

HOW AOSCA TRACKS WILDLAND SOURCED SEED

**& Other Plant
Propagating Materials**



INTRODUCTION

Members of the Association of Official Seed Certifying Agencies (AOSCA; aosca.org.) offer third party certification for tracking germplasms and varieties of directly collected native or naturalized wildland plant materials and their respective cultivated increases. Certification is based on maintaining genetic identity (recognition of distinctive traits as established by geographic source, botanic key and/or formal description) and genetic purity (monitoring the presence of those distinctive traits in cultivated reproductive generations and applying tolerances for limiting off-type, weed, or other species contaminants).



Seed and other plant propagating materials consistent with vegetation objectives for specific geographic areas and having verified genetic identity and purity are needed for wildland restoration, fire mitigation, and other rehabilitation projects. This need is being addressed by the individuals, private companies, public land management agencies, and non-governmental conservation organizations having a stake in the wildland seed industry. Each stakeholder may view aspects of plant germplasm collection, development, production, and usage through very different lenses, but each may benefit from the value-added service provided by AOSCA in tracking genetic integrity in wildland seed commerce.

Upon stakeholder clientele request for certification, AOSCA member agencies having geographic jurisdiction will provide application forms, inspections, and labeling for tracking the collection and production of these plant materials.

Stakeholders often have specific questions regarding AOSCA germplasm designations, generations, labeling, or requirements and standards for seed collection and/or cultivated increase. These questions can be answered by consulting the subjects and definitions in the following **FLOW CHART**, **TOPICAL KEY**, and **GLOSSARY**, which offer easy public access and a stepwise guide to the essentials of AOSCA wildland sourced seed certification.



Arrowleaf balsamroot seed heads collected into seed bag.

The following subjects (A-D) are a brief directory of the FLOWCHART/TOPICAL KEY:

- A. Commercial wildland collectors/contractors: 0, 3a, 3b, 4
- B. Germplasm originators/developers: 0, 1a, 1b, 2a-2d, 3b, 5, 6a, 6b, 7a-7c, 8, 11
- C. Commercial cultivated seed producers/contractors: 0, 6b, 8, 9, 10a-10e
- D. Seed buyers/project managers: 0, 1a, 1b, 2a-2d, 4, 5, 7a-7c, 8, 10e, 11

To best utilize this guide, find a certification subject of interest in the stepwise FLOW CHART and note the number of the box. The subject is further explained in the statement of the same number in the TOPICAL KEY. See the GLOSSARY for the definition of terms. Terms are underlined and hyperlinked at their first instance in the TOPICAL KEY.

0. Wildland Plant Species Populations

AOSCA Seed Certification Flow Chart

1a. Natural Track (N-T) Germplasm

Unrestricted Genetic Accessions

2a. SOURCE IDENTIFIED:
N-T
Germplasm
Generations &
Labeling

2b. SELECTED:
Promising
Traits; N-T
Germplasm
Generations &
Labeling

2c. TESTED:
Proven Traits;
N-T
Germplasm
Generations &
Labeling

**2d. VARIETY/
CULTIVAR:**
Traits Uniform,
Stable; N-T
Classes &
Labeling

**3a. Wildland Collection for
Project Out-Planting**

**3b. Wildland Collection for
Cultivated Increase**

**4. Procedures for Collection &
Labeling of Wildland Seed
for Direct Marketing**

**5. Procedures for Collection &
Designation of Stock Seed
Eligible for Cultivation**

**6a. Cultivated Stock Increase
under Direct Supervision of
Collector/Developer**

**6b. Stock Seed Labeled for
Distribution to
Commercial Growers**

**10b. Seedling
Inspection:**
Planting Design,
Stand
Establishment,
Volunteers

**10c. Field
Inspection:**
Genetic Purity &
Integrity, Isolation,
Weed Control

**10d. Seed
Harvest,
Transporting,
Cleaning,
Sampling,
Storage**

**10e. Seed Lots,
Seed Analysis,
Certification
Tags, Analysis
Tags**

**11. Practical
Application of
Pre-Variety
Germplasm in
Revegetation
Projects**

0. Wildland Plant Species Populations

AOSCA Seed Certification Flow Chart

1b. Manipulated Track (M-T) Germplasm

Restricted Genetic Selections

7a. SELECTED:
Promising Traits;
M-T Germplasm
Generations &
Labeling

7b. TESTED:
Proven Traits;
M-T Germplasm
Generations &
Labeling

**7c. VARIETY/
CULTIVAR:**
Traits Uniform,
Stable; M-T Classes
& Labeling

**8. N-T and M-T Germplasm Identification and
Variety Naming**

Advancement Optional: SI to S to T to V/C

9. Certified Cultivated Production:
SI, S, T, or V/C

**10a. Stock Seed Identity and Generation;
Land History; Isolation Distance**



Rocky Mountain Beeplant commonly collected for seed.

TOPICAL KEY

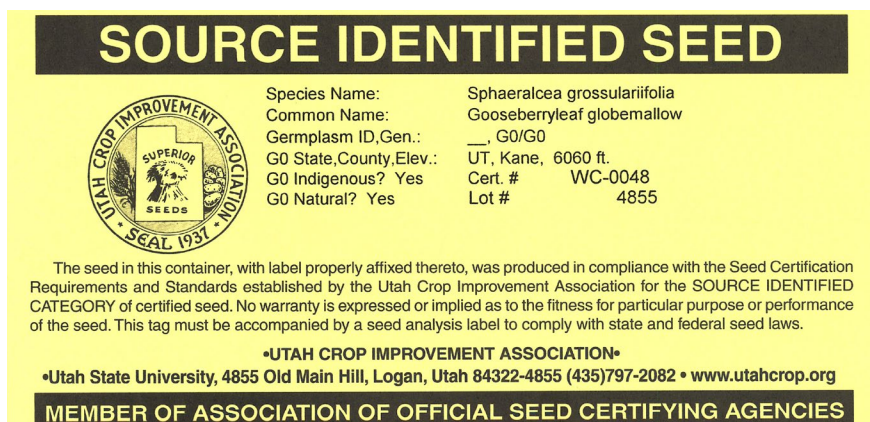
- #0. A wildland plant species population may be native or naturalized, indigenous or non-indigenous. A wildland sourced germplasm representation of this population may consist of directly collected propagating material or its cultivated increase. See #1
- #1a. The germplasm is an unrestricted genetic accession (see collection methods) of a natural plant population growing on a wildland site and can be used directly in revegetation projects or increased under cultivation in a manner to ensure maintenance of genetic identity and genetic purity: Natural Track (N-T). See #2, #9
- #1b. The germplasm is a restricted genetic selection resulting from purposeful genetic manipulation, such as selecting specific individuals from within natural populations or cultivated fields of known genetic identity, or from within a bulk population. Seed of a genetic selection can be increased under cultivation in a manner to ensure main-

tenance of genetic identity and genetic purity: Manipulated Track (M-T). See #7, #9

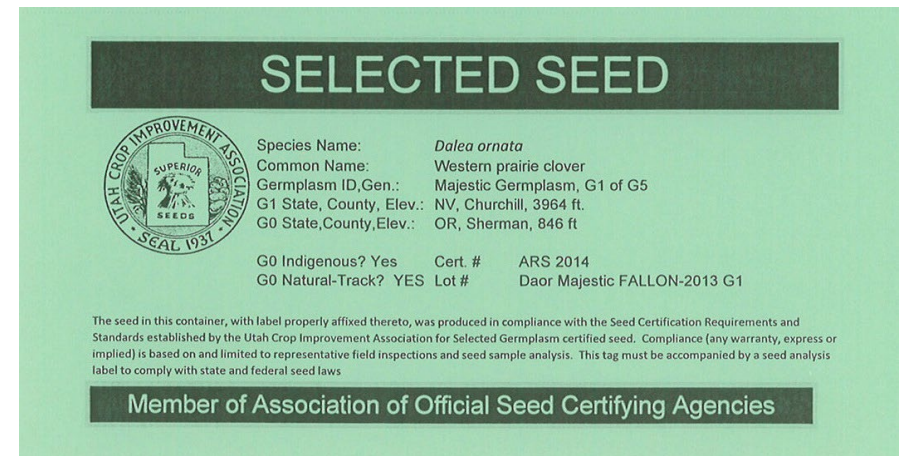
- #2a. The natural population accession is unevaluated in relation to other populations of the species; thus, the geographic source of a representative genetic accession is the only data known: Source Identified Germplasm (SI), N-T, yellow certification tags. Generations are designated as Generation Zero (G0) for wildland accessions, and G1, G2, G3, etc. for successive cultivated generations. The tag lists the G0 collection location (or locations of a bulked population), and the cultivation location of any successive cultivated generation. See #3, #8, #9, #11
- #2b. In addition to source information (#2a), the accession representing a natural population is chosen for indication, but not proof, of having distinct traits exhibited by the population as a whole compared with other natural wildland populations of the same species located in different geographic areas or designated seed zones; traits are identified from field observation, representative accessions grown in common gardens, or by genetic analysis : Selected Germplasm (S), N-T, green certification tags; generations and locations listed on the tag as in #2a. See #3, #8, #9, #11
- #2c. The distinct traits of the natural population accession (#2b) are proven heritable by genetic analysis or progeny testing: Tested Germplasm (T), N-T, blue certification tags; generations and locations listed on the tag as in #2a. See #3, #8, #9, #11
- #2d. The distinct natural population traits proven heritable (#2c) are shown to be uniform and stable as supported by data from multiple location/year trials under cultivation or in wildland plantings: Variety/Cultivar (V/C). N-T variety generation (class) designations of Breeder (tag color not specified), Foundation (white tag), Registered (purple tag), and Certified (blue tag) are analogous to the N-T germplasm generation designations of G0, G1, G2, and G3. The collection and cultivated locations are not specified on an N-T variety tag; the official variety release notice provides source and germplasm development information. NOTE: A Natural Track variety when wildland collected is fully representative of the genetic diversity of its natural wildland population, and when increased in the field according to AOSCA cultivation protocols is a legitimate representative of that

population from which it was originally Source Identified. It is distinct, uniform and stable within the context of the diversity of the natural population from which it was sourced as influenced by its mode of reproduction (self or cross pollinated or apomictic) and environmentally induced yearly phenotypic variation. See #3, #8, #9, #11

- #3a. The specific Natural Track germplasm (see #2a through #2d) as collected (usually large volumes) is destined for direct marketing/re-vegetation project outplanting. See #4
- #3b. The specific Natural Track germplasm (see #2a through #2d) as collected (usually small quantities) is destined for cultivated increase after meeting seed stock eligibility requirements. See #5
- #4. The collector/applicant fills out a Pre-Collection Application (or equivalent) with the appropriate AOSCA seed certification agency (SCA) (U.S state or AOSCA International Member) to initiate site inspection. The Site Identification (Site ID) Log, Part 1 (or equivalent) is completed through a coordinated applicant and SCA verification of the collection location (source or provenance), seed harvest, seed conditioning, obtaining a seed sample, and seed analysis. Upon SCA final approval, certification tags are issued. Large volume collections are normally tagged as Source Identified, but may qualify as other germplasm types (see #2b through #2d) as proposed by the origina-



Example of Source Identified certification tag for wildland collected seed.



Example of Selected germplasm certification tag for a first generation seed increase.

tor/developer and reviewed by the SCA. The generation notation on these certification tags is G0/G0 for Source Identified, Selected, or Tested Germplasm, or tagged as Certified Class for a Cultivar; these designations indicate that the germplasm is not eligible as stock seed for certified cultivation without further documentation as detailed in #5.

- #5. In addition to the documents listed in #4, the collector/applicant submits a Site ID Log Part 2 (or equivalent) to the appropriate certification agency to apply for Generation Zero (G0) stock seed eligibility. Additional information requested by the agency may include physical details of the collection location, description of collection methods, associated plant species, plant and site orientation photographs, and voucher specimens. Note: Germplasm accessions acquired within established seed collection and species verification protocols of recognized public agencies are normally eligible (with appropriate data on file and accessible to the certification agency in lieu of the documents listed in #4 and #5) to enter the certification process as G0 stock seed. See #6
- #6a. Generation Zero (G0) stock seed accessions are intended for cultivated increase under the direct supervision of a public or private originator/developer. In this case, certification tags are not issued for the



Wildland harvest of Wyoming sagebrush seed near Susanville, CA.

certified eligible G0 stock seed; the first certification tags required are for the appropriate certified eligible generation that is made available for commercial cultivated production (see generation limitation notation in #6b). See #9

- #6b. Generation Zero (G0) stock seed accessions are destined for commercial cultivated production. In this case certification tags are issued by the certification agency for the certified eligible G0 stock seed. The generation notation of the G0 germplasm accession is G0/GX if the number of generations in cultivation is not specified; if the generations are specified and limited by the originator/developer, they would be notated as G0/G3, G0/G5, or other specific generation limitation (read as G0 of 3 allowed, G0 of 5 allowed, etc.). See #9, #10a
- #7a. A defined genetic selection resulting from purposefully selecting individuals having promise of distinct phenotypic traits from within

wildland or cultivated populations: Selected Germplasm (S), M-T, green certification tags. Generations are Generation One (G1) for the defined genetic entity, and G2, G3, G4, etc. for successive cultivated generations. The tag lists either the wildland collection location or the cultivation location where the G1 genetic entity was formally selected and defined, and the cultivation location of a successive cultivated generation. See #8, #9, #11

- #7b. The promising distinct genetic selection traits (#7a) are proven heritable by progeny testing or genetic analysis: Tested germplasm, M-T, blue certification tags; generations and locations listed on the tag as in #7a. See #8, #9, #11
- #7c. Distinct genetic selection traits proven heritable (#7b) are shown to be uniform and stable as supported by data from multiple location/year trials under cultivation or in wildland plantings: Variety/Cultivar (V/C). The M-T Variety generations (class) designations of Breeder (tag color not specified), Foundation (white tag), Registered (pur-



Wildland harvest of bottlebrush squirreltail along the Utah-Arizona border.

ple tag), and Certified (blue tag) are analogous to M-T Selected and Tested germplasm generation designations of G1, G2, G3, and G4. The wildland or cultivated initial selection location or cultivated production locations are not specified on an M-T variety tag; the official variety release notice provides source and germplasm development information. See #8, #9, #11

- #8. Natural Track (Source Identified, Selected, and Tested) and Manipulated Track (Selected and Tested) germplasm types are collectively referred to in the AOSCA certification program as Pre-Variety Germplasm (PVG). These are normally labeled with a germplasm identification (Germplasm ID), followed by the word “Germplasm” to distinguish it from an official variety name, and may be offered in commerce as wild collected or cultivated plant materials with or without a formal release notice. If a germplasm is optionally advanced from one germplasm type to another (SI to S to T: N-T; S to T: M-T) as distinct germplasm traits are identified and/or proven heritable, the same Germplasm ID is used unless changed via a formal release notice. If an N-T or M-T germplasm is advanced to a Variety/Cultivar, the release notice includes documentation as to its distinct, uniform, and stable status, and the Germplasm ID normally becomes the variety name. See #9, #11
- #9. For certified cultivated production of both natural and manipulated germplasms and varieties, the contractor or grower completes an application for certification with the appropriate AOSCA state/country SCA. The grower agrees to follow certification rules, regulations and guidelines, including requirements and standards, which are set up to track genetic identity and genetic purity through the process of planting, growing, harvesting, seed cleaning, seed sampling and seed analysis, and final bagging and tagging. See #10
- #10a. Stock seed or other plant materials destined for certified field/nursery production must be accompanied with certification tags to establish species, Germplasm ID and source, and specified limitation of generation. Land history of the proposed field is required, as is proper isolation from pollen sources of different germplasms or varieties of the same or related hybridizing species if outcrossing is a possibility. See #10b



Inspection of a cultivated seed field of Anatone germplasm bluebunch wheatgrass.

- #10b. A seedling inspection (seedlings, transplants, cuttings, etc.) is conducted at an appropriate time after planting but before plant maturity to evaluate planting design (if specified by a release notice) and stand establishment (stand density in relation to the pure live seed

USDA Forage and Range Research Lab
696 North 1100 East, Logan, Utah 84322

Variety & Kind	Discovery Snake River Wheatgrass		
Origin	UT	Cert No.	G-31219
Pure Seed	98.07%	Lot No.	DSRWG NL-19
Inert Matter	1.93%	Other Crop	0.00%
Weed Seed	0.00%	Germ	89%
Noxious Weeds	0.00%	Dormant Seed	NA
Date Tested	4/30/20	Total Viability	NA

Seed analysis tag

or vegetative material planted) and to note any volunteers (see land history) of the same or closely related species. See #10c

#10c. Field inspection is completed before harvest (repeated each crop year for perennial species) to check compliance with field standards for genetic purity (proper isolation distances and tolerances for off-types or contaminants) and for genetic integrity (maintenance of stand density as related to length of stand). Control of noxious weeds or other weedy species may be required according to specific U.S. state or other country regulations. See #10d

#10d. Seed harvest methods and timing should be optimized to maintain the genetic diversity of the germplasm (may be specified in the release notice). Harvesting and transporting equipment, storage facilities, and seed cleaning equipment may be subject to inspection by the certification agency to avoid contamination from other species and weed seed. After cleaning and/or bagging, a representative seed sample is drawn for seed analysis. See #10e

#10e. Labeling of the seed lot with certification tags is completed after compliance with certification requirements and standards. Seed analysis tags or documentation stating seed mechanical purity and seed viability must accompany seed in commerce and is usually supplied by the seed vendor, though some AOSCA member agencies list this information on the back of the certification tag. The

seed vendor is required to update seed viability at specified intervals as required by the U.S state or other country seed laws. See #11

#11. For most wildland sourced plant materials, germplasm evaluations and comparisons are designed to facilitate native plant use in localized site revegetation rather than for advancement toward formal release. In this context, a germplasm designation at any Pre-Variety Germplasm (PVG) category (Source Identified, Selected, or Tested) and at any permitted generation is a legitimate end product. Utilizing the PVG process is essential when natural germplasms are needed for timely (often immediate) restoration of localized geographic areas, and when purposefully selected manipulated germplasms are required to meet unique project demands. The limited market potential of plant materials for these localized and unique projects, however, can make reasonable supply and price levels problematic for the wildland seed industry. For germplasms with wider geographic adaptability and greater market potential, formal Variety/Cultivar release (and variety name recognition through the Federal Seed Act) may be applicable. Many public and private agencies follow internally established protocols for germplasm acquisition, study, development, and/or release, though such formality is not required of individuals or companies utilizing AOSCA wildland sourced plant materials certification.



Diverse and healthy wildland site in Northern Utah.

GLOSSARY

Accession: See Genetic accession.

Application for Certification: Filing an application for certification initiates the SCA processes to assess eligibility for certification according to state and country seed standards. Information needed on this application includes land history, field location, stock seed identity, contact information, and other items related to production of the seed crop.

Associated plant species: The major plant species, including weeds, that coexist at the collection location with the target species and provide context of local environmental conditions and species succession information, also providing ecological insight to the collection site relative to natural or human caused influences such as fires, flooding, drought, invasive plants, overgrazing, replanting, etc.

Bulk population: A plant breeding term that refers to undefined plant material of a species which no longer conforms to any previously defined genetic accession or selection. This may be due to purposeful or inadvertent hybridization, contamination, or loss of stand in a cultivated population leading to loss of genetic integrity.

Bulk populations are not a category of Pre-Variety Germplasm and thus are not eligible for tagging; This terminology is not to be confused with “bulk populations”

Bulked population(s): Refers to two or more genetic accessions or selections of a species which are purposefully combined, pooled, or “bulk” to form a Pre-Variety Germplasm which is defined, produced, labeled, and utilized in filling specific revegetation project needs. Bulk populations may be sourced from multiple states/counties or other jurisdictions (e.g., province, parish), and elevations; and/or from a seed zone, ecoregion, or both.

Certification tag(s): Color coded tags are issued following AOSCA format by individual agencies displaying their insignia or logo, and clearly stating the PVG germplasm category or the variety class (generation) of seed in block letters across the top of the tag as follows: (a) PVG categories are SOURCE IDENTIFIED (yellow tag), SELECTED (green tag), and TESTED (blue tag); specific generations, source and production locations, and other information pertinent to the characteristics of the germplasm are listed on the tag for each category. (b) Variety generation classes are BREEDER (tags provided by the variety developer, color is not specified), FOUNDATION (white tag), REGISTERED (purple tag), and CERTIFIED (blue tag); source and production locations and variety characteristics are not listed on variety tags but are stated in the variety release notice.

Some agencies include seed analysis information on the certification tag, but normally a separate seed analysis tag is applied by the seed vendor. See examples of certification tags and the information displayed thereon in “The AOSCA Native Plant Connection” bulletin at www.aosca.org.

Class: Refers to generations of a Variety (Breeder, Foundation, Registered, and Certified); these terms are not applicable to Pre-Variety Germplasm (see Generations)

Collection location: The specific geographic site where a native or naturalized plant population of a species has become reproductively adapted and establishes the wildland source of a germplasm (see Site inspection). GPS coordinates and topographical maps provide general orientation for inspection of large volume collections intended for wildland planting. Additionally, for stock seed accessions or selections, carefully marked maps with detailed driving directions and orientation photographs may be required by inspection personnel to verify the size, shape, aspect, and other physical and vegetative details of the collection location. State, county and elevation is normally listed on PVG tags though seed zones, ecoregions, or other geographic description (based on environmental or genetic relationships) may be used upon request; the exact GPS location is not normally listed on the tag in order to keep the seed source confidential.

Collection, collection method(s): Though not formally specified by AOSCA certification standards, proper wildland seed collection methods maximize inclusion of

the wildland population genetic diversity for unrestricted genetic accessions (Natural Track). Basey et al. suggest collection from a minimum of 50 random plants of cross pollinated species, more for self pollinated species; collect from widely separated individuals throughout a population without favoring the most robust or avoiding small stature plants, and collect from all microsites including habitat edges (Basey, A.C.; Fant, J.B.; Kramer, A.T. 2015. Producing native plant materials for restoration: 10 rules to collect and maintain genetic diversity. Native Plants Journal. 16(1) 37-53). Additional collection recommendations and guidelines are provided in online manuals (e.g., ENSCONET 2015: USDI BLM SOS 2017). Large scale collections for direct project outplanting normally maximize genetic diversity of the population, but bias towards plants having greater seed production should be purposefully avoided. Selection criteria must be recorded for germplasms generated by purposefully selecting individuals with desired traits from within a population (see #7a), or by selecting one population over others (see #2b). See Selected (S) germplasm. See Selecting, selection process.

Collector/applicant: A private individual may apply to collect seed from a wildland site; companies, agencies, or other organizations may qualify as the applicant representing individuals or crews that collect for them.

Common garden(s): Accessions from different populations of a plant species being planted on a common site(s) to evaluate whether distinguishable phenotypic traits are genetically induced or are simply a result of differing environmental conditions at collection sites.



Discovery Snake River wheatgrass being grown for Certified seed.



Successful revegetation and soil stabilization of a wildland site following a wildfire near Beaver, Utah

Contaminant(s): Seeds or plants of other germplasms/cultivars and/or weedy species which are present in a seed lot or in a cultivated field. These may have been introduced by improper cleanout of planting, harvesting, or seed cleaning equipment, or may be volunteers resulting from the field soil bank. See Off-types.

Cultivated increase, cultivation: Any planting or increase of seed or other propagules when removed from the collection site, however small (greenhouse benches or test plots or gardens) or large (commercial fields), is considered cultivation. Tillage, irrigation, fertilizing, and weed, insect, wildlife, and disease control are often necessary. However, success of cultivated seed production can be challenging for various reasons, e.g., difficulties with achieving stand establishment, lack of known weed control options, need for specialized harvesting techniques, etc. The goal is to maintain a true representation of the genetic diversity of a natural accession or manipulated selection when planted under field conditions, but agricultural simulation of wildland sites is almost impossible to attain. Managing cultivated fields to maximize seed production and yet minimize genetic shifts or contamination is addressed in AOSCA standards for land history, volunteers from the soil seed bank, physical isolation, and maintenance of stand.

The converse of cultivated seed production is large scale wildland seed collection. This is for a few species (e.g., big sagebrush, bitterbrush, globemallow, needle-and-thread grass, etc.) for which seed harvesting from wildland populations is often more cost effective than cultivated production due to such factors as timing of demand, existing dense stands and access to them, relatively easily harvested seed, and little or no requirement for land or expensive farming equipment.

Cultivation location: The geographic location of a cultivated increase from which seed or other propagules are harvested. On a certification tag of a variety, no location information is given since the variety release document includes suggested area of adaptation. For a germplasm, the minimum location information required for tagging is State/County or other jurisdictions (e.g., province, parish) and elevation; seed zone or ecoregion may also be given. Thus, critical consideration by the seed user of the wildland source, the locations of subsequent cultivated generations, and the intended planting site is possible. On the application for certification, specific location information is required, e.g., accurate GPS coordinates, Township/Range/Section, maps showing field outline, street/road locations, etc.

Distinct: Genotypic or phenotypic characteristics that are distinguishable by visual or laboratory method and are used to differentiate between plant populations, genetic accessions, or genetic selections of a species. See Variety/Cultivar.

Field inspection: Inspection of the cultivated field or nursery will be made in the year of establishment prior to harvest, and additionally at least once each year that certification is applied for to harvest seed of perennial crops. This inspection should be made at the stage of plant development when stand density, seed maturity, off-types, contamination by weeds, other germplasms/species, volunteer plants, disease status, etc. can be best detected and evaluated. See Seedling Inspection. See Stand establishment: 2..

Generation(s):

1) Designation: PVG germplasm types are designated with a numeric generational succession, as in Generation Zero (G0), Generation One (G1), G2, G3, etc. Variety/cultivar generation (class) successive designations are Breeder (B), Foundation (F), Registered (R) and Certified (C).

2) Definitions:

- a) The generation is not defined for native or naturalized parent plants growing in a natural wildland plant population. Thus propagules harvested from such populations in a non-selective manner (genetic accessions) are designated Generation Zero (G0) (which is analogous to Breeder seed for Natural Track varieties), and G1, G2, G3, etc. for successive cultivated generations.
- b) The generation is defined as G0 (following the convention for traditional crop breeding) for a set of parent plants preferentially selected (manipulated genetic selection) from a wildland or wildland sourced cultivated plant population. Thus propagules harvested from such G0 parent plants are designated Generation 1 (G1) which is analogous to Breeder seed for Manipulated Track varieties/cultivars, and G2, G3, G4, etc. for successive cultivated generations.

3) Limitation: AOSCA seed certification is based on a limitation of generations in cultivated production to mitigate additive hazards potentially compromising ge-

netic purity such as outcrossing, mixtures, and genetic drift.

- a) The number of generations of named varieties is intrinsically limited by the (B), (F), (R), and (C) class designations, though the germplasm developer may limit generations to B-C or B-F-C for genetic reasons or to control stock seed availability for marketing purposes. In certain circumstances of stock seed shortages, strictly limited additional generations of (F) and (C) can be allowed. For PVG germplasms, the number of field or nursery increase generations is not limited unless specified by the originator/developer in consideration of species mode of reproduction (vegetative, apomictic, self-pollinated, cross-pollinated), genetic stability, plant longevity, etc.
- b) PVG generations may be further designated or limited (and labeled) as follows:
 - i) A generation notation on a PVG certification tag of G0/G0 means that the natural wildland collected germplasm is eligible for direct out-planting, but is not eligible for cultivated seed increase (meaning that the additional site information required to designate an accession as stock seed has not been completed).
 - ii) A generation notation for Natural Track germplasm on a PVG certification tag of G0/GX, G1/GX, G2/GX, etc. (where X=unspecified or unlimited) means the accession is eligible for cultivated seed increase but a limitation of generations has not been specified by the germplasm originator/developer; if specified, the number of generations allowed replaces the X as in G0/G4, G1/G4, G2/G4, etc. where five total generations (including G0) are allowed. Similarly, the generation notation for Manipulated Track germplasm (see 2) b) above) on a PVG tag would be G1/GX, G2/GX, G3/GX, etc. for the germplasm entity when cultivated generations are not limited, or G1/G5, G2/G5, G3/G5, etc. where five total generations (including G1) are allowed.
 - iii) Any generation can serve as stock seed, with the exception of the final generation of a germplasm having a specified limitation. Any generation may be used directly for wildland site revegetation/restoration. See Stock seed.
 - iv) Accelerated downgrading of any generation(s) can be specified on the PVG tag by request of the seed producer or contractor, limiting the number of cultivated generations in order to control access to stock seed for marketing purposes. For instance, a seed lot eligible for G2/G5, could be downgraded from G2/G5 to G5/G5 so that the seed lot would not be eligible for certified increase.

Generation Zero (G0): See Generations, 2) a)

Generation One (G1): See Generations, 2) b)

Genetic accession: In the context of this publication, plant material from a single

species which is collected in an unrestricted manner at one time from a specific location. Each accession is an attempt to capture the genetic diversity present in a given population of plants and is assigned a unique identifier or accession number by the collector or germplasm repository. Purposefully selecting individuals with distinguishable traits during the collection process alters the genetic integrity of the accession and the resulting germplasm is referred to as a genetic selection.

Genetic analysis: Use of chemical, electrophoretic, or DNA evaluation methods to differentiate or examine genetic relationships between different plant populations of a species, or between accessions or selections within a plant species population. Also, may be used to determine parameters of parent/progeny trait heritability.

Genetic identity: The verification of the identity of a variety or germplasm entity by an AOSCA member agency is defined as, and limited to, (a) the application of botanical keys or voucher specimens for wildland site inspections, (b) documentation of the pedigree, i.e., tracing the particular cycle of reproduction back to its origins with the collector or developer, and (c) matching the germplasm description with distinguishable phenotypic traits in the field, and/or in some cases, results of seed laboratory analysis, DNA testing, or grow outs.

Genetic integrity: The status of genetic identity and genetic purity of genetic accessions or selections throughout the acquisition, development, production, and movement in commerce as maintained by application of AOSCA requirements and standards. Purposeful or inadvertent outcrossing, loss of stand, contamination



Gooseberry leaf globemallow near Beaver, Utah.

tion by other germplasm entities or species, disease or insect damage, etc., may lead to loss of genetic integrity and rejection of a cultivated field for certification.

Genetic manipulation: Alteration of wildland or cultivated populations of a species by purposeful selection of desirable traits, inadvertent selection through deficient collection methods, purposeful hybridization or inadvertent genetic introgression through inadequate isolation, inducement of mutations or polyploidy, or inadvertent plant attrition in a cultivated stand due to various cultural or environmental pressures leading to loss of genetic integrity.

Genetic purity: The verification of genetic purity by an AOSCA member agency is defined as, and limited to, the application of the requirements and standards to evaluate presence of certain phenotypic traits (and strict application of tolerances to limit adulterating off- types or other contaminants) relative to the developer's description of the germplasm or variety/cultivar. Maintenance of genetic purity should not be interpreted to imply routine verification by genetic analysis of the genotype or verification of all described traits, though additional trait testing can be arranged by the certification agency.

Genetic selection: Refers to a restricted and defined germplasm representation of a species that has resulted from selecting a subset of individuals with distinguishable traits from a species natural plant population or its cultivated progeny. This designation is in contrast to a genetic accession, which is an unrestricted representation of a natural wildland population.

Germplasm, germplasm representation: Seed or vegetative tissue of a plant species containing the genetic template from which progeny, representative of the genetic diversity of the accession or selection it is originated from, can be reproduced. Either a specific natural accession or a manipulated selection may be defined according to AOSCA wildland sourced germplasm development steps and labeled with a germplasm identification or a variety/cultivar name.

Germplasm development: Refers to any action (collection, archiving, test plots, large scale cultivation, selection, etc.) that removes an accession or selection from its natural plant population for study, propagation, and/or storage.

Germplasm Identification (Germplasm ID):

1) A Germplasm ID is not mandatory, though the collector/developer can choose a Germplasm ID relevant to the collection area, traits, and/or letters and numbers unique to a sponsoring agency or company to designate the identity of natural accessions or manipulated selections (Germplasm ID is rarely used for wildland collected Source Identified germplasms intended for direct project outplanting). Once labeled by a certification agency, the Germplasm ID may not be changed from year to year or seed lot to seed lot in commerce; the same ID also follows

the germplasm if it is advanced through germplasm types (S, T, and V) unless a different Germplasm ID or Trademark or Variety Name is assigned through a formal germplasm release process. Labeling must be consistent with the germplasm type (SI, S, T, or V) currently designated by the originator/ developer in collaboration with the certification agency of jurisdiction (e.g., a variety may not be tagged as SI).

- 2) Subsequent collections from the same defined geographic source by the same originator may use the same Germplasm ID if the species presence on the site has not been altered or depleted and if collection and development methods are replicated.
- 3) When a pre-variety germplasm is offered in commerce attendant with a Germplasm ID, the word "Germplasm" must follow (e.g., ARS 2936 Germplasm scarlet globemallow; Southern Iowa Germplasm Canada wildrye, etc.) to avoid misconstruing the term as an official variety/cultivar name.
- 4) Variety/Cultivar names are protected under the Federal Seed Act in that a specific name may not be used for more than one cultivar of a specific crop kind, and truth in labeling means that a seed lot claimed to be a specific cultivar must consist of that variety genetically. A list of variety names is maintained by the USDA Agricultural Marketing Service, as well as rules and regulations for enforcement of the varietal labeling provisions of the Federal Seed Act.

Heritable: Genetic traits (morphological or physiological) that are passed on from one generation to the next in predictable and stable percentages as determined by the reproductive system (self-pollinated, cross-pollinated, or apomictic) of the plant species and as influenced by environmental conditions in a given growing season or cycle.

Indigenous: Plants growing naturally in a particular geographic area; in a broad sense all accessions of a native plant species throughout its natural range of occurrence would be considered indigenous. In a strict sense, however, a native germplasm accession collected at one wildland site may not technically be considered indigenous when used for restoration at some distance away (seed zone, ecoregion, genetic geographic separation, etc.) although still in the species overall native range.

Isolation: Separation of plots or fields of different germplasms or variety/cultivars of the same species or closely related hybridizing species by distances found to contain outcrossing to levels below tolerances specified in certification standards; self-pollinated or apomictic species may require much less isolation distance or only a mechanical separation. In general, isolation distances are greater for higher generations (e.g., Foundation or G1) and smaller fields; utilizing borders on field edges for non-seed use may reduce isolation distance requirements. For isolation

distance requirements for specific species, contact the certification agency having jurisdiction for the field.

Labeling: See Certification tags, Seed analysis tag

Land history: The number of crop years that must elapse between removal of plants of a germplasm or variety/cultivar and replanting a different germplasm or variety/cultivar of the same or other hybridizing species on the same land, unless germination stimulation or other practices serve to diminish the soil seed bank more quickly. The intent is to minimize volunteer plants that can lead to off-types or contamination when producing the planted germplasm or variety/cultivar. Contact the certification agency having jurisdiction of the location of the field for specific requirements.

Length of stand: See Stand establishment.

Manipulated Track (M-T): The germplasm development process of defining genetic selections by purposefully selecting individuals with desirable traits from unevaluated natural populations, previously defined Pre-Variety Germplasms or Varieties/Cultivars, or cultivated wildland sourced bulk populations. Inadvertent selection, hybridization, or contamination with other germplasm accessions or selections must be avoided during cultivated field increase.

Native: A plant species that has evolved through natural selection to adapt to a geographic area in some geological period. A native population gradually shifts genetically in response to natural environmental conditions but may be more speedily altered by human caused factors. Unaltered native populations, or remnants thereof, can provide known sources for collecting indigenous genetic accessions and genetic selections.

Natural, natural population: Refers to a native or naturalized amalgamation of individuals of a species growing in a designated geographic area at a designated time of observation which are responding to biotic and abiotic environmental factors (see Collection location). Separate populations of a species may be distinguished by climatic or physical terrain relationships or by traits or genetic markers. A natural genetic accession is one collected in an unrestricted manner from such a population.

Natural Track (N-T): The germplasm development process of defining one or a combination of unrestricted genetic accessions representative of a native or naturalized population of a plant species. Inadvertent selection, hybridization, or contamination with other germplasm accessions or selections must be avoided during wildland harvest and cultivated field increase.

Naturalized: Refers to a plant population that is not native or indigenous to a

specific geographic area but is growing and has gone through reproductive cycles showing it can persist in the area and establish multiple generations.

Noxious weed(s): Invasive species that are particularly troublesome, causing losses for agriculture and to ecosystem functions and services, e.g. wildlife habitat, forage and browse, nutrient cycling, hydrologic cycling, fire frequency, etc. Noxious weeds are rapid invaders of disturbed sites and are very difficult to control with chemical, mechanical, and biologic methods. Federal or State government entities may develop lists that declare certain species noxious (prohibited or restricted), and interstate commerce in seed and plant parts may be regulated; intensive control or eradication efforts may be required over large areas.

Off-types: Individual plants appearing in a cultivated field of a genetic accession, selection, or variety/cultivar of a species that do not conform to the described characteristics or previously noted variability. Off-types are most often induced by natural genetic segregation and/or as a product of outcrossing due to inadequate isolation in the previous cultivated generation. See Contaminates.

Orientation photograph(s): In addition to geographic information such as GPS coordinates or mapping and voucher specimens, photographic documentation may be required by the SCA of site(s) where accessions(s) are collected for stock seed. Photo documentation should include representative plants of the species, spatial relationship with other plants of the species and associated species on the site, and their orientation with unique and recognizable landmarks (close-ups and landscape scale) that would allow an inspector to locate the exact site of collection. Photos provide evidence of species presence including seed, fruiting bodies, or other propagating materials during the year of collection.

Originator/developer: The originator may or may not be the original collector of a wild collected genetic accession, but is the entity (private, public, or other organization) that assumes control of the germplasm's development through completion of Site ID Log, Part 2 and/or is the initial cultivated field certification applicant which may lead to formal published release of the germplasm. Development in this context means (a) identifying and studying distinguishing characteristics of a natural population with the aim of offering it in commerce as a wildland collected germplasm, or (b) increasing a wildland collected accession under cultivation with the intent of either maintaining the natural population genetics, or selecting or otherwise manipulating the germplasm to concentrate desired traits. In consultation with the SCA, the originator/developer has responsibility for justifying and specifying the following and any changes thereto: a) germplasm identification (see Germplasm identification), b) limitation of generations (see Generation(s): 3) Limitation:, and c) length of stand (see Stand establishment, density, length of stand).

Outcrossing: Refers to exchange of genetic alleles through cross pollination in wildland or cultivated populations. The degree of outcrossing is determined by

the reproductive system of the species, i.e., cross-pollinated, self-pollinated, or apomictic (there may be low levels of outcrossing in self-pollinated or apomictic species). See Isolation.

Planting design(s): Refers to the spatial patterns of plants in a seed orchard, common garden, or cultivated production field (broadcast vs. row seeding, orientation of rows, density of individuals in the stand, etc.). This becomes an issue when attempting to facilitate pollination within germplasm of a species (e.g., sufficient individuals to maintain genetic diversity, spatial location of males vs. females, etc.), or following isolation requirements to help prevent outcrossing between different accessions of the same species.

Population: See Natural population.

Pre-collection application: Filing this application initiates certification agency site inspection for large amounts of plant materials (usually seed) destined for large scale revegetation projects and/or smaller planting stock or research collections. Name, address and other contact information for the applicant (seed collector or contractor) is listed along with scientific and common names of the species to be collected, site ownership (permits, contracts, or written permission may be required), site location (state, county or other geographic notation such as ecoregion or seed zone, elevation, and GPS coordinates), site size and description (acres, square miles, or other specific geographic delimitation) and reproductive material to be collected (seed, seed stalks or heads, cones, fruit, vegetative parts, etc.).

Pre-Variety Germplasm (PVG): Collectively refers to Source Identified, Selected, and Tested wildland sourced germplasm as designated by AOSCA certification protocols; such germplasm has not been formally released as a variety/cultivar. These are normally labeled with a germplasm identification (germplasm ID, not to be construed as a variety name) and may be offered for commerce (seed increase and marketing); a formal release notice is optional but can benefit recognition, production, and movement in the marketplace. See Manipulated Track and Natural Track.

Progeny testing: Field or greenhouse grow outs or genetic analysis of an accession or germplasm entity with the purpose of determining whether certain morphological or physiological characters of interest are heritable in the next generation at some expected ratio as determined by the species mode of reproduction.

Propagating material(s): Seed or vegetative propagules that are used for the purpose of producing new individuals which are representative of accessions or genetic selections as collected or developed from a plant species population. Seed is the most common plant propagating material, and thus a reference to seed in AOSCA certification programs may also include reference to other propagating materials such as seedlings, cuttings, buds, root sprouts, pollen, etc.

Provenance: See Collection location.

Pure live seed: Pure Live Seed (PLS) is calculated by multiplying the % pure seed units by the % total viability. PLS is not required to be listed on an analysis label, but much wildland sourced seed is sold on a PLS basis and many seed mixes are specified in PLS pounds. A fair market value of seed lots not meeting high “agricultural” mechanical quality standards can thus be standardized utilizing PLS. PLS is helpful in determining seeding rates and true cost per viable unit of seed. See publication “How to be a Seed Connoisseur” at www.utahcrop.org.

Release notice: Public or private plant germplasm developers may author and publicize a formal release document that includes the germplasm ID or variety name, details the origin and development procedures, states the morphological and physiological characteristics that differentiate the PVG germplasm or variety from others of the species, and indicates geographic range of adaptation. A release notice is required for varieties and provides the details for a certification agency to verify genetic identity and the description of phenotypic traits enables maintenance of genetic purity in cultivated fields. PVG plant materials may be formally released with a published notice but are often documented only by information on the certification tag, which is normally adequate for certification purposes and is often sufficient to guide appropriate use on wildland revegetation projects.

Requirements and Standards: Refers to the approved program requirements and genetic standards of AOSCA. Requirements include certification procedures such as field history, stock seed germplasm type and eligible generations, isolation, inspection timing and methods, tagging etc. relating to establishing and maintaining genetic identity. Standards are designed to maintain genetic purity and include numerically expressed tolerances for off-types and other varieties or germplasms of the same species. The intent of genetic standards is to achieve a subsequent generation seed lot that closely replicates the genetics of the wild growing parent plants and/or the germplasm as released. An SCA may also adopt quality (mechanical) tolerances to limit other crops (species), common weeds, and restricted and prohibited noxious weeds in the seed lot.

Restricted: Refers to collection or selection methods that restrict inclusion of the full genetic component of natural populations or their cultivated progeny. Reference: Collection, collection methods

Seed: See Propagating materials

Seed analysis: Based on a set of procedures adopted by the Association of Official Seed Analysts (AOSA) or International Seed Testing Association (ISTA) that when performed on a representative seed sample determines the composition (seed mechanical purity) and the viability of a seed lot. Seed analysis does not normally verify a germplasm’s genetic identity unless additional chemical or DNA



Wildland seed collectors collecting gooseberryleaf globemallow seed in central Utah.

tests are performed. Some species do not have rules for testing, hence analysis is done based on the best information possible and experience of the analyst. The results of a seed analysis may determine eligibility for seed certification. See publication “[How to be a Seed Connoisseur](http://www.utahcrop.org)” at [utahcrop.org](http://www.utahcrop.org).

Seed analysis tag: This tag is based on an official seed analysis report and is where the vendor lists the variety name or germplasm identification, mechanical purity, and viability of the components present in the container of seed. In some states AOSCA members list this information on the back of the certification tags. Other vital details include the lot number, viability test date, net weight, and labeler name and address. See publication “[How to be a Seed Connoisseur](http://www.utahcrop.org)” at [utahcrop.org](http://www.utahcrop.org).

Seed Certifying Agency (SCA): An officially designated organization established by state and/or country seed laws; all U.S. states and several countries are members of AOSCA, which follow basic seed certification requirements and standards contained in the U.S. Federal Seed Act. SCAs have various names and affiliations: e.g., state departments of agriculture, university extension programs, seed grower associations, crop improvement associations, national ministries and agencies.

Seed cleaning, seed conditioning: The removal of debris (inert matter) or low quality, immature, infested or infected seeds, and seeds of different crop kinds or weed species that are foreign to the species of the seed lot of interest. This procedure is often done by hand for small archival or stock seed lots, while large

scale equipment and specialized cleaning methods are used for commercial seed lots. Seed conditioning is a term often used as synonymous with seed cleaning, but also encompasses operations such as receiving, pre-conditioning (drying, de-bearding, hulling, etc.), conveying, sizing, treating, and packaging.

Seed harvest: Seed can be collected by hand cutting fruiting structures for later seed separation, or by hand stripping or beating seed into a canvas hopper or large bucket or can. Various mechanical and/or motorized devices such as full size or plot combines or implements with rotating brush or vacuum stripper heads are sometimes used on uniform stands. Public land permits often limit harvest to non-mechanical methods. Species may be determinate or indeterminate regarding flowering and seed maturation, and different populations of the same species may mature seed at different times when planted in common gardens. For NaturalTrack collections, the goal is to obtain seed that represents the entire genetic diversity of the species in the field or wildland stand. A good rule of thumb for many native grasses and forbs is that 10% of mature seed may shatter, 10% is immature, and one harvest will hopefully capture 80% good quality seed. Percentages may vary, and in some situations more than one harvest by hand or with a brush or vacuum stripper may capture a better range of maturity and genetic diversity.

Seedling inspection: An official inspection is conducted after planting but before the pre-harvest field inspection to evaluate the growth of the plants in the stand (see Stand establishment and density). The presence of volunteer plants of the same or related species (see Land History) and noxious and/or abundant common weeds should be reported; control of field contaminants may be required by the SCA.

Seed lot: A specific amount of seed that has been wildland or field harvested, cleaned, packaged, and tagged as a quantity of uniform consistency and genetic identity, and is labeled with a lot number by the seed collector, conditioner, and/or vendor.

Seed mechanical purity: Those characteristics of a representative sample of a seed lot that can be determined by “mechanical” means such as physical separation of components, weighing, viability tests, etc. Mechanical purity specifies the percentage by weight of the pure seed units (defined as mature and complete seeds of each plant species or crop kind as described by seed testing rules), inert matter, seeds of other cultivated native species or crop kinds, seeds of weed species, and the percentage of seed viability (actual germination plus viable dormant seed). Note that seed purity in this sense refers only to the physical components of the representative seed sample; genetic identification is indicated only to the species level. This means that the genetic identity of different varieties or germplasms of a native species is not verified, and genetic purity is not measured.



Globemallow seed capsules.

Seed sample, sampling: Seed lots must be sampled with the proper equipment following protocols established by AOSA or ISTA to secure a representative sample for seed analysis at an official state or designated commercial seed laboratory. Samples are normally taken by SCA representatives or others authorized at the seed cleaning or storage facility. To resolve disputes regarding seed purity, viability, or weed seed content, it may be advantageous for a seed vendor or purchaser to arrange for a government seed official or other authorized third party to draw an official sample. (See publication “How to be a Seed Connoisseur,” www.utahcrop.org)

Seed viability: The actual germination percentage of a seed sample indicates seeds that are alive and have the capacity to immediately germinate and grow given favorable moisture and temperature conditions. Total viability includes the percentage seeds in the sample which are alive but are dormant due to seed coat impermeability or physiological status and which need extended time or special environmental stimulus to germinate. Tetrazolium chloride (TZ) tests indicate respiring tissue and are a quick way to estimate the total viability of the seed lot sample.

Seed Zone: A geographic area within which plant materials can be transferred with reduced risk of being poorly adapted to their new location. Generalized provisional seed zones have been developed by public land management agency scientists based on climate data that can be applied to any plant species to help guide seed

movement. These zones may be refined for a given species by developing empirical seed zones through application of common garden data or DNA analysis that link genetic variation across the landscape with collection location environments.

Selected germplasm (S): May be either (a) Natural genetic accessions collected from a natural population which has been chosen for indication of desirable traits in comparison with other natural populations of the same species, or (b) Manipulated genetic selections showing promise of having distinct morphological or physiological traits as contrasted with other genetic selections, genetic accessions, or varieties of the species. Selection criteria must be stated on the initial collection documentation and any germplasm release information. Certification tags list the generation number and location of the specific cultivated production field, and (a) the geographic location and elevation of the original seed collection site or (b) cultivated location where the selection originated.

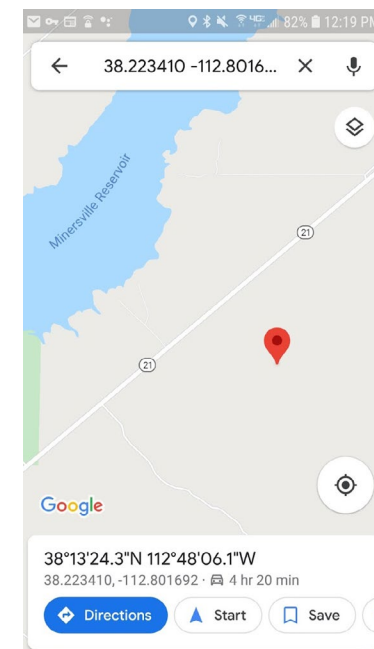
Selecting: The comparison, preferential choosing, and designation between accessions of different natural populations, or by choosing individuals from within a wildland or cultivated population. These selections are based on promising morphological or physiological traits of populations or individuals, respectively, for which heritability in successive generations is unknown. Inadvertent selection may result during cultivated increase conducted outside the protocols of certification program requirements and standards, or may occur on wildland sites due to inadequate sampling (see Collection methods) or environmental pressures such as unusually hot or frequent fires, excessive grazing, precipitation extremes, or invasion of exotic plant species. See Genetic accession; Genetic selection.



Milkweed seed being screened during the seed conditioning process.

Site Identification (Site ID) Log, Part

1: Information on this log is sufficient for wildland collected material intended for direct sale and revegetation outplanting, but not for seed stock usage (see Site ID Log, Part 2). A Pre-Collection Application must be filed so that the appropriate AOSCA seed certification agency can complete a site inspection. The Site ID Log Part 1 requires name and address and other contact information for the collector/applicant; species scientific and common name; GPS coordinates and area actually collected (such as acres, square miles, geographic description, etc.); permit/contract/permission information for the public or private collection site; and type (seed, cuttings, etc.) and amount (pounds, volume, etc.) and field lot number of the bulk field material collected. After seed conditioning, following protocols for maintenance of genetic identity and purity, the applicant attests to the veracity of the collection and conditioning information by signature and requests certification tags with the completed form. The certification agency confirms the information on the form, seed sampling for seed analysis is arranged, all components of eligibility are reviewed, and tags are issued on qualifying seed lots.



GPS coordinates being used to mark a wildland seed collection location.

Site ID Log, Part 2: Information provided by the originator/developer in addition to that required on Site ID Log, Part 1 is used to provide further verification of the species identification, collection methods, and site data for wildland collected stock seed. This may include botanic voucher specimens, site and plant photographs (detailing taxonomy characters, plant community, site orientation, etc.), details of species distribution on the site, percent of the population collected from, whether specific plants were intentionally selected for seed collection, site physical details (soil texture, site aspect, etc.), and associated plant species.

Site inspection: Refers to an SCA representative viewing a site as requested on a Pre-Collection Application, to observe the presence of the species intended for collection, and to evaluate the abundance of seed or other propagating materials that could be collected in quantities that approximate the amounts listed on a subsequent Site ID Log. A Pre-Collection Application must be submitted each year the

site is to be inspected for seed collection.

Source, Sourced: See Collection location.

Source Identified germplasm (SI): Native or naturalized genetic accessions which may be wildland collected or field or orchard produced. Genotypic or phenotypic comparisons with other germplasm collections, accessions, or ecotypes of the same species have not been conducted. Certification tags list the geographic location and elevation and/or seed zone or ecoregion of the original seed collection site and the generation number and location of the current cultivated production field: the germplasm ID is also listed as designated by the originator/developer.

Species: Classification of plant life into a taxonomic hierarchy (as a subset of genus) based on similarity of genetically induced morphological and physiological characters and reproductive compatibility. Plant subspecies are also often defined that are linked by similar species characteristics but have shifted enough in character expression due to geographic isolation and/or environmental adaptation to justify a further division for taxonomic and seed production purposes. Thus, wildland collection methods and avoidance of outcrossing under cultivation must accommodate subspecies as well as species designations.

Stable: See Variety/Cultivar.

Stand establishment, density, length of stand:

1. Planting rates vary with species and field conditions, but a rule of thumb for many grasses and forbs is 25 pure live seeds per foot of row, assuming that often as little as 10% emergence and survival is sufficient for economically viable seed production. However, stand establishment on revegetation plantings and species natural recruitment on wildland sites is generally much less than 10%, so the comparative degree to which a cultivated stand contains the genetic diversity of the original accession may be similar to wildland plantings but is also difficult to assess. Seeds planted in greenhouse or nursery settings normally achieve greater seed germination and seedling survival, and when used as transplants for field establishment usually result in better stand establishment than realized through direct seeding. Regardless of how the field is established, the initial stand may decline over years, or may alternatively become thicker due to volunteer recruitment from seeds escaping harvest.
2. An SCA inspector has guidelines to follow for evaluating stand density and maintaining genetic integrity for wildland sourced PVG or varieties: (a) The length of the stand is normally unlimited as long as 75% of the plants present in the stand are those that were planted originally; exceptions may be otherwise specified by the originator/developer of the germplasm or their designee, in consultation with the certification agency; (b) When over 50% of the seed producing plants

in a cultivated stand are volunteers (progeny of plants from the original seeding), then the generation will be downgraded (e.g., G1 to G2, G2 to G3, etc.).

Stock seed: Refers to seed or other propagating materials of an eligible generation which are used to establish cultivated fields or nurseries such that the seed or plants produced are of a successive generation eligible for certification labeling (see Generations: Designation, Definitions, and Limitation). The originator/developer plans the procedures whereby stock seed is produced, maintained, and stored in order to make adequate quantities of seed stock available for the life of the germplasm or variety. If stock seed of an eligible generation is no longer available for cultivated production of a given PVG germplasm, (a) the number of allowed generations could be amended by the originator/developer, (b) reconstitution of a natural G0 germplasm may be accomplished following proper re-collection protocols, (c) a replication of the initial selection criteria whereby the original manipulated G1 germplasm was defined may be possible, or (d) proclaim that the germplasm is no longer supported by the originator/developer and alternatives must be found. Breeder or Foundation stock seed of released varieties may be reconstituted according to AOSCA guidelines, though subject to limitations and qualifications in keeping with the species reproductive mode and method of variety development.

Tested germplasm (T): (a) N-T genetic accessions collected from a natural population which, in comparison with other natural populations of the same species, exhibit desirable traits that have been proven heritable, and (b) M-T genetic selections having distinct morphological or physiological traits proven heritable by progeny testing as contrasted with other germplasm accessions, germplasm selections, or variety/cultivars of the same species. Supporting comparative data at the 10% level of confidence are indicated in AOSCA germplasm eligibility guidelines. Certification tags list the generation number and location of the cultivated production field, and also the geographic location of the original seed collection site or cultivated location where the original selection was done. Though tagging of Tested plant materials is not unusual, heritability testing can produce data on germplasm adaptation, trait stability, and uniformity which may logically lead to variety release. The Germplasm ID is also listed as designated by the originator/developer.

Trait(s): Morphological or physiological characteristics of individuals observed in plant populations which are an expression of the genotypic DNA template as influenced by environment. Common gardens, progeny testing, or genetic analysis can determine whether observed traits are genetically heritable at some calculable frequency, thus being useful in distinguishing species or different populations of a species or subspecies.

Trials: Refers to replicated field, nursery, or greenhouse experiments with plant materials where data are collected to elucidate plant characteristics such as trait ex-

pression, uniformity, stability, or adaptability to different environmental conditions.

Unevaluated: Refers to a Source Identified natural plant population whose genetic differences with other populations of the same species or subspecies have not been studied nor described; its geographic source information is the primary consideration in revegetation planting decisions.

Uniform: See Variety/Cultivar.

Unrestricted: Refers to collection methods that do not restrict inclusion of the full genetic component of a native or naturalized plant population on a wildland site. Plants that are spindly or diseased or low in propagule production should not be excluded since they may contain genetic characters that in a different year's environmental conditions may be an asset to the survival of the species population.

Variety/Cultivar (V/C): The word variety is synonymous with the word cultivar (International Code of Nomenclature of Cultivated Plants, 1969) and with a few exceptions the word variety is used to represent both terms in this publication. Variety means a subdivision of a plant species which is distinct, uniform, and stable (Federal Seed Act, 1939): "distinct" in the sense that the variety can be differentiated by one or more identifiable morphological, physiological, or other traits from all other varieties of public knowledge; "uniform" in the sense that variations in essential and distinctive characteristics are describable; and "stable" in the sense that the variety will remain unchanged to a reasonable degree of reliability in its essential and distinctive characteristics when reproduced or reconstituted as indicated by the different modes of reproduction and genetic synthesis of varieties. Wildland sourced germplasm can be released as a variety if supporting data shows it to be distinct, uniform, and stable; a natural population can fit these



Utah Department of Natural Resources seed warehouse, Ephraim, Utah.

criteria when distinct traits are identified, the degree of uniformity described, and are stable according to its mode of reproduction (self-pollinated, cross-pollinated, or apomictic). It should be recognized that varieties which have undergone genetic manipulation to concentrate desirable traits still contain most of the genetic diversity of the species, and a variety developed on the Natural Track contains all the genetic diversity of the wildland-growing parents.

Variety name: When officially named and released, a variety name is protected by the Federal Seed Act (FSA) in the sense that a specific name cannot be used for more than one variety of a specific species. Many native plant species do not have developed varieties; the agronomic crop name is substituted on seed analysis labels as the native plant species or common name, sometimes with "Variety Unknown" in place of the variety name. A native plant germplasm entity following Pre-Variety Germplasm protocols may be marketed with a unique germplasm identification or designation (usually having geographic relevance), though this is not to be construed as equivalent to an official variety name in the FSA sense. See Germplasm Identification (Germplasm ID).

Voucher specimen(s): A voucher specimen is a representative sample of a plant species that is used for identification when compared with specimens held, studied, and assigned to a taxon in recognized herbaria. A representative voucher includes all the plant parts used in the taxonomic key to identify and describe the specific species, e.g., flowers, fruits, leaves, hairs, stems, roots, etc. It is critical that voucher specimens be harvested and preserved correctly and accompanied by appropriate field location data for pertinent comparison with herbaria specimens.

Wildland collected: See Collection methods.

Wildland site: A non-cultivated private, NGO, or public site where plants of associated species are growing. Some sites may be administratively designated for wildland seed production and collection and may be protected by fences and strict collection regulations. Sites may be a natural iteration of the plant life indigenous in the area as influenced by geography and climate or in some cases are reseeded areas where indigenous or nonindigenous native and/or non-native plant materials have successfully naturalized.

Wildland sourced: Germplasm originating from a native or naturalized plant population on a wildland site, such as genetic accessions, genetic selections, or their cultivated progeny having a lineage directly traceable to those wildland sites; these plant materials are normally destined for wildland rehabilitative projects. It is recognized that all traditional cultivated crop kinds have historic native origins intrinsic in their development, but they are normally utilized in food and fiber production and are not considered wildland sourced, in the immediate sense, for the purposes of this publication.



Utah Agricultural Experiment Station UtahStateUniversity

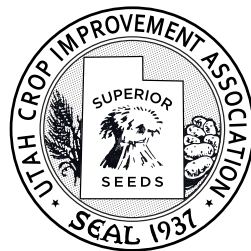
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