

# TECHNICAL NOTES

---

U.S. DEPARTMENT OF AGRICULTURE    STATE OF COLORADO    NATURAL RESOURCES CONSERVATION SERVICE

---

**PLANT MATERIALS TECHNICAL NOTE NO. 72**

July 2010

To:            All Field and Area Offices

From:         Christine Taliga, Colorado Plant Materials Specialist

**TRe:         Colorado Forb and Grass Seed Collection Guide**

The mission of the Natural Resources Conservation Service (NRCS) Plant Materials Program (PMP) is to develop, test, and transfer plant science technology to provide timely and effective vegetative solutions to meet customer and natural resource needs. Collecting seed of potential conservation plant species is the basis for plant selection and improvement for revegetation of disturbed areas.

This Technical Note outlines procedures for NRCS staff and partners on collecting wildland forb and grass seed.

# Contents

<b>INTRODUCTION</b> .....	<b>1</b>
<b>THE PLANT MATERIALS PROGRAM AND CONSERVATION</b> .....	<b>1</b>
<i>Why Conduct Seed Collections?</i> .....	<i>1</i>
<b>PLANT MATERIALS COLLECTION PROCEDURES</b> .....	<b>1</b>
<b>TARGET PLANTS AND COLLECTION SITES</b> .....	<b>1</b>
<i>What to Collect?</i> .....	<i>1</i>
<i>How to Identify Possible Collection Sites - Where to Collect?</i> .....	<i>2</i>
<b>COLLECTING AND HANDLING THE SEED</b> .....	<b>2</b>
<i>When to Collect?</i> .....	<i>2</i>
<i>How to Collect Seed?</i> .....	<i>4</i>
<b>DOCUMENTING PLANT SPECIES AND COLLECTION SITES</b> .....	<b>5</b>
<i>How to Collect a Plant Specimen?</i> .....	<i>5</i>
<i>How to GPS?</i> .....	<i>7</i>
<i>Where to send Seed?</i> .....	<i>7</i>
<i>Where to send Voucher Specimens?</i> .....	<i>7</i>
<i>What now?</i> .....	<i>7</i>
<i>How does this help?</i> .....	<i>8</i>
<i>Acknowledgements:</i> .....	<i>8</i>
<b>APPENDIX</b> .....	<b>9</b>
<b>EASY REFERENCE SEED COLLECTION CHECKLIST</b> .....	<b>9</b>
<b>UPPER COLORADO ENVIRONMENTAL PLANT CENTER SERVICE AREA</b> .....	<b>10</b>
<b>NRCS-ECS-580</b> .....	<b>11</b>
<b>DETERMINING SEED FILL</b> .....	<b>12</b>
<b>REFERENCES</b> .....	<b>13</b>

# INTRODUCTION

## ***The Plant Materials Program and Conservation***

The mission of the Natural Resources Conservation Service (NRCS) Plant Materials Program (PMP) is to develop, test, and transfer plant science technology to provide timely and effective vegetative solutions to meet customer and natural resource needs. Collecting seed of potential conservation plant species is the basis for plant selection and improvement for revegetation of disturbed areas. Plant Materials Centers (PMC) evaluate the variability among plant species across habitat and range gradients and select plants that will perform best in the environment of concern and develop propagation and harvesting techniques for those selected plants.

Selected conservation plants are then utilized to develop information technology transfer to solve Colorado's most important resource concerns. The Plant Releases and technology developed at PMC's are incorporated into the NRCS Field Office Technical Guide (FOTG) and become standards for conservation practices implemented on public and private lands. Over 70 percent of the plant species listed in the FOTG were selected by the Plant Materials Program.

This Technical Note outlines procedures for NRCS staff and partners on collecting wildland forb and grass seed. Three main components organize the information to assure the time and effort spent in collecting wildland seed will yield viable high quality accessions for development through the plant materials program, they are: 1. Target Plants and Collection Sites; 2. Seed Collection and Handling and; 3. Documentation

### **Why Conduct Seed Collections?**

This is your opportunity to provide a lasting and dramatic contribution to the conservation effort! The Colorado NRCS Plant Materials Committee identified a suite of key plant species required to address conservation resource concerns in the Upper Colorado Environmental Plant Center (UCEPC) service area (Appendix, p. 10) and we need YOUR assistance.

Because of your expert knowledge of plant communities in your area, NRCS field personnel, partners, and Earth team volunteers are relied upon to collect wildland seed for testing and evaluation at the UCEPC. Perhaps the plants you collect will become the next vegetative conservation solution for your area and beyond!

# PLANT MATERIALS COLLECTION PROCEDURES

## ***Target Plants and Collection Sites***

### **What to Collect?**



Whorled buckwheat (*Eriogonum heracleoides*) seed. Photo by Derek Tilley.

The NRCS State Conservationist transmits a bulletin every year identifying the high-priority conservation plant species and soliciting collections. Please refer to the Colorado NRCS website under Seed Collection, for plant descriptions and references.

It is important to become familiar with species sought for collection prior to the field season in order to maximize collection opportunities. Plants (particularly forbs) should be identified during the flowering period because it is often difficult to locate some species after the colorful blossoms have gone to seed. Learn what to look for in the desired species and how to tell

it apart from other look alike, then mark the site with a GPS unit to record the location and to track back to the site at a later date for seed collection.

### How to Identify Possible Collection Sites - Where to Collect?

Ensure that the plant population is of wild origin. Collect seed only in a wildland setting, such as a prairie, valley, foothill, playa, mesa, wetland, or mountain. Natural plant populations on ungrazed or rested rangeland, forestland, or riparian exclosures are excellent sites from which to collect. Areas recently burned by wildfire provide good collection sites if these areas have not been re-seeded. Do not collect seeds of native species that were included in a seed mix as part of a conservation planting such as CRP, from a yard, lawn, garden, park, or any other obviously cultivated or re-seeded site.



Wetland site with *Iris Missouriensis*, Rocky Mountain Iris, Photo by Christine Taliga

A collection site is environmentally similar in associated plant community composition, soil type, aspect, and elevation. In most cases, for a comprehensive assembly, collections should be made from 30 – 100 sites across the species natural range or the range that accompanies the identified resource concerns and/or objectives outlined by the study plan.

While collecting seed, it is important to obtain a complete genetic representation from each collection site,



*Iris Missouriensis*, Rocky Mountain Iris, detailing the 3-celled seed capsule. Photo by Christine Taliga

so sample from many plants across a population. Ideally, seed from 30 - 100 individuals should be harvested per population taking care not to collect more than 20% of seed from the total population. Plant populations growing in unusually harsh conditions are very good candidates for collection. In the case of many native plant species, the reproductive biology has not been studied; therefore the capture of the rarer genes will require a markedly increased sample size. Collect as much seed as possible over an entire collection site (population). Collectors are advised to sample from at least 50 individuals, from within a single collection site (population) where available and to look for populations with a large number of plants.

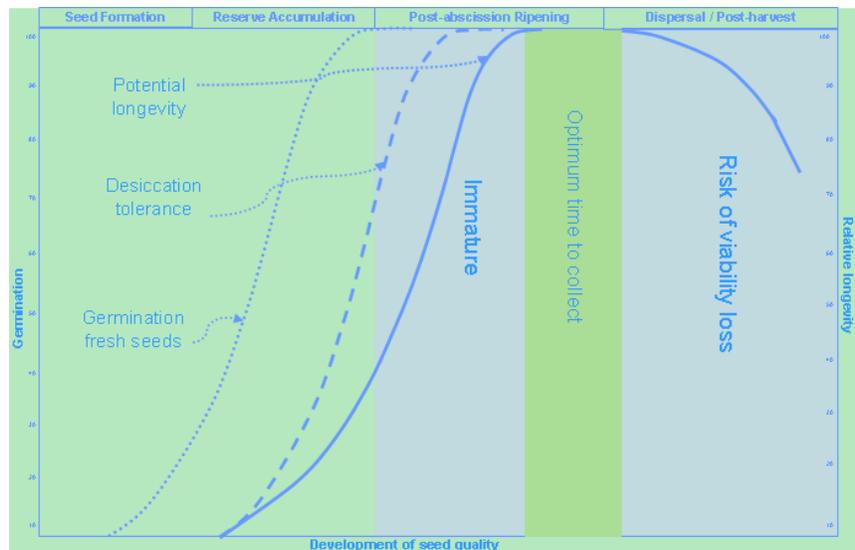
Always obtain prior permission from the landowner to collect seed and **avoid areas with heavy weed or pest**

**infestations!**

### Collecting and Handling the Seed

#### When to Collect?

Learn and understand the flowering and fruiting times and methods of the desired plant species across their respective ranges. Early seed collecting can result in immature seed, in turn, resulting in low seed viability, poor germination, and reduced rates of successful establishment. Delayed collecting may result in seed loss from shatter or dispersal after ripening.



Graph 1, taken from Assessing a potential seed collection- technical information sheet\_2, Millennium Seed bank Project KEW

Many native forb species and several warm season grass species mature with the basal or outer flowers blooming first and seed maturation occurring in an upward or inward pattern (indeterminate flowering). This indeterminate flowering pattern results in many different stages of flowering on the same stalk with the most mature seeds found near the base or outer regions. This can complicate the successful collection of viable seeds.



*Camissonia scapoidea*, Barestem camissonia, detailing indeterminate flowers. Photo by Christine Taliga

On the other hand, determinate flowering, which is found in many cool season grass species, develop flowers first from the top of the head (spike) and move downward. Determinate flowering always places the most mature seed at the top of the head. However, depending on the species and precipitation and temperature the actual time of flowering and fruiting will vary from year to year. For example, an early spring and dry summer may hasten seed set, while lower spring and summer temperatures may delay flowering and seed ripening. Therefore, it is necessary to periodically monitor plants for seed maturity. Collecting seed over the season is important, similar to collecting across geographic populations for diversity; collections should represent variety of dates to avoid selecting against either early or late maturing genotypes. Generally, seed set occurs from 4 to 8 weeks after anthesis (flowering) is complete, graph 1. Access local herbaria websites such as the [Colorado State University Herbarium](http://wsprod.colostate.edu/cwis440/herbarium/index.asp) website at: <http://wsprod.colostate.edu/cwis440/herbarium/index.asp> for location information and the [University of Wyoming Rocky Mountain Herbarium](http://www.rmh.uwyo.edu/) at: <http://www.rmh.uwyo.edu/> for location information and phenology (flowering or fruiting) data.



*Koeleria macrantha*, prairie Junegrass, detailing determinate flowers. Photo by Christine Taliga

When seed is firm, it is time to collect. To determine seed maturity hand cut a cross-section in a few representative seeds to determine stage of maturity. Figure 1 illustrates the difference between immature seed in a milky stage, as compared to mature seed in a firm dough stage. Seed in the firm dough stage will continue to mature into viable seed. The trick is to avoid collecting seed that is green, or immature, but also to harvest prior to shatter and dispersal.



Figure 1. Immature, soft dough stage on the left, and mature, hard stage on the right. Photo by Susan Winslow, Bridger PMC.

Look for these signs of seed readiness:

- Changes in fruit color
- Changes in seed coat color
- Fruits splitting and breaking open
- Seeds rattling
- Seeds that are firm/hard and dry
- Some seeds already dispersed

Again, knowing and planning for seed collection of target species is very important. Begin your seasonal seed collecting efforts on lower elevations, staying in synchrony with seed maturation as warmer temperatures and growing season move up in elevation, in order to extend the optimum seed collecting period. If seeds of the target species have shattered on south- or west-facing slopes, seed of the same species may still be available for collection on north- or east-facing slopes.

## How to Collect Seed?



Collecting whorled buckwheat near Craters of the Moon, photo by Aberdeen PMC.

**Do not mix multiple species in a single collection.** It is usually impossible to separate the different species during the processing stage.

Grass seeds can be harvested by stripping seed off the stem or by clipping the seed stem (culm) just below the spikelet. Collect into buckets, cloth, or paper bags.

The seeds of many broadleaf herbaceous plants can be collected by holding a paper bag or tray under the plant and shaking the seeds from the plant.

For species that dehisce explosively, the entire inflorescence (seed head) must be cut before maturity and allowed to dry in mesh bags.

Pods from species having spike-type inflorescences (e.g. *Penstemon*) may be stripped in the same manner as grasses.

A physical examination of the seed is crucial! Take time to visually inspect for signs of immaturity and to ensure the proper identity of the species.

- There should not be any remaining signs of flowering parts, such as anthers, stamens, or petals on the plant.
- Collect seed during dry weather because excess moisture is fatal to seed viability.
- Remove a small portion of the inflorescence and rub vigorously in the palm of your hand to loosen the seed from the stalks. It may be necessary to use a hand lens or other eye aid to determine if the seed has been released.
- Sort through the chaff for seeds carefully and check readiness by clipping with a fingernail clipper or cutting with a knife, (see Determining Seed Fill in Grasses, Appendix, p. 12).
- Harvest seed when no doughiness is evident and the endosperm is firm. Moisture should not be present when the seed is cut or rubbed in the palm of the hand. Mature seed ranges in color from tan to dark brown, and rarely is green. It will be necessary to check several plants in the immediate area, as ripening will vary among individuals. Waiting a few days may result in a more fully mature seed crop.
- Native legumes are very often attacked by seed predators. Carefully cut open a few seed and inspect for the presence of live larvae. Make sure there is not just an empty shell left behind after the insect consumed and vacated the seed. Another clue is the presence of a minute entrance hole where the insect accessed and vacated through the seed coat.
- Use a sharp utensil, such as scissors, knife, hand-scythe, or clippers to remove the inflorescence and a small amount of stalk. In many instances where the size of the area and number of plants is moderate, it is just as easy to hand-strip. It is best to harvest only the inflorescence or seed structure, as unnecessary vegetation such as leaves and stems, add undesirable moisture and bulk. In the case of indeterminate flowering (different stages occurring on a plant at the same time), a greater amount of material should be harvested to allow more seed to mature.
- Wear gloves if you are sensitive to the sharp or sticky capsules and pods of some species.



*Cymopterus purpureascens*, widening parsely. Photo by Christine Taliga.

- Collect as much seed as possible, while only taking approximately 20% of the total seed crop in a given area.
- Choose only to harvest from healthy, robust plants, because at this time of the year, many of the plants will be very dry and brown in appearance.
- Place material in paper sacks with adequate room for air circulation to promote drying.
- Do not store seed for any length of time in plastic sacks! Plastic holds moisture and increases temperature and humidity, which very quickly promotes mold and damages the seed.
- Label each sack with the species, collector's name, and the date.
- Complete in full, the NRCS-ECS-580 Plant Collection Information Form (Appendix, p. 11), located at <http://www.co.nrcs.usda.gov/technical/ecs/PlantMaterials/PlantMaterials.html>. Record a description of all physical characteristics, such as elevation, aspect, slope, soil texture, annual precipitation, MLRA, associated species, and ecological condition. Accurately record site location with the use of both a GPS unit and a topographical map to document the township, range, and section, and the proximity of landmarks, such as geographic formations, roads, rivers, bridges, structures, land ownership, etc. This is important because it may be necessary to re-visit the site sometime in the future.
- Leave the sack open after transporting and periodically stir up the contents to promote drying. It is best if material can be spread out on a flat surface to dry at room temperature. When curing is complete, temporarily store the bag in a place that is cool and dry until it can be sent to the Upper Colorado Environmental Plant Center.

### Documenting Plant Species and Collection Sites

Plant Collection Information Form NRCS-ECS-580 (Appendix, p.11), must be completed and must accompany each collection.

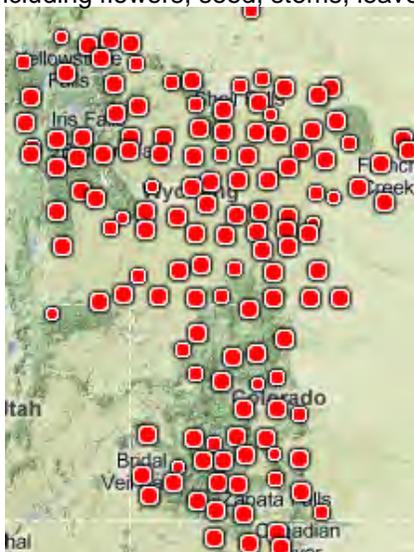
#### How to Collect a Plant Specimen?

**Verify that the plant material being collected is the species desired.** Confirmation may require the assistance of the plant materials specialist, or other plant expert. Positive identification may require that plants be examined during

flowering and may also require examination of the entire plant, including flowers, seed, stems, leaves and roots.



Jim Spencer, USDA NRCS, identifying population of Gunnison's Mariposa Lily.



*Koeleria macrantha* range, Wyoming State University, Rocky Mountain Herbarium data

It is critical to the value of the seed collections that the species is accurately identified. Plant specimens or vouchers are essential to verify the species from which seed has been collected. Collect two representative plants, with seed intact, at the time of seed harvesting. Close-up photographs can occasionally be used, but the most useful for the plant materials program is a set of quality pressed and dried plant specimens for each collection. Therefore, collectors are required to submit plant voucher specimens for all plant materials collections to the Colorado Plant Materials specialist. To collect a plant, be sure to obtain permission from the landowner and include all the plant parts needed for proper identification by common available keys. Select an average plant or collect several specimens to show the range in variation. Collect a plant with both flowers and fruits if possible, or make collections of different plant parts over the growing season. Whenever possible, the entire plant should be collected, including the roots if the plant is herbaceous. The roots may contain important identifying features, such as bulbs, corms, and rhizomes, giving clues as to whether the plant is an annual or perennial, or is a bunch-type or rhizomatous.

Appropriate tools are necessary in order to conduct field collections. A digging tool such as a pick, shovel, hand trowel, or a strong hunting knife is necessary for digging the roots of some species. A pair of clippers or a sharp knife is needed to cut off twigs and other parts of woody plants. If plants are not being pressed immediately in the field, then some container is necessary to prevent desiccation. The most convenient method is to place specimens with a damp paper towel into plastic bags and temporarily store in a cooler or refrigerator until pressing. Another option is to place the plant at once into a temporary press called a hand press. A hand press consists of many single sheets of paper within stiff covers, supported by straps, attached to a handle for convenience in carrying. Once the specimens are brought back to the office, they may be transferred to a full size press.

### **Field Preparation**

Large plants may be folded to fit the press, or representative portions can be selected when handling very large plants. For instance, when preparing woody specimens such as *Pinus* sp., a representative sample would include the leafy branches, seed-producing and pollen-producing cones, and bark (Benson 1979). Most preferably the plant is placed in a press immediately upon collection because it is impossible to make a good specimen from a wilted plant. Keep accurate collection information about each plant, preferably with the plant specimen, as most of this information will appear on the label. If a label is misplaced or its information is inaccurate, it can cause a great deal of trouble and confusion later on. Close-up photographs, especially of flowers and other important plant organs that aid in identification and that may be damaged by pressing and drying, are appreciated and should be emailed to [christine.taliga@co.usda.gov](mailto:christine.taliga@co.usda.gov). Use newspaper the size of a herbarium sheet (11.5 in. x 16.5 in.), and please cut to size if needed. Do not use tape on your specimen or the newspaper. Label the plant material on the outside of the newspaper with the label information shown in Appendix p.11.

Several items are important to remember when collecting a plant specimen.

#### Do

- Collect the entire plant, when possible, including root structure.
- Immediately press in a field press or keep cool in a plastic bag to prevent wilting.
- Fold the plant to press the entire plant.
- Write detailed notes on habitat, growing conditions, and which other plants (associates) are noted in the immediate vicinity.
- Take photographs of the plant prior to collecting.
- Collect two plants per population from which seed is harvested.
- Complete a collection label and send along with the specimen.
- GPS the location of the plant specimen.
- Secure the pressed plant materials between card boards for mailing the specimens.

## How to GPS?

GPS must be used to mark collection areas in order to be able to accurately record the location of the specimens collected.

- GPS waypoints should be marked when species are identified during the flowering stage as a potential collection area and saved for navigation back to those areas later in the season when the seed has developed and matured.
- Collect a new waypoint each time the area is accessed along with date and development stage attribute data in order to maintain an accurate history of the specimen in that location.
- Use an agency standard GPS unit with an accuracy of at least two meters and set to record points at a PDOP of at least six.
- Collect one waypoint in the center of each collection area. Multiple waypoints may be collected if the plants are in multiple separated areas.
- Leave the time and date collected as part of the attribute data of the waypoints.
- Attribute the waypoint(s), before or after downloading, as to the genus/species and the development stage, i.e. flowering, dough stage, mature seed, etc.
- Set the GPS data output to be latitude / longitude degrees, UTM is also acceptable.
- Download the waypoint data, fill in any additional attribute data needed and then save the points into a projected shape file, UTM NAD83 is recommended. Name the file using the first two letters of the genus, followed by the first two characters of the species, followed by the collector's initials (same as the saved form).
- Send the shape file, along with the completed form 580, by e-mail, to the Plant Materials Specialists at the State Office, [christine.taliga@co.usda.gov](mailto:christine.taliga@co.usda.gov).

Help with using specific GPS models and software can be obtained through the Resource Conservationist for Technology staff, or possibly from experienced peers.

## Where to send Seed?

Mail or deliver seed collections to the following address.

Upper Colorado Environmental Plant Center  
5538 County Road 4  
Meeker, CO 81641

## Where to send Voucher Specimens?

Mail or deliver seed collections to the following address.

USDA-Natural Resources Conservation Service  
Attn: Christine Taliga, Plant Materials Specialist  
Denver Federal Center  
Building 56, Room 2300  
PO Box 25426  
Denver, CO 80225

## What now?

The PMC processes the material to clean seed, assigns an accession number to each viable collection, and works with Field Offices and partners to periodically install Initial Evaluation Plantings to test the performance of individual collections against one another. Assigned accession numbers are sent to the original seed collector(s) so they also can track the reported performance of the material throughout the testing and selection process. Superior performing material will proceed to Comparative Evaluation Plantings, Seed Increase, Field Evaluation Plantings, and eventual selection and release for distribution to the commercial seed industry.

## Lastly!

Print off and use the Easy Reference Seed Collection Checklist in the Appendix p.9 to ensure you have completed the important steps in these seed collection guidelines.

### **How does this help?**

The NRCS Field Offices play a vital role in the continued testing and selection of native species that help to conserve and protect the natural environment. The PMC's plant release tool-box of 20 grass, forb, legume, tree, and shrub species, will, with the assistance of the Field Offices, continue to grow and be beneficial in biomass production, carbon sequestration, erosion reduction, wetland restoration, water quality improvement, stream bank and riparian area protection, and other special conservation treatment needs.

### ***Acknowledgements:***

Excerpts from the following publications were utilized in this guide: A Guide to the Collection, Preparation, and Preservation of Herbarium Specimens, 2009, Hartman and Nelson;

<http://www.rmh.uwyo.edu/resources.php>, Texas Plant Materials Collection Guide;

[http://www.tx.nrcs.usda.gov/technical/pmc/collection\\_guide.html](http://www.tx.nrcs.usda.gov/technical/pmc/collection_guide.html); Idaho Plant Materials Collection Guide, 2009: <http://www.plant-materials.nrcs.usda.gov/pubs/idpmctn8442.pdf>; and Montana NRCS Field Office

Guide to Collecting Wildland Seed;

<http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes/pmtechnoteMT50.html>.

Thank you to Susan Winslow, Dan Ogle, Loren St. John, Derek Tilley, John Riley and Shelley Maher for the use of photographs and other assistance, Colorado Plant Materials Committee, Colorado NRCS ECS staff, and the UCEPC staff for review of this Guide. Photographs not cited were contributed by Christine Taliga, please cite if utilized in other publications.

# APPENDIX

## Easy Reference Seed Collection Checklist

	<b>Method</b>	<b>Rationale</b>
<input type="checkbox"/>	Assess the target population and confirm that a sufficient number of individual plants (usually 50) have seeds at natural dispersal stage.	To ensure that adequate genetic diversity can be sampled from the population, and that the seeds are likely to be at maximum possible viability and longevity.
<input type="checkbox"/>	Verify that the desired plant is correctly identified and distinguished from other similar species	It is critical to the value of the seed collections that the species is accurately identified. Work with the plant materials specialist or local experts to verify the identity of the plant population.
<input type="checkbox"/>	Carefully examine a small, representative sample of seeds using a cut test and for smaller seeds a hand lens.	Estimate the frequency of empty or damaged seeds and confirm that the majority of seeds are mature and fully formed.
<input type="checkbox"/>	GPS the seed collection site, collect two representative plant species to submit as vouchers and carefully document the habitat.	Accurate location information, habitat description, and plant documentation is critical in the analysis of the species for conservation applications.
<input type="checkbox"/>	Collect mature, dry seeds into double-bagged brown paper bags. Large collections can be made using plastic buckets and then transferred into paper bags.	Ensure the highest possible viability at collection and maximize the potential storage life at the Seed Bank.
<input type="checkbox"/>	In general, cleaning should be left to the UCEPC staff. If seeds can be liberated from their fruits quickly and easily, by shaking the open fruits over a container, carry this out and note it on the field data form.	Maximize the use of available field time and leave the cleaning and storage preparation of seeds to PMC.
<input type="checkbox"/>	Fleshy fruits should be collected directly into plastic bags and allowed to aerate under refrigeration. Ship to PMC within 24 hours and avoid weekend delays	Fleshy fruits decompose rapidly and poor storage can lead to mold infested seed collections.
<input type="checkbox"/>	Sample randomly across the extent of the population, maintaining a record of the number of individuals sampled.	Capture the widest possible genetic diversity from the plant population sampled. Where a population exhibits a pattern of local variation, randomly sample the area, make detailed notes and separate the seed collection assembly from the rest of the assembly.
<input type="checkbox"/>	Collect as many seeds as possible but no more than 20% of the viable seed available on the day of collection.	This will ensure enough seed for evaluation but that the sampled population is not over collected.
<input type="checkbox"/>	Clearly label all bags with your name, date and plants common and scientific name. If there are multiple bags, label 1 of 3, 2 of 3, etc.	To ensure that this unique identifier is attached to each sample of a collection. All other data will be recorded on the field data form.
<input type="checkbox"/>	Record all applicable field data on the ECS form 580 (see appendix 2).	It is very important to track the site and collection area over time for the purpose of linking accessions with various habitats across various geographic gradients for plant development.
<input type="checkbox"/>	Keep the seed collections in a cool, dry place prior to sending to the UCEPC. If the seed is damp, spread it out on newspaper, labeling the paper, to dry.	Exposure to sustained high temperatures or moisture can damage the seed collections. Try to maintain ventilation around the collections at all times.
<input type="checkbox"/>	Mail the pressed plant specimens (with label information see appendix 3) to the plant materials specialist, as soon as possible.	Plant specimens provide verification and documentation of species identity and characteristics.
<input type="checkbox"/>	Mail the dried seed, Monday to Wednesday with ECS-form 580 to the Upper Colorado Environmental Plant Materials Center as soon as possible.	Avoid shipping seed during the latter part of the week to ensure seed is in transit for the least amount of time possible.

*Upper Colorado Environmental Plant Center Service Area*





## Plant Collection Information

(seed or vegetative)

PLANT INFORMATION	COLLECTION INFORMATION
Scientific Name _____ _____	Date Collected _____
Common Name _____	Collector's Name _____
Cultivar/Release _____	Collector's Headquarters _____
Plant type: _____	_____
Number of Plants from which collected _____ (minimum population of 30 plants is preferred)	
<input type="checkbox"/> Seed <input type="checkbox"/> Vegetative Material	

COLLECTION SITE INFORMATION			
State	Section	N. Latitude	
County	Range	W. Longitude	
Township	Site Location (ie. landmarks, roads, etc.)		MLRA
Elevation (ft or m)	Slope (%)	Exposure (N,S,E,W)	Precipitation (in or mm)
Plants Growing in Association			

Soils Information		
Soil Series & Texture	Soil Survey Sheet #	Soils Mapping Unit Symbol
Remarks		

---



---



---

Please complete the above form as completely as possible, following the instructions below for collecting and handling seed and vegetative material.

Watch for superior plants that display unusual characteristics and record observations. Seed or cuttings from an individual plant or from several plants in the same colony can constitute a collection if warranted. Make separate collections of the same species if the growing site or location is different.

Use the back of this sheet to sketch the collection area or record additional information.

Be sure to label each collection as it is made so collections do not get mixed up. Send seed to the Plant Materials Center serving the state, unless other specific instructions are provided.

**Seed Collection:** Check each collection for filled seed and then attempt to get the equivalent of one-fourth pound of seed. Collection should be from a minimum population of 30-50 plants if possible. Mature seed is typically dry and hard and has separated from the rachis (grasses) or loosens easily from the pods, capsules, or flower heads. Do not collect unripe seed. Fleshy seed from woody species should be enclosed in a plastic bag and kept in a cool place out of direct light.

**Vegetative Material Collection:** Collect only good healthy material. Use a sharp knife, scissors or pruners for cutting vegetative material. Root cuttings should be a minimum of 6" in length. Stem cuttings should be 6-8" or longer and have a minimum of 2 nodes. Wrap roots or cuttings with moist paper or cloth. Place material in a plastic bag with a few small holes in it. Refrigerate or keep cool until shipped. Material should be shipped or delivered as soon as possible so that it does not dry out.

Clear Form

## Determining Seed Fill

### Determining seed fill when making field collections

When is the right time to harvest seed?

The right day to harvest is the one when the largest amount of seed is ripe or filled. However, when collecting seed from more than one species it is not always possible to harvest seed in one day. This makes it necessary to start harvesting before all seed is mature.

Heading and flowering of many range and pasture grasses generally does not occur at one time but over a long period of time. In general, the interval between bloom and seed maturity is about 4 weeks. Cool moist weather may lengthen the interval while hot dry weather may shorten it.

Keep in mind that flowering starts at the top of the head and moves downward. This always places the most mature seed at the top of the head.

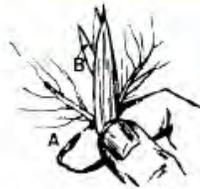
Stages of maturity in grass seed are the same as for any other grain: milk, soft dough, hard dough and vitreous or mature. The optimum time for seed harvest is the hard dough and mature stage. Seed harvested in this stage tend to be filled, will survive the curing process, and will germinate when planted. Seed harvested in the milk or soft-dough stage tend to be not filled, will shrivel as it cures, and generally will fail to germinate when planted.

Some shattering of seed will always occurs before harvest, but for a few days the rate of shattering is matched by the amount of seed ripening. When this stage is past, the rate of shattering exceeds the rate of new seed ripening. This means that at times

some heads will be full of ripe seed, while early producing heads will have very few seeds due to shattering, and late producing heads will have just started flowering.

This makes it important that careful daily inspections be made during the flowering period to decide when most of the heads contain seed in the hard-dough and mature stage.

**Field methods of determining grass seed fill (use method that most closely resembles the type species you are collecting)**



Pinching base of a fertile, sessile spikelet of little bluestem



Rubbing out spikelets of June grass in palm of hand



Cutting across center of buffalograss bur with a knife



Pressing across center of a fertile floret of switchgrass



Pinching base of several spikelets in a single spike of blue grama

## REFERENCES

### This technical note utilized components of the following references:

Benson, L. D. 1979. *Plant Classification*, Lexington, Mass.

Chicago Botanic Garden. *Technical Protocol for the Collection, Study, and Conservation of Seeds from Native Plant Species*. [http://cbgseedbank.org/contractors\\_forms\\_protocols.html](http://cbgseedbank.org/contractors_forms_protocols.html)

Chicago Botanic Garden, *Technical Protocol for the Collection, Study, and Conservation of Seeds from Native Plant Species for Seeds of Success & Dixon National Tallgrass Prairie Seed Bank*.

Harrington, H. D. 1985. *How to Identify Plants*, Athens, Ohio. Swallow Press.

Hartmann, HT, DE Kester, and F.T. Davies Jr. 1990. *Plant Propagation Principles and Practices*, 4<sup>th</sup> ed., p. 95. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

J.A. Young and C.G. Young. *Collecting, Processing, and Germinating Seeds of Wildland Plants*, Timber Press, and October 1986.

Morris J Houck. [Determining Seed Fill in Grasses](#). Knox City PMC, Knox City, TX. January 2006. P.2. (ID# 6492)

Official "Seeds of Success" website can be found at <http://www.nps.gov/plants/sos/>.

Royal Botanic Gardens. Technical Notes 2 and 3. *Millennium Seed Bank Project*. KEW. <http://www.kew.org/science-conservation/conservation-climate-change/millennium-seed-bank/index.htm>

S. R. Winslow, M. Majerus, L. Holzworth. Technical Note No. MT-50. *The NRCS Field Office Guide to Collecting Wildland Seed*. June 30, 2005.

St. John, L, D.G. Ogle, J.Scianna, S. Winslow, C. Hoag and D. Tilley. Technical Note No. 1. [Plant Materials Collection Guide](#). Aberdeen Plant Materials Center, Aberdeen, ID. February 27, 2009. P. 17. (ID# 8442)

St. John, L., Ogle, D., Scianna, J., Winslow, S., Holzworth, L., Hoag, C., Tilley, D. Technical Note No. 80. [Plant Materials Collection Guide](#). CAPMC, Davis, CA. February 24, 2009. P. 17. (ID# 8973)

USDA NRCS Boise, Idaho. *Plant Materials Collection Guide*, Technical Note Plant Materials No. 1, December 2003. <http://www.plant-aterials.nrcs.usda.gov/pubs/idpmctn5386.pdf>

USDA NRCS Brooksville, Florida. Technical Note No. 35. *Collecting Plant Material*, <http://www.plant-materials.nrcs.usda.gov/pubs/flpmctn3597.pdf>, 1997.

U.S.D.A. Natural Resources Conservation Service. *National Plant Materials Manual*, 2000.

Utah State University Intermountain Herbarium. *Making Herbarium Specimens*. <http://herbarium.usu.edu/collect.htm>

### SOURCES OF COLLECTING AND HERBARIUM SUPPLIES

Carolina Biological Supply Company (www.carolina.com.)  
Herbarium Supply Company, 2317 Birdie Drive, Bozeman, Montana 59715-8420 (406 994-006)

St. Louis Paper and Box Company, P.O. Box 8260, (3843 Garfield Ave.) St. Louis, Missouri 63156-8260 (800/779-7901)