchra, C. tinctoria, C. tripteris, C. verticillata, C. wrightii, Crepis acuminata, Dalea foliolosa* var. *canescens, Echinacea pallida, E. sanguinea, E. simulata, Encelia farinosa, Ericameria nauseosa, E. paniculata, Erigeron acris* subsp. *kamtschaticus, E. pumilon, Eriophyllum lanosum, Fragaria iinumae, Geraea, canescens, Glycine argyrea, G. canescens, G. clandestina, G. curvata, G. cyrtoloba, G. dolichocarpa, G. falcata, G. latifolia, G. max, G. microphylla, G. pescadrensis, G. rubiginosa, G. soja, G. tabacina, G. tomentella, Grindelia squarrosa* var. *quasiperrenis, Gutierreza microcephala, Hedysarum alpinum, H. candidum, Helianthella uniflora, Helianthus annuus, H. anomalus, H. argophyllus, H. arizonensis, H. atrorubens, H. bolanderi, H. californicus, H. carnosus, H. cusickii, H. debilis* subsp. *cucumerifolius, H. debilis* subsp. *debilis, H. debilis,* subsp. *silvestris, H. debilis,* subsp. *tardiflorus, H. debilis* subsp. *vestitus, H. decapetalus, H. deserticola, H. divaricatus, H. eggertii, H. exilis, H. floridanus, H. giganteus, H. glaucophyllus, H. gracilentus, H. grosseserratus, H. heterophyllus, H. hirsutus, H. laciniatus, H. laevigatus, H. maximiliani, H. microcephalus, H. mollis, H. neglectus, H. niveus* subsp. *canescens, H. niveus* subsp. *tephrodes, H. nuttallii, H. nutallii,* subsp. *nutallii, H. nutallii* subsp. *rydbergii, H. occidentalus* subsp. *occidentalus, H. occidentalis* subsp. *plantagineus, H. pauciflorus* subsp. *pauciflorus, H. pauciflorus* subsp. *subrhomboideus, H. petiolaris, H. petiolaris* subsp. *fallax, H. petiolaris* subsp. *petiolaris, H. porteri, H. praecox, H. praecox* subsp. *hirtus, H. praecox* subsp. *praecox, H. praecox* subsp. *runyonii, H. pumilus, H. radula, H. resinosus, H. salicifolius, H. silphioides, H. simulans, H. smithii, H. strumosus, H. tuberosus, H. x laetiflorus, Heliomeris multiflora* var. *multiflora, Heterotheca villosa, Hosackia crassifolia, H. crassifolia* var. *crassifolia, Hymenoxys odorata, Lactuca serriola, Lasthenia gracilis, Layia platyglossa, Lotus corniculatus, Lotus corniculatus* var. *corniculatus, Lupinus lepidus* var. *aridus, Lupinus succulentus, Madia sativa, Medicago arabica, M. astroites, M. edgeworthii, M. lupulina, M. medicaginoides, M. minima, M. monspeliaca, M. orbicularis, M. polymorpha, M. praecox, M. rigidula, M. rigiduloides, M. sativa nothos*subsp. *varia, M. sativa* subsp. *caerulea, M. sativa* subsp. *sativa, Melampodium leucanthum, Microseris douglasii* subsp. *douglasii, Monarda fistulosa, Monolopia stricta, Neltuma odorata, N. velutina, Nothocalais troximoides, Oxytropis besseyi* var. *fallax, O. campestris, O. deflexa* var. *sericea, O. lagopus* var. *atropurpurea, O. pallasii, O. sericea* var. *speciosa, Packera multilobata, Parthenium argentatum, P. incanum, Perityle emoryi, Phaseolus filiformis, P. glabellus, P. leptostachyus, Pisum abyssinicum, P. fulvum, P. sativum, P. sativum* subsp. *elatius, P. sativum* subsp. *transcaucasicum, P. sativum* var.

arvense, P. sativum var. *pumilio, Rafinesquia neomexicana, Ratibida tagetes, Sanvitalia abertii, Sartwellia flaveriae, Scabrethia scabra* subsp. *scabra, Senecio spartioides, Senna armata, Solidago wrightii, Stenotus armerioides, Tanacetum camphoratum, Taraxacum kok-saghyz, Thelesperma megapotamicum, Thermopsis rhombifolia, Thymophylla pentachaeta, Townsendia incana, Trifolium ambiguum, T. dichotomum, T. fragiferum, T. hybridum, T. medium, T. pretense, T. repens, T. trichocephalum, T. willdenovii, Vachellia vernicosa, Verbesina encelioides, Viguiera dentata, Xanthisma gracile, Xanthisma grindelioides* var. *grindelioides, Xanthium strumarium, Xylorhiza tortifolia* var. *tortifolia, Xylorhiza venusta, Zinnia acerosa, Z. angustifolia, Z. bicolor, Z. citrea, Z. elegans, Z. haageana, Z. juniperifolia, Z. peruviana*

Use/impact:

Data/Publications: Bradshaw M., E. Goolsby, C. Mason, and P. Tobin. 2021. Evolution of disease severity in the Asteraceae to the powdery mildew *Golvinomyces latisporus*: major phylogenetic structure coupled with highly variable disease severity at fine scales. Plant Dis. 105:268-275. DOI: https://doi.org/10.1094/PDIS-06-20-1375-RE.

PI: Molly Carney

Representation: Washington State University

Species: *Allium acuminatum, A. geyeri* var. *geyeri, Amaranthus hybridus, Balsamorhiza hookeri, Blitum capitatum, Chamaenerion angustifolium, Eriogonum thymoides, Erythronium grandiflorum* subsp. *grandiflorum, Fritillaria camschatcensis, Helianthus annuus, H. petiolaris* subsp. *petiolaris, H. tuberosus, Lomatium dissectum, L. nudicaule, Potentilla anserina, Ribes cereum, R. lacustre, Rubus spectabilis, Toxicoscordion venenosum, Vaccinium myrtilloides, V. oxycoccos*

Use/impact: Use in paleoethnobotanical analysis of archeological sites in Washington State, and teaching.

Data/publications: Carney M., J. d'Alpoim Guedes, E. Wohlgemuth, and S. Tushingham. 2022. Bulbs and biographies, pine nuts and palimpsests: exploring plant diversity and earth oven reuse at a Late Period Plateau site. Archeol. Anthropol. Sci. 14:130. DOI: https://doi.org/10.1007/s12520-022-01588-1

PI: Shaun Clare

Representation: Washington State University

Species: *Hordeum vulgare*

Use/impact: These lines were used to make barley mapping populations of resistance to *Pyrenophora teres*.

Data/publications: Clare, S. 2022. Genetic characterization of barley and Pyrenophora teres host pathogen interactions. Ph.D. thesis, Washington State University.

PI: Rodney Cooper

Representation: USDA-ARS

Species: *Solanum* spp.

Use/impact: These germplasm were used to screen non-crop hosts of potato psyllid (*Bactericera cockerelli*), bindweed psyllid (*Bactericera maculipennis*), and a plant pathogen both psyllids transmit called Candidatus *Liberibacter solanacearum*.

Data/publications: We have conducted an extensive amount of work on identifying the non-crop sources of infective psyllids, especially species of *Lycium* and *Physalis*. We have found that nearly all species of *Physalis* are very good hosts for potato psyllid and are also susceptible to Liberibacter. Moreover, Liberibacter overwinters in the underground stolons of certain *Physalis* species, which produce infected plants in early spring from which psyllids can acquire Liberibacter before moving to potato. *Lycium* species appear to be more important as a source of potato psyllids colonizing potato, but vary in their susceptibility to potato psyllid. The non-native species that is prevalent in the Pacific Northwest is the primary source of psyllids colonizing potato in early spring, but is not susceptible to Liberibacter. In contrast, native species of *Lycium* in the southwest are susceptible to Liberibacter, and many psyllids moving from native *Lycium* to potato are infected with the zebra chip pathogen. Bindweed psyllid develops on Convolvulaceae. We have had challenges in determining whether these plants are susceptible to Liberibacter. For example, we have never detected Liberibacter from leaves of bindweed (*Convolvulus arvensis*), yet 30% of bindweed psyllids and potato psyllids collected from this plant carry the pathogen. *Ipomoea ternifolia* is highly susceptible to Liberibacter. We used this plant to show that bindweed psyllid is a vector of the pathogen, and not a passive carrier.

PI: Brian Irish

Representation: USDA-ARS

Species: *Medicago arabica, M. bonarotiana, M. brachycarpa, M. cancellate, M. ciliaris, M. coronata, M. cretacea, M. daghestanica, M. doliata* var. *doliata, M. doliata* var. *muricata, M. fischeriana, M. granadensis, M. intertexta, M. italica, M. lesinsii, M. littoralis, M. noeana, M. orbicularis, M. pironae, M. platycarpos, M. polyceratia, M. polymorpha* var. *polymorpha, M. radiata, M. rotata, M. rugosa, M. sativa* subsp. *sativa, M. sauvagei, M. shepardii, M. truncatula, M. turbinata, M. x blancheana,*

Use/impact: This set of alfalfa crop wild relative species (*Medicago* spp.) were used to try to define host range and disease reaction to an important fungal foliar plant pathogen, *Phoma medicaginis*, that causes spring black stem and leaf spot in alfalfa.

Data: It was clear that the fungal isolates tested infected all species evaluated, but some were quite resistant compared to alfalfa and other more susceptible species. Data is being summarized for likely a Crop Protection article and once this happens all summarized data will be uploaded to GRIN-Global to be associated with specific accessions evaluated.

Publication: Finding tools to fight spring black stem. Hay and Forage Grower (non-refereed), April/May 2021 issue.

PI: Tyson Koepke

Representation: Washington State University

Species: *Triticum aestivum* subsp. *aestivum*

Use/impact: Used as controls in screening for aluminum tolerance

Data/publications: Manuscripts in preparation for publication later in 2023.

PI: Peter Kowalec

Representation: Clean Plant Center Northwest/Washington State University

Species: *Malus domestica, M. hybr., Prunus avium*

Use/impact: Germplasm was intended to be included in CPCNW's collection for future distribution, dependent on development of virus-free material.

Data/publications: Some are still "in progress" stage, most were replaced by different source material (same variety, different vendor) due to their unprecedented viral load.

PI: Rebecca McGee

Representation: USDA-ARS

Species: *Phaseolus vulgaris, Pisum sativum, Pisum sativum* subsp. *asiaticum, Pisum sativum* subsp. *elatius, Pisum sativum* subsp. *sativum, Pisum sativum* var. *arvense, Pisum sativum* var. *sativum, Triticum aestivum* subsp. *spelta*

Use/impact: Accessions were planted at Pullman, WA in the autumn and evaluated for winter survival.

Data/publications: The lines that had good winter tolerance and desirable pod types were advanced as potential parents and included in a crossing block. Those progeny are currently F4's and are in the general nursery.

PI: Phil Miklas

Representation: USDA-ARS

Species: *Phaseolus vulgaris*

Use/impact: The seven requested *Phaseolus vulgaris* navy dry bean selections from GRIN were used to fine-map and validate the causal mutation for two candidate genes bc-2 and bc-4 conditioning resistance to BCMV (bean common mosaic virus).

Data/publications: Soler-Garzón A., P. McLean, and P. Miklas. 2021. Coding mutations in vacuolar protein-sorting 4 AAAC ATPase endosomal sorting complexes required for transport protein homologs underlie bc-2 and new bc-4 gene conferring resistance to bean common mosaic virus in common bean. Front. Plant Sci. 12:769247. DOI: https://doi.org/10.3389/fpls.2021.769247

PI: Carol Miles

Representation: Washington State University

Species: *Camellia sinensis*

Use/impact: I attempted to root the tea plant germplasm that I received, but or methods failed. We had no survival from the germplasm. The impact is that in 2022-23 we created a new propagation method using cuttings from tea plants sourced locally. We are repeating the methods in 2023-24.

Data/publications: The germplasm will not be included in any publications or datasets. However, our lack of success with the germplasm gave us the impetus to investigate tea plant propagation. I now have a PhD student working on my project to develop a cutting propagation method for tea plants. In the first year of the experiments, she obtained 77-99% success. Other research programs have reported success rates of about 60%. We are repeating the experiment and will publish our results, and results will be part of the student's dissertation.

PI: Robin Morgan

Representation: Washington State University

Species: *Thinopyrum elongatum, T. ponticum, Triticum aestivum* subsp. *compactum, T. aestivum* subsp. *macha, T. aestivum* subsp. *sphaerococcum, T. ispahanicum, T. timopheevii* subsp. *armeniacum, T. timopheevii* subsp. *timopheevii, T. turgidum* subsp. *carthlicum, T. turgidum* subsp. *palaeocolchicum, T. turgidum* subsp. *polonicum, T. turgidum* subsp. *turanicum, T. turgidum* subsp. *turgidum, T. vavilovii, T. x petropavlovskyi, T. zhukovskyi, X Tritordeum* spp.

Use/impact: The accessions ordered in 2019 were used to evaluate their crossability and seet set in wide hybridizations with *Thinopyrum* spp. as part of the effort to develop a perennial grain crop based on wheat. Among the accessions only PI 636334 (x*Tritordeum* spp.) presented the capacity to set seeds without further interventions (for example embryo rescue) when fertilized with pollen from *Thinopyrum* spp.

The hybrid seeds obtained from those crosses are currently being evaluated in field conditions. Plant fertility is the main issue encountered in this type of work, hence slowing down the rate of progress. PI 42014, PI 330557, PI 277165, with which the student is conducting a study evaluating the effect of *T. sphaerococcum* lines to bread wheat seed shape and its potential effect on flour yield. This will be part of the student's Ph.D dissertation.

Data/publications: None yet.

PI: Nickisha Pierre-Pierre

Representation: USDA-ARS

Species: *Brassica napus* subsp. *napus, Cicer arietinum, Citrullus lanatus, Glycine max, Helianthus annuus, Phaseolus vulgaris, Solanum lycopersicum.*

Use/impact: Tomato and soybean germplasm was used in one of our publications testing deletion mutants on *Sclerotinia slerotiorum*. The material helped us make a definitive claim regarding the role of the D-galacturonic acid catabolic pathway in virulence.

Data/publications: Wei W., N. Pierre-Pierre, H. Peng, V. Ellur, G. Vandemark, and W. Chen. 2020. The D-galacturonic acid catabolic pathway genes differentially regulate virulence and salinity response in *Sclerotinia sclerotiorum*. Fungal Genet. Biol. 145:103482. DOI: https://doi.org/10.1016/j.fgb.2020.103482.

PI: Lyndon Porter

Representation: USDA-ARS

Species: *Pisum sativum, P. sativum* subsp. *arvense, P. sativum* subsp. *asiaticum, P. sativum* subsp. *elatius, P. sativum* subsp. *pumilio, P. sativum* subsp. *sativum, P. sativum* subsp. *transcaucasicum.*

Use/impact: This germplasm was used to screen for resistance to *Fusarium avenaceum*, a major root rotting pathogen on peas. The hope is to determine the genetic resistance associated with lines demonstrating resistance to the pathogen. We are looking to develop markers that can be used to rapidly screen pea lines for resistance.

Data/publications: A manuscript for publication in the journal *Plant Disease* is in preparation but has not been submitted.

PI: Jenna Price

Representation: Sakata Seeds

Species: *Beta vulgaris* subsp. *vulgaris.*

Use/impact: *Beta vulgaris* lines were analyzed for disease resistance. Lines were used to develop new breeding material for a babyleaf chard breeding program.

Data/publications: Data (disease resistance notes, photos) attached.

PI: Samuel Revolinski

Representation: Washington State University

Species: *Bromus inermis* subsp. *inermis, B. sterilis, B. tectorum, B. tectorum* subsp. *lucidus*, *Phleum paniculatum*.

Use/impact: Accessions were used for genome sequencing, phenotyped for flowering time traits, and used in genome wide association mapping (GWAS).

Data/publications: Revolinski S., P. Maughan, C. Coleman, I. Burke. 2023. Preadapted to adapt: underpinnings of adaptive plasticity revealed by the downy brome genome. Commun. Biol. 6:326. DOI: https://doi.org/10.1038/s42003-023-04620-9.

PI: Aaron Mahoney and Hendrik Rietman

Representation: Storm Seeds

Species: *Glycine max*

Use/impact: Accessions were evaluated for breeding purposes. Several accessions were compared to edamame genotypes in the breeding program, and the better ones were hybridized with commercial grain cultivars. One is now a founding parent in our edamame breeding program. F3 and F4 lines are currently being evaluated.

Data/publications: None.

PI: Laurie Rowell

Representation: Private individual

Species: *Malus domestica*

Use/impact: Laurie is a technical writer and home grower who requested scions for an ebook currently being compiled. The goal is to give simple advice and procedures for home growers to cultivate apples in pots.

Data/publications: 'Rosemary Russet' is exceptional for pot culture: easy to manage, precocious, disease resistant, and productive of apples with remarkably fine flavor.

PI: Chris Rylands

Representation: Renaissance Orchards

Species:

Use/impact: Cider apple cultivars were evaluated for their ability to grow and fruit in Ferndale, WA, in order to verify that the terroir is good for cidermakers.

Data/publications: Online scionwood database created for cidermakers: https://renaissanceorchards.com/store/SCIONWOOD-STORE-c139644693

PI: Jonathan Schnore

Representation: Washington State University

Species: *Poa arachnifera, P. ligularis, P. secunda*

Use/impact: Germplasm was used to make a series of interspecific hybrids. Eight successful hybrids produced.

Data/publications: None yet. More useful information should be available next year when the progeny are planted out.

PI: Derek Siver

Representation: Private individual

Species: *Zea diploperennis, Z. mays* subsp. *mays*.

Use/impact: Seedlings of 'Oloton' were transplanted to a community garden. Ears were pollinated with 'Painted Mountain' flint type corn. Ears developed after bagging, but the cobs were stolen by local homeless individuals.

Data/publications: None.

PI: Longxi Yu

Representation: USDA-ARS

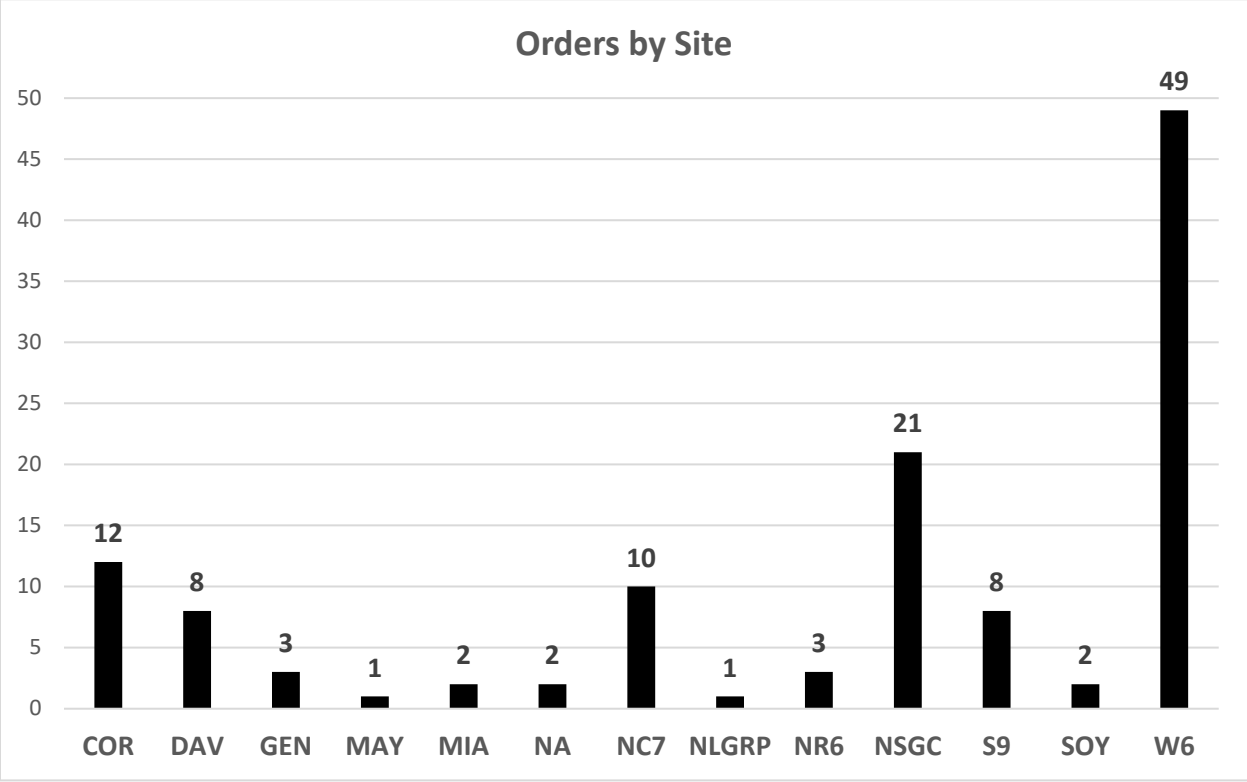
Species:

Use/impact: Germplasm was used for enhancing drought tolerance in alfalfa.

Data/publications: Lin S., C. Medina, B. Boge, J. Hu, S. Fransen, S. Norberg, and L-X. Yu. 2020. Identification of genetic loci associated with forage quality in response to water deficit in autotetraploid alfalfa (*Medicago sativa*). BMC Plant Biol. 20:303. DOI: https://doi.org/10.1186/s12870-020-02520-2.

2022 Report

- Number of requestors: 73
- Representation:
  - US State agencies and all universities: 24
  - Federal: 18 (15 USDA-ARS, 3 PNNL)
  - US Commercial Company: 14
  - Individual/Non-profit: 17



Germplasm Requested

Genus	Species	Total accessions
Actinidia	arguta	3
Adenophyllum	cooperi	1
Agapetes	rubrobracteata	1
Allium	sativum	2
Anthoxanthum	nitens	1
Arachis	monticola	2

Avena	sativa	95
Beta	vulgaris subsp. vulgaris	1
Blitum	nuttallianum	1
Bolboshoenus	maritumus	2
Brachypodium	distachyon	2
Brassica	carinata, napus, napus subsp. napus	7
Bromus	tectorum	12
Camelina	microcarpa, sativa	15
Canavalia	ensiformis, gladiata	4
Carthamus	tinctorius	4
Celtis	occidentalis	1
Chenopodiastrum	simplex	1
Chenopodium	album, berlandieri var. zschackei, giganteum, quinoa, watsonii	28
Cicer	arietinum, bijugum, chorassanicum, cuneatum, echinospermum, hybr., judaicum, pinnatifidum, reticulatum, yamashitae	837
Citrullus	amarus, mucosospermus	6
Cornus	nutallii	1
Cryptantha	circumscissa	1
Cyamopsis	senegalensis, tetragonoloba	3
Cycloloma	atriplicifolium	1
Cydonia	oblonga	25
Daucus	carota	4
Elymus	elymoides	1
Ericameria	cooperi	1
Erigeron	bloomeri var. bloomeri, filifolius, linearis	3
Eriophorum	angustifolium	1
Festuca	lemanii	1
Ficus	carica, hybr.	15

Fragaria	× ananassa, chiloensis f. patagonica, hybr., × vescana	7
Gaultheria	leucocarpa var. yunnanensis, shallon	5
Glossopetalon	spinescens	1
Glycine	argyrea, clandestina, max, microphylla, soja, tomentella	11
Helianthus	annuus, hybr., tuberosus	56
Hordeum	vulgare subsp. spontaneum, vulgare subsp. vulgare	344
Humulus	lupulus var. cordifolius, lupulus var. lupuloides, lupulus var. lupulus, lupulus var. neomexicanicus, lupulus var. pubescens	88
Iberis	amara	3
Inga	laurina	1
Ipomoea	batatas var. batatas	3
Juncus	longistylis	1
Juniperus	communis	1
Koenigia	alpine	2
Lablab	purpureus, purpureus subsp. uncinatus	5
Lactuca	georgica, indica	2
Lathyrus	cassius, chloranthus, cicero, clymenum, japonicus, latifolius, ochrus, odoratus, pratensis, rotundifolius, sativus, sylvestris, tuberosus	39
Lens	culinaris subsp. culinaris, culinaris subsp. orientalis	734
Lonicera	caerulea var. edulis, caerulea var. villosa	2

Lupinus	albus, angustifolius, luteus, mutabilis	32
Lycium	andersonii, fremontii, pallidum var. oligospermum	3
Malus	domestica, fusca	22
Medicago	lupulina, sativa subsp. falcata, sativa subsp. sativa	10
Mentha	aquatica, aquatica var. citrata, canadensis, hybr., longifolia, longifolia subsp. typhoides, spicata, suaveolens subsp. suaveolens, × dalmatica, × gracilis, × villosa	29
Morus	alba, cathayana, hybr., macroura	11
Mucuna	pruriens var. utilis	3
Pachyrhizus	erosus	2
Penstemon	watsonii	1
Peritoma	lutea	1
Phacelia	glandulosa var. glandulosa, heterophylla	2
Phaseolus	acutifolius, acutifolius var. tenuifolius, coccineus, lunatus, polystachios, polystachios, subsp. polystachios, polystachios subsp. sinuatus, vulgaris,	79
Phlox	speciosa	1
Pisum	fulvum, sativum, sativum subsp. arvense, sativum subsp. asiaticum, sativum subsp. elatius, sativum subsp. sativum, spp.	89

Plagiobothrys	figuratus, figuratus var. corallicarpus	2
Poa	glauca, glauca subsp. litvinoviana, nervosa, pratensis, secunda	6
Prunus	avium, hybr., mahaleb, padus, pseudocerasus, spp., × eminens, × gondounii	98
Psathyrostachys	juncea	1
Psophocarpus	palustris, tetragonolobus	5
Pyrus	communis, communis subsp. caucasica, communis subsp. pyraster, hybr., pyrifolia, salicifolia, ussuriensis, × bretschneideri, × sinkiangensis	132
Ribes	nigrum	2
Rubus	idaeus subsp. idaeus, spectabilis, ursinus	10
Saccharum	hybr.	4
Sambucus	racemosa	2
Solanum	chacoense, lobbianum, microdontum, parishii, tuberosum, tuberosum subsp. andigenum	23
Sorghum	bicolor subsp. bicolor	7
Spinacea	oleracea	5
Sporobolus	cryptandrus	1
Symphysia	poasana	2
Theobroma	cacao	11
Thinopyrum	elongatum, intermedium, junceum, ponticum, scirpeum, spp.	12
Thlaspi	arvense	67
Trifolium	pallidum, pratense, repens, subterraneum	17

Trigonella	foenum-graecum	4
Triticum	aestivum subsp. aestivum, aestivum subsp. compactum, turgidum subsp. durum	489
Vaccinium	acrobracteatum, calycinum, delavayi, formosum, ovatum, parvifolium, reticulatum	12
Vicia	americana, ervilia, faba, narbonensis, palaestina	16
Vigna	aconitifolia, angularis, angularis var. nipponensis, minima, radiata, radiata var. radiata, radiata var. sublobata, subterranea, trilobata, umbellata, unguiculata, unguiculata subsp. dekindtiana	35
× Phyllosasa	tranquillans	1
× Sorbopyrus	auricularis, spp.	4
× Triticosecale	spp.	19

Total: 3668