14 October 2019

Fig. 1 (L-R) Scott Dorsch, Shaun Townsend, and Kim Hummer, participants on the expedition.

Areas collected:

Golden vicinity, Deer Creek, Carbondale vicinity, Clear Creek Canyon, Buckhorn Canyon, LaPorte, and Taft Hill Road, Ft. Collins.

Executive Summary

From to 1 to 5 October 2019, Dr. Scott Dorsch, O'Dell Brewing Company, Dr. Shaun Townsend, Hop Breeder, Oregon State University, and Kim Hummer, Research Leader USDA National Clonal Germplasm Repository, collaborated on an expedition to collect hop genetic resources in mountain canyon regions of western Colorado. Permission for collection was obtained from private lands for collection. Import Permits were obtained from the Oregon Department of Agriculture to bring germplasm (seeds and cuttings) into Oregon. The target species was *Humulus lupulus* var. *neomexicanus* from roadside mountain gorges. Between October 1 - 4, about 800 miles were driven through western Colorado. The expedition obtained 28 accessions with 25 seed samples from Carbondale vicinity, Clear Creek, Deer Creek, Golden vicinity, Buckhorn Canyon, LaPorte, Taft Road, In addition, 13 voucher specimens were collected for deposit at the US National Arboretum, Washington, D.C. Some of the associated plants included *Salix monticola*, *Fraxinus americana*, *Seriphidum arbusculum* Nattall, *Parthenocissus quinquefolia* Planchon, *Prunus virginiana*, *Rosa* sp. *Clematis lingusticifolia* Nuttall ex Torrey & Gray. After establishment, plant and seed accessions will be preserved at and distributed for research from, the USDA ARS National Clonal Germplasm Repository (NCGR) in Corvallis, Oregon. Morphological, molecular and taxonomic evaluation of this germplasm will be conducted after plant establishment.

Participants (Fig 1):

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Dr. Scott Dorsch, Agronomist, Odell Brewing Company, Ft. Collins, Colorado

Additional Contacts

Greg Michaud, Farmer, LaPorte, Colorado, permission for collection on his property provided 4 October 2019.

Chris Walters, Research Leader USDA National Laboratory for Genetic Resource Preservation, 111 S. Mason Street, Ft. Collins, Colorado.

Introduction

Hops, the cones or strobils from the cultivated European hop, *Humulus lupulus* L., is a high valued agronomic crop. Hops are most widely used as flavoring and aromatic agents in fermented beverages (Small and Catling 1995, 1999) though they are also used for pharmaceuticals, bread making, salad greens, ornament, pillow stuffing, textile fibers, and fodder (Small and Catling, 1999).

From 2012 to 2017, with the advent of micro-brewing, hop production has increased 3-fold. In 2017, cultivated hop production in the US was valued at more than $600 million (Statista, 2019).

For these reasons, growers and brewers want to expand the production of hops and provide a broad range of flavors and aromas of hops. Wild American hops has been documented to have diverse essential oils, and beta acids, besides having disease resistance. With this in mind, the objective of this plant collecting expedition was to expand the available diversity of Native American hops germplasm from western Colorado to hop breeders. The target species for this expedition was *Humulus lupulus* L. var. *neomexicanus* (*Cannabaceae*). Early October was chosen as the time for the collection, because it was expected that most cones would be brown and seed would be mature and ready for harvest. Previous trips to the American Southwestern states in mid-September had found immature green seed and suggested that several weeks later may provide more ripe seed (Oliphant personal communication, 2019).

Botanical information

Hop, is a sub-dioecious twining bine. It climbs on trees, shrubs, or boulders growing to a length of about 6 m. This species is found in riparian or is associated with well- drained but moist areas. It's roots seek out accessible water tables or springs. The female infructescences or strobili are commonly known as cones and are the economically important part for harvest in cultivated plants. If male plants are nearby, seeds form at the base of each bract within the female cone. If no males are near, no seeds form.

Small (1978, 1981, 1997) provided the accepted determination for *Humulus lupulus* L. He recognized five botanical varieties: *H. lupulus* var. *cordifolius* (Miguel) Maximowicz, Hokkaido; *H. lupulus* var. *neomexicanus* Nelson and Cockerell, of the western American Cordillera; *H. lupulus* var. *pubescens* E. Small, of the midwestern United States; H. *lupulus* var. *lupuloides* E. Small, of central and eastern North America; and the Eurasian *H. lupulus* var. *lupulus*, which was widely introduced from Europe into North America for brewing and as an ornamental. The European hop has become established mostly in the northeastern United States and southeastern Canada. Of the three native North American varieties, two have ecological specialization: *H. lupulus* var. *neomexicanus* is adapted largely to western Cordilleran conditions. This species was previously know as *Humulus lupulus* L. subsp. *americanus* (Nuttall) Löve & Löve and is reported in Colorado Flora (xxx) under that name. We use Small's treatment (1980) here. Small analyzed the vegetative distinctions of commercial and wild hop variants from Europe, North America, and Hokkaido.

Procedure

Scott Dorsch, through support from Odell Brewing Company, provided a vehicle and gasoline for travel within Colorado for this trip. He also communicated with contacts for locality and collection permission. Kim Hummer and Shaun Townsend worked with Oregon Department of Agriculture to obtain permits for importation of seeds and plant parts of hops into Oregon.

Hummer and Townsend flew to Denver Airport, and met up with Scott Dorsch. The trip started from Ft. Collins each morning.

Table 1. Itinerary

1 October 2019 Tuesday	Arrival of ST and KH to Colorado	ST and SD collecting during the afternoon.

1 October 2019 Tuesday	Collection at Golden vicinity and Deer Creek Canyon	Lodging Kiva Best Western, Ft. Collins, Colorado
2 October 2019 Wednesday	Collection in Carbondale, and Clear Creek	Lodging Kiva Best Western, Ft. Collins, Colorado
3 October 2019 Thursday	Collecting Buckhorn Canyon Road, Pouder River Canyon, LaPorte, Taylor Hill Road	Lodging Kiva Best Western, Ft. Collins, Colorado
4 October 2019 Friday	Cleaning of seed and surface sterilization	O'Dell Brewery and National Laboratory for Genetic Resource Preservation, Ft. Collins
5 October 2019 Saturday	Return of ST and KH to Oregon	Denver International Airport to Eugene Airport

Inspection and Disposition of Samples

Oregon State Department of Agriculture will be notified of the shipment. Plant material will be available to ODA inspectors The plant material was propagated and placed in the domestic quarantine greenhouse (GH04, Room 01) at NCGR-Corvallis according to on-site guidelines. The seedlots were cleaned treated with sodium hypochlorite solution (1:5), rinsed with water, and air dried prior to being brought into Oregon. The seeds were weighed and placed in NCGR-Corvallis collection. The cuttings were propagated in GH 1 at NCGR-Corvallis. The herbarium voucher specimens will be shipped to US National Arboretum, Washington, D.C.

Funding Arrangements

Table 2. Costs of the trip

Item	Cost	Comments
Airfare for Hummer EUG to/from DIA	516.60	United Airlines flight through SFO to DIA; return one-stop to EUG.
Lodging 1 October through 3 October	234.86	
Lodging 4 October in Denver (Day's Inn)	115.00	
Shuttles in Colorado (44+35+8)	87	
Parking in Eugene	40	

Table 2. Number of samples collected for the Colorado Hop Expedition, October 2019.

Location	Cone samples	Seedlots	Herbarium samples total
Golden Railroad	3	3	0
Deer Creek	2	2	0
Carbondale	7	7	3
Clear Creek	3	3	5
Golden Elevator	4	4	1
Horsetooth Reservoir	1	0	0
Buckthorn Canyon	7	5	3
LaPorte	1	1	0
Taft Hill, Ft. Collins	1	0	1
Total	**29**	**25**	**13**

***Humulus lupulus* var. *neomexicanus* samples were collected.**

Carbondale Vicinity 2 October 2019

Samples were collected along Rio Grande (Bike) Path which ran parallel to County Road 100 about 2 miles east of Carbondale, Colorado. Collected on the north and south sides of the bikepath as *H. lupulus* var. *neomexicanus* was growing up on *Salix monticola*. The native hop grew where it had access to water, in the drainage between the road and the bike path or on the south side where there were seeps or moist corners.

Rio Grande bike path (photo Google July 2017) facing towards Carbondale. County Highway 100 is on the right. This locality had male and female hop plantss present. Cone samples were collected from 7 separate plants.

Carbondale 1 and 2 39.399150 N -107.202693 W, Rio Grande bike path near County Road 100, Catherine Store Road.

Carbondale 1. The hops were growing on the south side of the road. Carbondale 2: the hope bine was growing on the north side of the path between the bike path and County Rout 100. Hummer sample combined cones from both plants. Cones and vines were brown and seed was mature. The vines were growing on *Salix monticola*, willow. The ground was moist. The site was in open sun.

Carbondale 3 39.399150 N -107.202693 Rio Grande bike path near County Road 100, Catherine Store Road.

This plant was mature (bine and cones were brown and dried. The vine was growing on *Prunus virginiana*. Other associated vegetation included *Ribes aureum Salix monticola* and Canary grass.

Male plants were nearby. Seed set was plentiful.

Carbondale 4 39.398422 N -107165645 W Rio Grande bike path near County Road 100, Catherine Store Road.

Female plant on the south side of the path. In moist depression with willow present.

Carbondale 5 39.398515 N -107.164918 W Rio Grande bike path near County Road 100, Catherine Store Road.

Plant to 4 meters, climbing on *Prunus virginiana*. Plant and cones were brown and dried. Cones were plentiful. Male plants were nearby so seeds were plentiful in the cones. Plant on north side of the path.

Carbondale 6 39.398515 N -107.164918 W Rio Grande bike path near County Road 100, Catherine Store Road.

Carbondale 7 39.398828 -107.162259 W Rio Grande bike path near County Road 100, Catherine Store Road.

Mature (brown, dried) female cones but some green leaves remained on some vines. Hops growing on *Prunus virginiana. Ribes aureum*, *Salix*, and *Rosa* were present

Clear Creek Canyon 2 October collection

Route 6 near Clear Creek Shaun Townsend joyfully collecting hop cones near the creek.

Clear Creek 1 - Milepost 270 Route 6 near Clear Creek 39.743159 N -105.271092 W

Female plant with cones and male plant with male inflorescences were collected. The plants and cones were less mature at this lower elevation site than they were at Carbondale sites. Water access was available to the hop plants. Leaves were green and cones were a green-brown though the seeds appeared mature (brown) enough for collecting. These cones took extra drying after collection before they could be threshed.

Clear Creek 2 collected on 2 October on the trail south of Tunnel 1 on Route 6

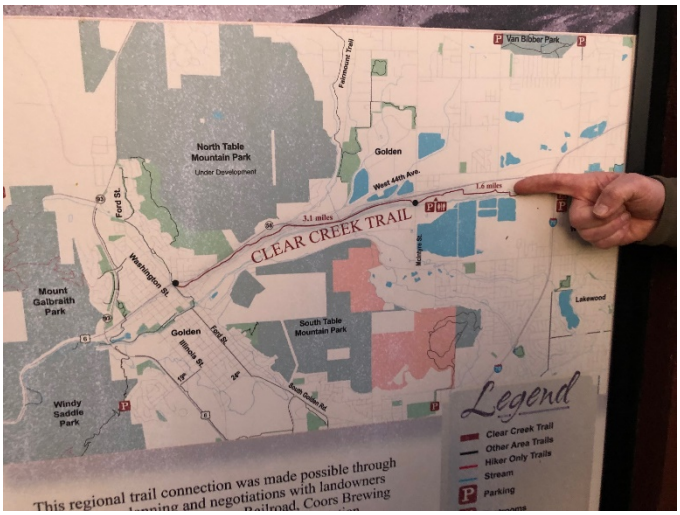
39.743159 N -105.271092 W Evergreen, Colorado 80439

This female hop was growing with its roots directly in the watertable adjacent to Clear Creek. The water supply kept this hop with green leaves and green bines. The hop cones were green and just lightly turning tan. The cones needed extra drying time in the laboratory prior to threshing.

Clear Creek 3 was collected upstream of Clear Creek 2

Golden Elevator – 15200 Route 58 2 October 2019

This location is named because it was near the main grain elevator in Golden, Colorado, near the Coors Brewing Company main offices. The hop were collected from a wild area near the Clear Creek bicycle trail that winds through the city.



Hop plants collected just to the north of Clear Creek Trail. Female and male plants were present. Hop canes and leaves were green while hop cones were brown. Cones were moist and took 1 week longer to dry during threshing. Male samples were collected for pressing. Any cuttings wouldn't have rooted because the stems, though green, were long past the rooting stage.

Golden Elevator #1 39.77353 N -105.16553 W Collected on 1 October 2019

Golden Elevator #2 39.77353 N -105.16498 W Collected on 1 and 2 October 2019

Golden Elevator #3 39.771138 N - 105.190873 W Collected on 1 and 2 October 2019

Golden Elevator #4 39.771138 N - 105.190873 W Collected on 2 October 2019

Golden Railroad – 1 October 2019

Golden Railroad #1 39.771138 N -105.190873 W Collected on 1 October 2019

Golden Railroad #2 39.771138 N -105.190873 W Collected on 1 October 2019

Golden Railroad #3 39.771138 N -105.190873 W Collected on 1 October 2019

Deer Creek – 1 October 2019 collection

Deer Creek #1 39.553383 N -105.121249 W Collected on 1 October 2019

Deer Creek #2 39.553383 N -105.121249 W Collected on 1 October 2019

Buckhorn Canyon – 3 October 2019

Horsetooth 1 – not collected 40.51099000 N -105.19139000 W 1671 m elevation

One native hop plant was found south of Buck Creek Canyon Road (County Road 38E), Horsetooth Mountain in distance on 1/2 mile up from Red Stone Creek Road, 3 miles from Horsetooth Reservoir. A few cones were collected but the seeds were green, immature, and not likely to be viable so no sample was made.

Buckhorn Canyon 1 private stretch of creek just inside the park. 40.56966 N -105.33460 W

PI 691636 CHUM 1625

Buckhorn Canyon 2 This location was about 21829 to 21561 West Co Road 44H

PI 691637 CHUM 1626

Estimated latitude (KH) 40.57117 N -105.34504 W

Elevation

These hops were climbing across granite boulders and in association with wild pin cherry, American ash *americana,* and poison oak. The hop leaves and bines were light yellow-green but the cones were brown, and about 2 -3 cm long. Elevation was about 6100

Buckhorn Canyon 3 40.57133000 -105.34387000

PI 691638 CHUM 1627

This site was about 15 m above the previous granite boulder site with a female clone covering about 3 x 5 m. There may have been a seep or spring near the surface under this granite area that provided the hop plants with water.

Buckhorn Canyon 4 40.57090000 -105.34417000

PI 691639 CHUM 1628

This clone was growing in the fence line along the north side of the road.
Single female hop plant growing on the fence line adjacent to the road. Only a few cones with a small quantity of seeds gathered.

Seeds were very large. Only 13 seeds were collected from this one plant.

Buckhorn Canyon 5 estimated locality: 40.575001, -105.367340

PI 691737 CHUM 1631

Car parked at pull off at 40.575005 N -105.368279 W for samples 5. The collection sites were by the river. This sample was obtained across the river on a moist peninsula. Had to ford the creek on stones to get across to the dense underbrush where this hop was growing.

The leaves and vines for this sample were green. The cones were brown and roughly twice the length of most of the cones we collected. Suspected that this clone is triploid. A small sample (108 seed) was obtained from these cones.

Buckhorn Canyon 6 and 7 elevation = 2108m 40.57845834 N -105.383455 W

PI 691738 1632

About 30 m higher elevation where these were collected than the Buckhorn 2. These female cones set only a few seeds. No male was seen in the vicinity. Most of the cones were sterile. Samples 6 and 7 were bulked.

LaPorte – 3 October 2019 40.630661 N, -105.142522 W Elevation = 1547 m

3528 Orchard Drive, Laporte, Colorado, next to Sunrise Court waterway, about 3 miles upstream from confluence of the waterway with the Casche La Poudre River. Female hop plants grew along the north fenceline of the property. Cones were prolific in 2018 but few to none were present in October 2019. The cones from 2018 were placed in the freezer until they were presented to the collectors on 3 October 2019. When the cones were threshed, no seed was present. No male plants were nearby. Cuttings were taken of this plant but it is the wrong time of year and the cuttings did not root.

Scott Dorsch, Farmer Greg Michaud holding bag of frozen hop cones, Shaun Townsend at the Michaud farm in LaPorte, Colorado

Taft Hill Road 3 October 2019 collection

40.62926945 N -105.1140944 W elevation =1534 m

2899 N Taft Hill Rd, Ft. Collins, 1 mile south of 287. This plant was an individual female growing near the little Cache La Poudre Ditch that crosses under North Taft Hill Road. The plant was about 2 m tall growing up a post on the edge of a working farm. The cones were plentiful, but no male was nearby so no seed formed inside these cones. Leaf cutting insects were attacking almost all of the leaves of the plant. The canal was clearly providing ample water supply for this plant. This plant was the least mature and at the lowest elevation of all that we encountered with green leaves and bines and green-brown cones.

Associated species

The following species were observed growing with native hops in Colorado:
Alnus incana (L.) Moench subsp. *tenuifolia* (Nuttall) Breitung, grey alder
Cercocarpus ledifolius Nuttall in J. Torrey and A. Gray, curl leaf mountain mahogany
Chrysothamnus nauseosus (Pallas ex Pursh) Britton subsp. *nauseosus*
Clematis lingusticifolia Nuttall ex Torrey & Gray, old man's beard or western virgin's bower
Fraxinus americana L., American ash
Fraxinus anomala Torrey ex S. Watson, single leaf ash
Parthenocissus quinquefolia Planchon, Virginia creeper
Pinus ponderosa Douglas ex P. & C. Lawson subsp. *scopulorum* (S. Watson) W. A. Weber, ponderosa pine
Populus deltoides W. Bartram ex Marshall subsp. *monilifera* (Aiton) Eckenwalder, plains cottonwood
Populus tremuloides Michaux, quaking aspen
Prunus virginiana var. *demissa* (Nutt.) Torr. - Western chokecherry
Rosa woodsii Lindley subsp. *woodsia*, Wood's rose
Salix monticola Bebb, mountain or park willow
Seriphidium arbusculum (Nuttall) W. A. Weber subsp. *arbusculum*, sagebrush
Toxicodendron rydbergii (Small ex Rydberg), poison oak

Viney Look-A-Likes for hops.

Other vine species that can look like *Humulus* but are not !

Clematis ligusticifolia Nuttall ex Torrey & Gray, also known as Western white virgin's bower.
It often grows along creek bottoms, forest edges, riparian thickets, and in Ponderosa Pine forests and sagebrush. The white silky stringy fruits were visible on the vines as we drove by in early October. The vines can grow to a height of 7 or 8 meters on tall trees.

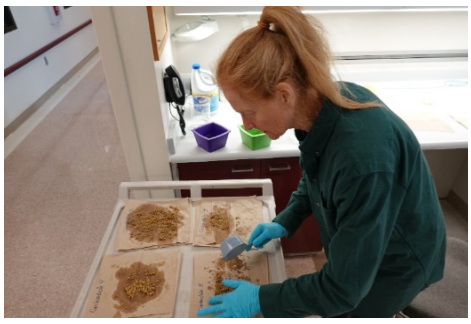
Clematis (l) growing on a *Populus deltoides*; (r) silky fruit as appearing in October.

Parthenocissus quinquifolia also known as Virginia creeper. The vines can grow to 10 meters long with support on trees. This vine's leave turn red in the fall. This is a give-away that it is not *Humulus* as you drive or walk by. *Humulus* leaves do not turn red in the fall. This image was taken by K. Hummer on the trail around South Tunnel 1 in the Clear Creek Canyon.

Post threshing seed treatment

Oregon State requires treatment of hop plants and plant parts (including seed) to prevent the entrance of powdery mildew strains from other regions. All hop parts (including seed) were treated with 2 minutes dip in bleach 5:1 v:v (sodium hypochlorite) with a 1 minute rinse in clean water.

Permit for hop germplasm entry are attached to this report.



Shaun Townsend (l) treats hop seeds in bleach solution at Odell Brewery Company, Ft. Collins. Kim Hummer (r) treats additional seedlots in bleach solution at National Laboratory for Genetic Resource Preservation, Ft. Collins.

Conclusions

The first week of October was an excellent time to collect native hop from river canyons in southwestern Colorado. Previous hop seed collecting trips proved to have less viable seed when collected in mid-September. While in October, most hop cones were mature and provided ample seeds, where males were present. Some hop clones that had readily available water sources remained green and would likely ripen in late October.

At higher elevations on in several canyons, such as the Buckhorn Canyon, no males were present in the higher elevations. Also, in lower elevations, near Ft. Collins for example, some individual female hop clones were not sufficiently near males to set seed. We believe that one clone in Buckhorn Canyon was polyploid, possibly triploid, and did not produce many seed for that reason.

Acknowledgements

We appreciate the gracious assistance of Odell Brewing Company, Ft. Collins, Colorado, for providing travel in Colorado and for providing space for sample clean-up.

We also appreciate the assistance of the staff of the USDA National Laboratory for Genetic Resource Preservation for additional sample cleanup and shipping,

We appreciate the permission of Mr. Greg Michaud to allow collection of hops on his property in LaPorte, Colorado.

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Appendix 1. Collection list by number.

Collection identifiers	Date collected	PI	LOC	Species	Seeds	Herbarium
Carbondale 1/2	10/2/2019	691624	1613	*H. l.* var. *neomexicanus*	4036	0
Carbondale 3	10/2/2019	691625	1614	*H. l.* var. *neomexicanus*	1127	0
Carbondale 4	10/2/2019	691626	1615	*H. l.* var. *neomexicanus*	1822	0
Carbondale 5	10/2/2019	691627	1616	*H. l.* var. *neomexicanus*	814	0
Carbondale 6	10/2/2019	691628	1617	*H. l.* var. *neomexicanus*	3643	1
Carbondale 7	10/2/2019	691629	1618	*H. l.* var. *neomexicanus*	987	2
Clear Creek 1	10/2/2019	691630	1619	*H. l.* var. *neomexicanus*	3781	2
Clear Creek 2 (S. tunnel trail)	10/2/2019	691631	1620	*H. l.* var. *neomexicanus*	1	2
Clear Creek 3	10/2/2019	691744	1638	*H. l.* var. *neomexicanus*	Shaun	1
Golden Elevator 1	10/1/2019	691635	1624	*H. l.* var. *neomexicanus*	Shaun	
Golden Elevator 2	10/2/2019	691632	1621	*H. l.* var. *neomexicanus*	496	1
Golden Elevator 3	10/2/2019	691633	1622	*H. l.* var. *neomexicanus*	15	
Golden Elevator 4	10/2/2019	691634	1623	*H. l.* var. *neomexicanus*	1	
Buckhorn Canyon 4	10/3/2019	691639	1628	*H. l.* var. *neomexicanus*	Seeds unripe	0
Buckhorn Canyon 1	10/3/2019	691636	1625	*H. l.* var. *neomexicanus*	1	1
Buckhorn Canyon 2	10/3/2019	691637	1626	*H. l.* var. *neomexicanus*	1	
Buckhorn Canyon 3	10/3/2019	691638	1627	*H. l.* var. *neomexicanus*	1	
Buckhorn Canyon 5	10/3/2019	691737	1631	*H. l.* var. *neomexicanus*	Shaun	
Buckhorn Canyon 6/7	10/3/2019	691639	1632	*H. l.* var. *neomexicanus*	0	2
LaPorte 1	10/3/2019	691640	1629	*H. l.* var. *neomexicanus*	0	
Taft Hill 1	10/3/2019	691641	1630	*H. l.* var. *neomexicanus*	5 seed	1
Golden Railroad 1	10/1/2019	691739	1633	*H. l.* var. *neomexicanus*		
Golden Railroad 2	10/1/2019	691740	1634	*H. l.* var. *neomexicanus*		
Golden Railroad 3	10/1/2019	691741	1635	*H. l.* var. *neomexicanus*		
Deer Creek 1	10/1/2019	691742	1636	*H. l.* var. *neomexicanus*		
Deer Creek 2	10/1/2019	691743	1637	*H. l.* var. *neomexicanus*		
Deer Creek 3	10/1/2019	691744	1638	*H. l.* var. *neomexicanus*		

Locality information for the collection.

Collection ID	Date collected	PI	Local No.	Latitude	Longitude	Elevation (m)
Carbondale 1/2	10/2/2019	691624	1613	39.398304 N	-107.166806 W	1859 (6099)
Carbondale 3	10/2/2019	691625	1614	39.398231 N	-107.167074 W	1859 (6099)
Carbondale 4	10/2/2019	691626	1615	39.398422 N	-107165645 W	1920 (6299)
Carbondale 5	10/2/2019	691627	1616	39.398515 N	-107.164918	1958 (6423')
Carbondale 6	10/2/2019	691628	1617	39.3985150 N	-107.16491800	2023 (6637)'
Carbondale 7	10/2/2019	691629	1618	39.398828 N	-107.162259 W	2023 (6637')
Clear Creek 1	10/2/2019	691630	1619	39.742231 N	-105.256214 W	1744 (5722')
Clear Creek 2 south tunnel trail	10/2/2019	691631	1620	39.747187 N	-105.250369 W	1766 (5794')
Clear Creek 3 south tunnel trail	10/2/2019	691744	1638	39.747187 N	-105.250369 W	1766 (5794')
Golden Elevator 1	10/1/2019	691635	1624	39.77353000	-105.16553000	1671 (5482')
Golden Elevator 2	10/2/2019	691632	1621	39.774800 N	-105.155549 W	1671 (5482')
Golden Elevator 3	10/2/2019	691633	1622	39.77365 N	-105.16475 W	1677 (5502')
Golden Elevator 4	10/2/2019	691634	1623	39.77113800 N	-105.1908730 W	1677 (5502')

Horsetooth 1	10/3/2019			Seeds Immature	Not Collected	
Buckhorn Canyon 1	10/3/2019	691636	1625	40.56966 N	-105.33460 W	1973 (6473')
Buckhorn Canyon 2	10/3/2019	691637	1626	40.57126N	-105.34375 W	2008 (6587')
Buckhorn Canyon 3	10/3/2019	691638	1627	40.57133 N	-105.34387 W	2011 (6598')
Buckhorn Canyon 4	10/3/2019	691639	1628	40.57090 N	-105.34417 W	1996 (6548')
Buckhorn Canyon 5	10/3/2019	691737	1631	40.57528 N	-105.36921 W	2057 (6749')
Buckhorn Canyon 6 and 7	10/3/2019	691738	1632	40.580455 N	-105.396671 W	2191 (7148')
LaPorte 1	10/3/2019	691640	1629	40.630661 N	-105.142522 W	1547
Taft Hill 1	10/3/2019	691641	1630	40.629203 N	-105.114106 W	1536