

**STATE OF UTAH**  
**Annual Report for Calendar Year 2017**  
**to the W-6 Technical Committee**  
**Compiled by Kevin B. Jensen**

**Germplasm Activities of Jason Baker - Order # 291131**

**Use:** Varietal Development - Will be used to hybridize with garden cultivars to introduce its heat and salt tolerance into the genes to potentially create cultivars that can tolerate living in a harsher climate that could come about from climate change.

**Report:** My intention was to hybridize my requested taxa with heirloom varieties to create more heat and salt tolerant varieties, but due to low flower production, I instead self-pollinated each taxon so I could have seed for the following growing season.

**Germplasm Activities of William Behling - Order # 286239**

**Use:** *Cydonia oblonga* ascensions will be used to evaluate the ability for quince to produce a viable consistent crop in our area. The *Zea mays* ascension will be used to develop new varieties of corn with tunicate genes.

**Report:** No report submitted.

**Germplasm Activities of Shaun Bushman - Order # 297983**

**Use:** Genetic studies - discover the relationship of *P. remota* to *P. pratensis*.

**Report:** No report submitted.

**Germplasm Activities of Aaron Carlisle – Order # 294943**

**Use:** Public education- these are for a research garden, to help discover better methods for propagation, germination and food sustainability. For this we are asking for this wide variety of seeds and starts. Thank you. Hopefully we will be able to create a better agriculture system that will help with food sustainability for entire neighborhoods.

**Report:** No report submitted.

**Germplasm Activities of Bryan Dayton – Order # 282366**

**Use:**

**Report:** No report submitted.

**Germplasm Activities of Spring Dawson - Order # 293518**

**Use:** Plant Pathological investigations - school project.

**Report:** No report submitted.

### **Germplasm Activities of Zack Donmez - Order # 297228**

**Use:** Genetic studies - we are going to use for a project about association mapping on sesame accession.

**Report:** No report submitted.

### **Germplasm Activities of Eerik Elias - Order # 292754**

**Use:** Varietal Development - Development of specialty **corn inbreds** top-crossed to an elite inbred, in order to develop lines with **high tolerance to abiotic stressors** found in the Intermountain West and retain the high grain quality of the original variety with improved agronomic characteristics- resistance to stalk and root lodging, drought tolerance, improved yield under irrigated organic production.

**Report:** Specialty corn evaluation and improvement.

PI 608599 (*Zea mays*) – Description: western Colorado bloody butcher landrace strain. Germination: 92%. Purpose: Following excellent performance of this strain under organic cultivation in the intermountain west and resistance to earworm, individuals were selected for improvement by recurrent selection. Results: A selection of this Bloody Butcher strain was made from the 2016 growing season. This selection is now undergoing recurrent selection for specific combing activity with the tester B109 (PI 597927).

PI 597927 (*Zea mays*) - Description: B109 inbred. Cross of B73 and BS20(S)C2 Iowa Late Rootworm Synthetic. Specific pedigree: [B73 X BS20(S)C1-73-1-1]B73-144-1-1-1-1-1. Germination: 100%. Purpose: Selected because of its elite inbred parentage and because of the impressive performance of its parent, BS20(S)C1, in our 2016 trials, we evaluated vigor under organic cultivation in the intermountain west and used it as a tester for recurrent selection of PI 608599. Results: This inbred grew vigorously and produced roughly 700g of seed by selfing a number of B109 plants for later use as a tester. B109 was also crossed with individual Bloody Butcher (PI 608599) plants to evaluate combining ability of specific Bloody Butcher selections.

### **Germplasm Activities of David Gedge – Order # 287424, 295619**

**Use:** Genetic studies/Varietal development - I have selected large seeded material. My objective is to develop large seeded nonoil high oleic **sunflower hybrids**. Will attempt to cross **proprietary sunflower** and improve drought tolerance

**Report:** With the intent of developing large seeded sunflower hybrids I obtained from the USDA NPGS system 9 accessions of large seeded sunflower. This included 7 open pollinated varieties from various places in the world, the high oleic B line HA350, and the high oleic R line RHA354. HA350 and RHA354 are inbred lines developed by USDA at Fargo which are now available through NPGS.

These accessions were planted spring 2017. During the summer hand emasculated crosses were made using this material. The crosses were made with the intent to develop F2 populations for selection of large seeded, high oleic, inbred lines used to produce high oleic, large seeded, hybrids.

Three crosses using HA350 and three crosses using RHA354 with the other large seeded accessions were made. In addition three crosses using HA350 and four crosses using RHA354 with proprietary materials were made. The plan is to plant these crosses during summer 2018 and self to produce F2 populations.

One hand emasculated cross, HA350 X Proprietary B line, is now in the process of growing and selfing under a grow light. Plan is to plant this F2 population during summer of 2018 for selfing and selection.

During the summer of 2017 in addition to making hand emasculated crosses, the accessions obtained from NPGS system were selfed for development of B lines and crossing to CMS material to start the process of developing an A line equivalent to any B lines obtained. Four selections from four different accessions plus HA350 have been selected for further advancement as A,B pairs during the 2018 summer growing season.

During the summer of 2017 I obtained from USDA NPGS system two accessions of *Helianthus anomalous*. Experience has shown me that I get better germination of wild sunflower if planted in the fall for seed vernalization. Therefore this seed was planted fall 2017 and has not yet germinated. The plan is to cross this wild germplasm to proprietary B lines during the summer of 2018. The objective is to attempt to develop sunflower lines with improved drought tolerance. My review of literature indicates that the cross *H. annuus* by *H. anomalous* should be possible.

#### Review of prior years' work

During the summer of 2013 I obtained from USDA NPGS system 20 accessions of *H. cusickii* and 9 accessions of *H. pumilus*. Both of these closely related perennial species develop an enlarged tap root. The objective of obtaining these accessions was to develop by crossing to *H. annuus* if possible sunflower with an enlarged tap root. A review of the literature indicated that crossing of these two species to *H. annuus* had not been accomplished. Thus the probability of accomplishing my objective was low.

Seed of the accessions was planted fall 2013 and attempted crossing to hand emasculated proprietary B lines was done during the summer of 2014. Attempted crossing was repeated during summer of 2015. Very limited seed set was obtained from the attempted crosses. Growing the seed out showed that the potential crossed seed was instead seed produced from stray pollen of the proprietary B line used as the hand emasculated female parent. Thus my attempted crossing was not successful.

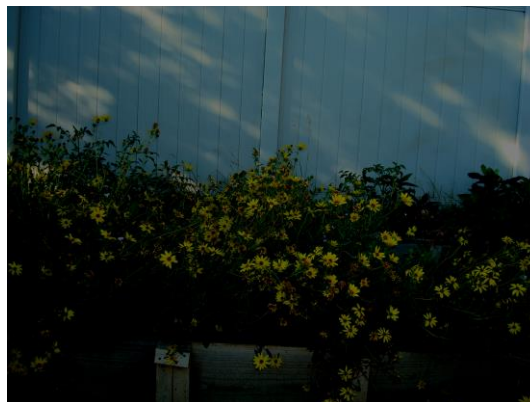
Seed from *H. cusickii* and *H. pumilus* was collected, planted and collected again. This became what I have called "A genetic mixture of *H. cusickii* and *H. pumilus*."

In 2017 I established the company Lone Peak Sunflower LLC. Currently I am selling product through an ETSY shop over the internet. The ETSY shop is Lone Peak Sunflower. One of the products I offer for sale is "A Sunflower seed mixture of *H. cusickii* and *H. pumilus*." To date I have not made any sale of this particular item. The description of this item in the ETSY shop is as follows:

## Description

This is seed from a genetic mixture of the closely related perennial wild sunflower species *H. cusickii* and *H. pumilus*. *H. cusickii* called Parsnip-Root Sunflower is native to open woodland and dry slopes in western Nevada northeastern California western Idaho, through central Oregon and into southcentral Washington. *H. pumilus* called Dwarfish Sunflower is native to dry often rocky soils in central Colorado northward through southeastern and central Wyoming.

This genetic mixture will grow and do well in semi-arid locations receiving from 10 to 14 inches of moisture annually. Seed planted fall of 2016 in central Utah at an elevation of about 4700 feet, emerged in spring of 2017 and grew through the unusually dry summer in which no effective moisture fell from mid-March to Mid-September. Plants established under such dry conditions may not flower the first year of establishment. All energy goes into root development. Seedlings receiving supplemental irrigation will flower the first year of establishment. Flowering occurs from May through October.



This genetic seed mixture was developed by obtaining 20 and 10 seed samples of *H. cusickii* and *H. pumilus* respectively from the United States Department of Agriculture Germplasm seed bank. These seed samples were planted next to each other and allowed to cross and/or mix naturally for a number of generations.

One other item sold in the ETSY shop is seed of the hand emasculated cross HA350 X Mongolian Giant. Following is the description of that cross. Notice that credit is given as to the USDA source of HA350. (Mongolian Giant was not obtained from the NGPS system.)

## Description

Have you ever wanted to develop your own garden variety? Here is the chance to develop something unique adapted to your specific locality. Offered is seed of the sunflower handmade cross HA350 by Mongolian Giant. HA350 is a confection type sunflower inbred line released to the general public by the United States Department of Agriculture. HA350 has the high oleic gene which means oil in the seed has a similar profile to that found in olive oil. HA350 can be used as one of the parents in crosses designed to make sunflower hybrids used in the snack food industry. Mongolian Giant is an open pollinated sunflower variety with vary large seed and tall height.

The cross between HA350 and Mongolian Giant was made by removing the anthers from HA350 before they shed pollen and then applying pollen collected from Mongolian Giant to the stigmas of HA350. See photographs of this process. This seed can be used to develop a brand new variety. Simple, detailed Instructions on how to proceed with new variety development will be sent with seed. This is a multiple year project.

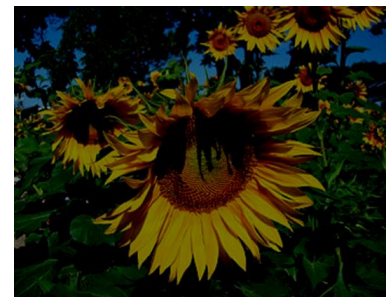
Following is a picture of the process of hand emasculating HA350 as indicated in the description.

During the summer of 2015 I obtained 3 accessions of sunflower from the NPGS system. These accessions, two B lines, HA448 and HA449, and one R line RHA450 were developed at the USDA Fargo sunflower breeding station. The main reason for their release was low levels of cadmium in the seed. I obtained this material with the idea of using them to make confection type sunflower hybrids. After working with the material for a few years I have determined that this material per se does not fit what I need and I do not have the resources to use them as parents to develop material that will work. I did find that one hybrid made crossing RHA450 onto a proprietary A line will produce a hybrid I call Sunrise 6F02. I promote this as a sunflower hybrid that produces fancy birdseed and offer it for sale at my ETSY shop. Following is a Description and image of this hybrid as listed at the ETSY shop.



#### Description

Following is a picture of the seed mixture of *H. cusickii* and *H. pumilus* as shown in the Lone Pesk Sunflower ETSY shop. Sunflower hybrid "SunRise 6F02". Sunflower seed produced by this hybrid can be categorized as "fancy" birdseed in contrast to the common black oil birdseed readily available at retail outlets. The defining characteristics of this seed is the classic grey stripe combined with a smaller seed size. The smaller seed size fits with the smaller body size of common song birds found in the back yard.



The sunflower hybrid "SunRise 6F02" has a medium late maturity of about 79 days from planting to flower. It is a medium short hybrid with a height of about 62 inches. SunRise 6F02 was developed using standard plant improvement techniques. It is non GMO. Following is a picture of the seed mixture of *H. cusickii* and *H. pumilus* as shown in the LonePeskSunflower ETSY shop.

#### **Germplasm Activities of David Gibby – Order # 286576**

**Use:** Botanical/taxonomic - investigating the suitability of various cultivars for growth in the greater Wasatch region and for potential use in breeding programs.

**Report:** No report submitted.

#### **Germplasm Activities of Melissa Hebdon - Order # 290575, 290583, 290613**

**Use:** Class instruction - seed germination in higher elevations, with shorter grow seasons.

**Report:** No report submitted.

**Germplasm Activities of David Hole – Order # 289586, 294430, 295710**

**Use:** Genetic studies - Bunt trial; TCK phenotype and crossing; Parent for Bt12 RIL population.

**Report:** No report submitted.

**Germplasm Activities of Rick Jellen - Order # 291783, 291867**

**Use:** Genetic studies - searching for DNA sequence variants in fatty acid biosynthesis genes; finish genome assembly - **preliminary assembly published last month in Nature.**

**Report:** No report submitted.

**Germplasm Activities of Cemal Kurt - Order #**

**Report:** I am preparing to project about association mapping with these germplasm genotypes. And I am planning to sesame breeding programs with these genotypes and my core collection. Your department would be very useful for scientist and breeders. Thanks for everything.

**Germplasm Activities of Steve Larson - Order # 297703, 297117, 297427**

**Use:** Genetic studies/Varietal development - Source *Festuca* materials to be included in genetic study (GBS) of breeding lines; evaluates materials for seed and forage production in western U.S. Select materials for breeding and genetic research; screen for seed and forage production traits coupled with DNA sequencing and genotyping.

**Report:** No report submitted.

**Germplasm Activities of Melissa Lott - Order # 296147, 296422**

**Use:** Class instruction - we plan to see the stages of each plant and development of the fruits.

**Report:** No report submitted.

**Germplasm Activities of Lisbeth Louderback - Order # 295411**

**Use:** Anthropology

**Report:** No report submitted.

### **Germplasm Activities of Lauren Lucas - Order # 294930**

**Use:**

**Report:** No report submitted.

### **Germplasm Activities of Jennifer MacAdams - Order # 288748, 288776**

**Use:** Botanical/taxonomic investigations - germplasm will be used for study "Reclamation of Lands Impacted by Energy Exploration and Extraction Activities in the Uinta Basin, Utah." Germination requirements and strategies for each species and year of germplasm collection will be tested and determined. This information will be used in field studies to determine native species for reclamation that have a high likelihood of success.

**Report:** I received seed of *Linum usitatissimum* for use in the Plants, Soils and Climate Department course PSC 3500, The Structure and Function of Plants a number of years ago. This plant material is grown each year into immature plants and used to demonstrate stem anatomy, specifically the location and appearance of the bast or phloem fibers that are used to make linen cloth. Seed have been collected every few years from plants that were allowed to flower and set seed, so we continue to make use of the seed we received from the NPGS system.

A grant received in 2013 by Dr. Edzard van Santen, who was with Auburn University at the time, included the study of 133 birdsfoot trefoil (*Lotus corniculatus*) accessions. Seed was requested from the NPGS by Dr. van Santen and distributed among Auburn, Michigan State University and Utah State University. Plants grown from seed and planted at each of these three locations were rated for dry matter production, seed production and prostrate vs. upright growth as well as for survival in these three climates. The further contribution made by Utah State University under this grant was to document variation for germination, including rate and time after planting, and to carry out wet chemistry to determine tannin concentration of greenhouse-grown seedlings as well as on plants that developed in the field the year after planting. That work has been completed, and the grant (USDA 2013-67013-21408) will end 31 August 2018.

### **Germplasm Activities of Silvana Martini - Order # 296471**

**Use:** Public education

**Report:** In September 2017 we received cocoa pods from USDA in Puerto Rico. The cocoa pods were used in the class NDFS1010: Chocolate: Science, History, and Society. We did not plant the seeds. The cocoa pods and the seeds were used to demonstrate to the class where chocolate comes from. We opened the pods and we tasted the seeds. This material was used for teaching purposes only.

### **Germplasm Activities of Jeff Maughan - Order # 295003**

**Use:** Genetic studies - whole genome resequencing.

**Report:** No report submitted.

### **Germplasm Activities of Brandy McConnell – Order # 289683, 289725**

**Use:** Public education - I am teaching my children, as well as their friends, and my neighborhood, about plants. My goal is to bring people together for this garden project and discover the difference plants make on people, socially, as they participate ... and answer the my own questions about plant health and diversity.

**Report:** No report submitted.

### **Germplasm Activities of Angelo Perillo III – Order # 290764, 291070, 292817**

**Use:** Public education - as a 17 year old student in the Landscape/Horticulture program at JATC-South, I have chosen to do an experiment concerning the germination of seeds in a greenhouse environment with generic seeding mix as a project for me being able to pass the course and earn college credit. I have collected many seeds from several native species that grow here in northern Utah but I had also wanted to do this experiment with plants that aren't native to Utah specifically but that are native to neighboring states too. I also plan to test the cold hardiness of some of these plants to see which ones are potential candidates for home landscaping in our desert climate. Although I have been able to collect seeds from a few plants that are not native to Utah but to neighboring states such as *Hesperaloe parviflora*, some of the plants I had wanted to trial do not set seed here in Northern Utah, probably due to there being few individuals of the plants and a lack of their natural pollinators. I would ask that you consider sending these seeds to me so that I can include them in my experiment. Thank You.

**Report:** There is missing data because there was a problem with the greenhouse sprinkler system and many of the seedlings died before I could count them.



Scientific Name	Common Name	# of Seeds Planted	Date Planted	Growing Media	Germination/Survival Rate	Year
<i>Agave utahensis</i> var. <i>nevadensis</i>	Nevada Agave	118	5/9	Potting Mix		2012
<i>Allenrolfea occidentalis</i>	Iodine Bush			Potting Mix		2012
<i>Dasyllirion wheeleri</i>	Common Sotol	72	3/29	Seed Mix	47.22% (55 days)	2011
<i>Encelia resinifera</i> subsp. <i>resinifera</i>	Sticky Brittlebush	172	5/9	Potting Mix	43.6% (14 days)	2009
<i>Ericameria nauseosa</i> var. <i>iridis</i>	Rainbow Hills Rabbitbrush	72	2/29	Seed Mix		2011
<i>Eriodictyon angustifolium</i>	Narrow-leaf Yerba Santa			Potting Mix		2005
<i>Hesperaloe funifera</i>	New Mexico False Yucca	51	4/17	Seed Mix	50.98% (36 days)	2004
<i>Hesperaloe nocturna</i>	Night-blooming False Yucca	50	4/17	Seed Mix	26% (36 days)	1995
<i>Hesperaloe parviflora</i>	Red Yucca	216	2/15	Seed Mix		2016
<i>Lycium andersonii</i>	Water Jacket	172	5/15	Potting Mix		2010
<i>Nolina bigelovii</i>	Bigelow's Beargrass	72	3/29	Seed Mix	72.22% (55 days)	2007
<i>Nolina microcarpa</i>	Sacahuista	72	3/29	Seed Mix	58.33% (55 days)	2007
<i>Nolina parryi</i>	Parry's Beargrass	172	5/9	Potting Mix		2010
<i>Penstemon deustus</i> var. <i>pedicellatus</i>	Scabland Beardtongue			Potting Mix		2012
<i>Perityle stansburyi</i>	Stansbury's Rock Daisy			Potting Mix		2007
<i>Peucephyllum schottii</i>	Pygmy Cedar	172	5/19	Potting Mix		2014
<i>Psoralea nuttallii</i>	Frémont's Indigo Bush	172	5/9	Potting Mix		2014
<i>Quercus gambelii</i>	Gambel Oak	30	2/15	Seed Mix		2016
<i>Shepherdia argentea</i>	Silver Buffaloberry	172	5/19	Potting Mix		2012
<i>Suaeda nigra</i>	Bush Seepweed	172	5/19	Potting Mix		2014
<i>Xylorhiza venusta</i>	Cisco Woody-aster	172	5/9	Potting Mix		2012
<i>Yucca angustissima</i> var. <i>kanabensis</i>	Kanab Yucca			Potting Mix		2016
<i>Yucca bailey</i>	Bailey's Yucca	91	5/9	Potting Mix		2009
<i>Yucca brevifolia</i>	Joshua Tree	51	4/17	Potting Mix		2009
<i>Yucca campestris</i>	Plains Yucca	50	4/17	Potting Mix	16% (36 days)	2009
<i>Yucca elata</i> 'Bonita'	Bonita Soap-tree Yucca	51	4/17	Potting Mix	1.96% (36 days)	1966
<i>Yucca filamentosa</i>	Adam's Needle	172	5/19	Potting Mix		2015
<i>Yucca schidigera</i>	Mojave Yucca	96	5/9	Potting Mix		2014
<i>Yucca utahensis</i>	Utah Yucca	72	2/29	Seed Mix		2016

### **Germplasm Activities of Rodney Prisbrey - Order # 291367**

**Use:** Public education - I am seeking to study, and blog about the topical uses of these plants. I would like to do a comprehensive step by step, planting to use pictorial post on each one.

**Report:** No report submitted.

### **Germplasm Activities of Ricardo Ramirez - Order # 293388**

**Use:**

**Report:** No report submitted.

### **Germplasm Activities of Teryl Roper - Order # 287370**

**Use:** Varietal Development - rootstock development for *P. vera* selections.

**Report:** Planted them in 2017 and had zero germination.

### **Germplasm Activities of Blair Waldron – Order # 297706**

**Use:** Genetic studies - evaluate phenotypic variation for drought tolerance.

**Report:** We ordered the NPGS collection of meadow fescue and tall fescue, but are not very far along in their evaluation. We were not able to use the tall fescue this year so it is in cold storage.

The meadow fescue was started in containers in the greenhouse. At this time I don't know how many germinated, or which entries did not. We will get an inventory of the PI's that did germinate and transplant them to the field this spring to be evaluated for adaptation to deficit irrigation in the semiarid west.