

# Colorado Plant Materials Program



*Christine Taliga  
Plant Materials Specialist  
Colorado NRCS*



United States Department of Agriculture  
Natural Resources Conservation Service

# Plant Materials Program.....

We select plants and develop plant technology for the successful conservation of our nation's natural resources.



# Plant Materials Program

## Purpose

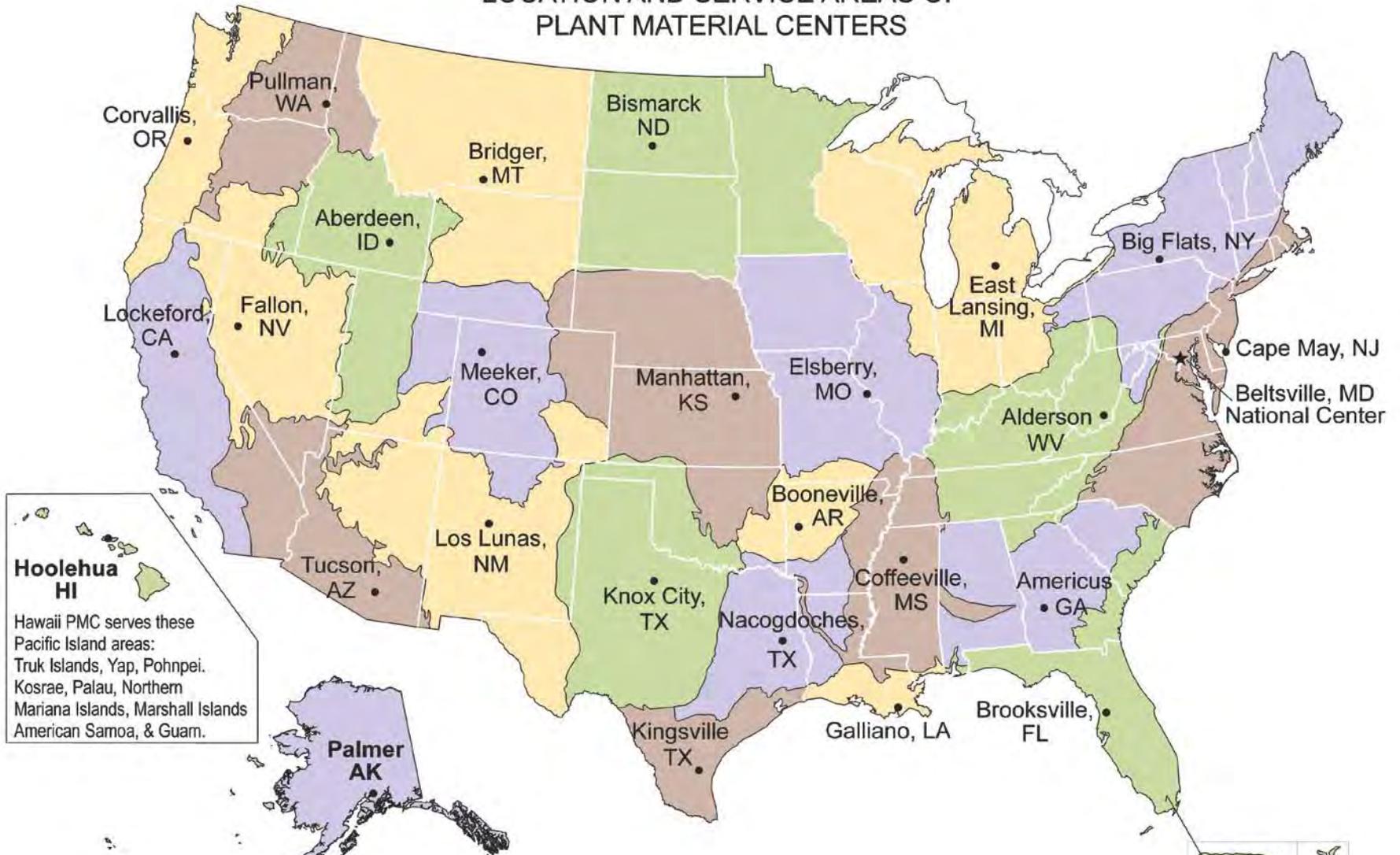
- ❖ Assemble, test, and release conservation plant materials.
- ❖ Determine techniques for use and management of plants.
- ❖ Facilitate the commercial increase of plants.
- ❖ Transfer of plant science technology to solve conservation problems.



Species are chosen NOT based on the species  
BUT to solve resource conservation problems.  
Example...to replace an invasive exotic ...

# Service Areas of the Plant Materials Centers

LOCATION AND SERVICE AREAS OF PLANT MATERIAL CENTERS



# Colorado Plant Materials



Technology Transfer

among Centers & NRCS  
Field Offices & On the  
Job Training

# Feedback from the field

- ❖ Lack of available native forbs
- ❖ Establishment techniques
- ❖ **Competitors for invasive species**



# Where to Start?

- ❖ What do we know and understand about the modern day North American landscape
- ❖ Plant Ecology and Plant Communities Principles
- ❖ How can we apply these principals in addressing the needs of our field offices?

## A disturbance evolved human influenced landscape.....



It is clear that North America's landscape owes much of its Holocene vegetational development and aboriginal biodiversity to choices that human cultures made locally to sustain a diverse array of biological resources for food, shelter, tools, clothing, medicine, and representations of beauty and art. These views most recently have been articulated by Mann (2002).

*"But Native Americans had three powerful technologies: fire, the ability to work wood into useful objects, and the bow and arrow. ... There is ample evidence that Native Americans greatly changed the character of the landscape with fire, and that they had major effects on the abundances of some wildlife species through their hunting."* Botkin, Daniel B. 1990.

# A disturbance evolved human influenced landscape.....

## ❖ Dust bowl



# A disturbance evolved human influenced landscape.....

- ❖ The advent of agriculture
- ❖ 100 fire prevention



# Our Historic Approach

- ❖ Focus on the desired state  
(target community)

Disturbance



Late seral perennials & shrubs



# Restoration of Plant Communities is difficult...

- ❖ Costly

- ❖ Difficult

  - Weather

  - Seeding Method

  - Seeds

  - Species Mixes



# Our tendency

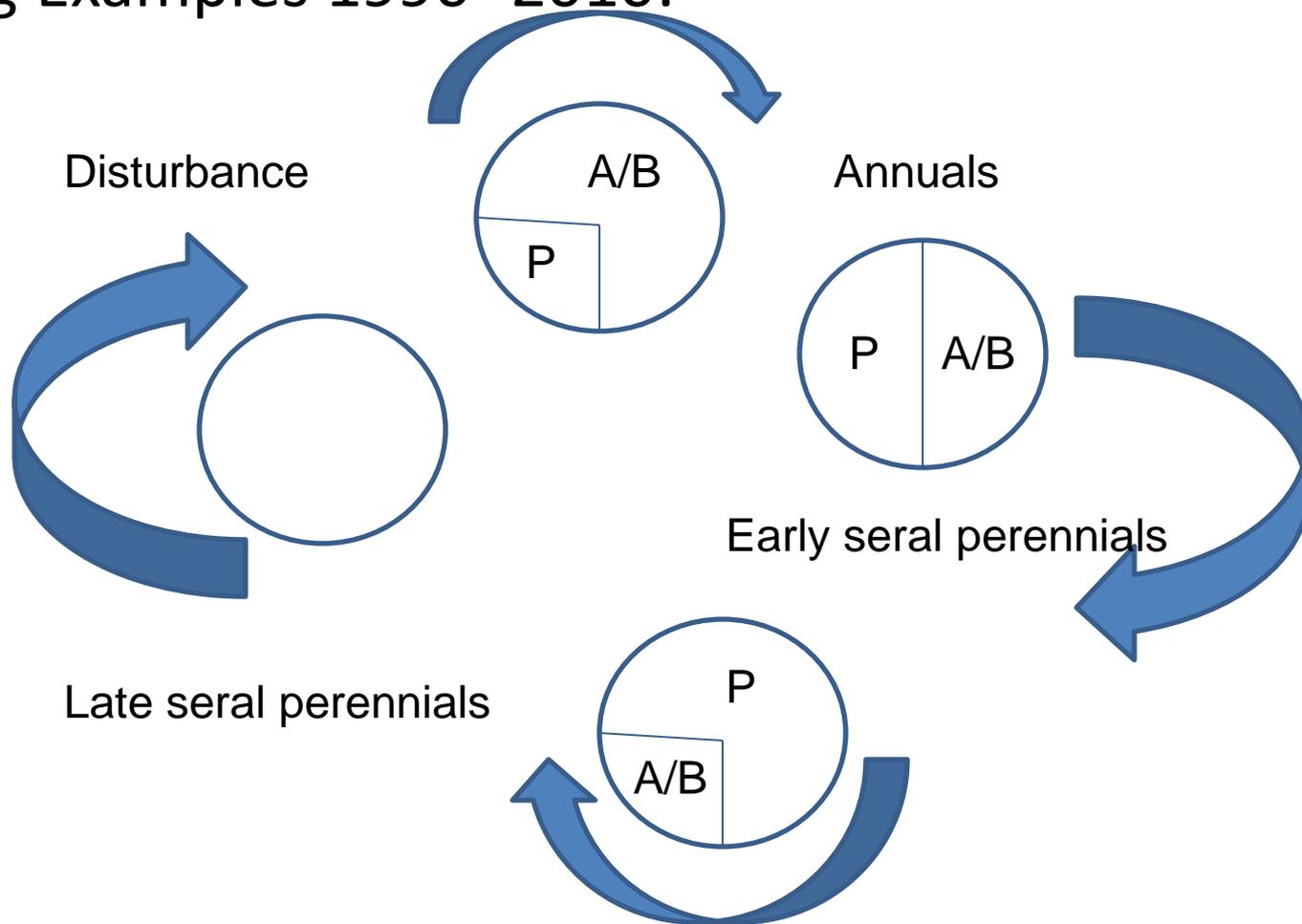
- ❖ Focus on the desired state (target community) at times ignoring or lack of understanding....
- ❖ Ecological plant community processes?



"We will now discuss in a little more detail the Struggle for Existence."  
.....Charles Darwin

# Ecological Cycles & Landscape History

Monitoring Examples 1990- 2010:



# What is currently in our toolbox

"Everything should be made as simple as possible, but not simpler."

Albert Einstein

# What is currently in our toolbox

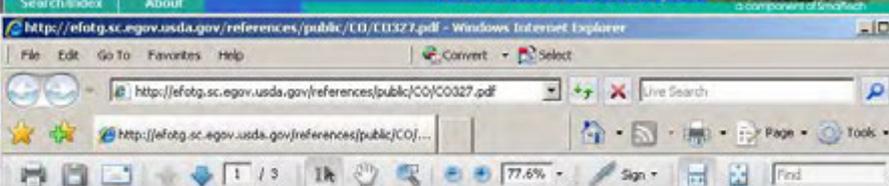
Colorado Plant Materials Technical Note No. 59 (revised)

Seeding Rates

Table 5. Graminoid, Forb and Shrub Seeding Rates for Conservation Plantings within Colorado											
Genus species (common name - Cultivar)	Notes		Seeds per pound (1,000s)	Seeds per square foot per pound planted per acre	Solid Stand Seeding Rates 1) pounds PLS (pure live seed) per acre						
					Irrigated		Nonirrigated		Critical, Riparian, Grassed Waterways		
					drill	broadcast	drill	broadcast	drill	broadcast	
<i>Achillea millefolium occidentalis</i> (western yarrow)	NF	2)	2,790	64.0	drill 0.05 or broadcast 0.1 pounds PLS per acre with grass mixture						
<i>Achnatherum hymenoides</i> (Indian ricegrass - Nezpar, Rimrock)	NCB	2) 4) 5)	235.0	5.4	8.0	16.0	4.0	8.0	8.0	16.0	
<i>Achnatherum hymenoides</i> (Indian ricegrass - Paloma)	NCB	2) 4) 5)	140.0	3.2	12.0	24.0	6.0	12.0	12.0	24.0	
<i>Agropyron cristatum X desertorum</i> (crested wheatgrass - Hycrest)	ICB	2)	302.0	6.9	6.0	12.0	3.0	6.0	6.0	12.0	
<i>Agropyron cristatum</i> (crested wheatgrass - Ephraim)	ICB	2)	302.0	6.9	6.0	12.0	3.0	6.0	6.0	12.0	
<i>Agropyron desertorum</i> (crested wheatgrass - Nordan)	ICB	2)	190.0	4.4	10.0	20.0	5.0	10.0	10.0	20.0	

- Quality Management (AC) (370)
- Brush Management (AC) (314)
- Channel Bank Vegetation (AC) (322)
- Channel Stabilization (FT) (584)
- Clearing and Snapping (FT) (328)
- Closure of Waste Impoundments (NO) (360)
- Composting Facility (317)
- Conservation Cover (AC) (327)
  - Conservation Cover (327) Standard
  - Conservation Cover (327) Statement of Work
  - Conservation Crop Rotation (AC) (328)
  - Conservation Power Plant (NO) (716)
  - Constructed Wetland

eFOTG Home Page  
**What is FOTG?**  
Technical guides are the primary source. They contain technical information about water, air, and related plant and animal



## Ecological Site Description

Plants ESTS ESD FSGD ESI Forestland ESI Rangeland

# UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

## ECOLOGICAL SITE DESCRIPTION (Old Format Report)

- Data Access**
- > Return to Reports Selection Screen
- Report Selections**
- General
  - > Physiographic Features
  - > Climate Features
  - > Water Features
  - > Soil Features
  - > Plant Communities
  - > Site Interpretations
  - > Supporting Information
  - > Rangeland Health Reference Sheet
  - > Complete Report
  - > HTML Printable Format

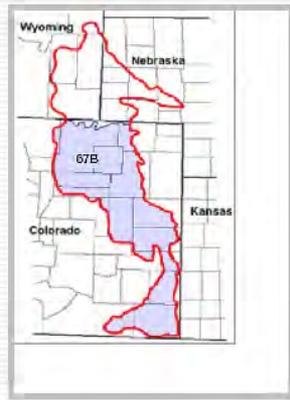
### ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Loamy Plains

Site ID: R067BY002CO

Major Land Resource Area: 067B-Central High Plains, Southern Part



# Do our recommendations reflect target historic plant communities?

- ❖ Grasses perhaps 1 or 2 annuals
- ❖ Forbs perhaps 1 or 2 annuals
- ❖ Sedges
- ❖ Shrubs
- ❖ Vines
- ❖ Trees
- ❖ What about the cryptogams?
- ❖ What could the implications of whole scale exclusion of groups of the native flora mean to native rangeland restoration and weed invasion?



# Roosevelt, Utah



# Larimer County, Colorado



# Arapaho National Forest



Erigeron formosissimus var. viscidus  
Potentilla gracilis var. pulcherrima  
Sambucus racemosa var. microbotrys  
Heterotheca fulcrata  
Castilleja sulphurea  
Poa secunda  
Festuca brachyphylla var. coloradensis  
Castilleja miniata var. miniata  
Thermopsis montana var. divaricarpa  
Viburnum edule  
Eremogone fendleri  
Vaccinium myrtillus var. oreophilum  
Packeria fendleri  
Solidago simplex var. simplex  
Zigadenus elegans  
Cymopterus lemmonii  
Campanula rotundifolia  
Arctostaphylos uva-ursi  
Cirsium clavatum var. americanum  
Juncus arcticus var. balticus  
Pinus flexilis  
Juniperus communis var. depressa  
Pinus contorta var. latifolia  
Boechera stricta  
Oryzopsis asperifolia  
Drymocallis fissa  
Phleum pratense var. pratense  
Heracleum maximum  
Calamagrostis canadensis var. canadensis  
Moneses uniflora  
Elymus trachycaulus var. trachycaulus  
Conioselinum scopulorum  
Picea engelmannii var. engelmannii

Geranium richardsonii  
Oxypolis fendleri  
Osmorhiza depauperata  
Mitella pentandra  
Pyrola asarifolia var. asarifolia  
Populus tremuloides  
Epilobium saximontanum  
Carex disperma  
Mertensia ciliata var. ciliata  
Achnatherum nelsonii ssp. nelsonii  
Platanthera purpurascens  
Aconitum columbianum ssp. columbianum  
Saxifraga odontoloma  
Alnus incana var. occidentalis  
Lonicera involucrata var. involucrata  
Equisetum arvense  
Luzula parviflora  
Symphyotrichum foliaceum var. canbyi  
Galium boreale  
Sedum rhodanthum  
Achillea millefolium  
Geum rivale  
Stellaria longifolia  
Trifolium hybridum  
Conioselinum scopulorum  
Dasiphora fruticosa  
Swertia perennis  
Orthilia secunda  
Cardamine cordifolia var. cordifolia  
Senecio triangularis  
Carex microptera var. microptera  
Veronica americana  
Mimulus guttatus

# Baca County SE Colorado



801 Taxa noted  
from the  
Comanche National  
Grassland  
In southeastern  
Colorado



The significant problems we have  
cannot be solved at the same  
level of thinking with which  
we created them.

Albert Einstein



Are we falling into this pattern when we are in  
direct combat with invasive species?

# What are the growing requirements of Native and Non-native Vegetation?

## ❖ Natives

- Tolerate and thrive in low N situations
- Late seral state vegetation particularly forbs need certain soil microrhizae fauna in order to establish (many orchids, *Lithospermum*, ...)
- Some native annuals are necessary for the correct soil microrhizal interactions in order for some species of sage brush to establish
- Some native species influence species composition

## ❖ Non-Natives

- Tolerate and thrive in high N situations
- Soil disturbances increase available N by removing resident vegetation, reducing N uptake or altering N cycling. Removing invasive species chemically or mechanically, may provide temporary control, but is unlikely to limit reinvasion while N availability remains high. Disturbance associated with chemical or mechanical control may even increase N availability, facilitating reinvasion.
- In some areas repeated burning may be an affordable tool to lower N availability. Fire may cause an initial flush of inorganic N, repeated fires can lower soil N availability in many grasslands (Ojima et al 1994).

# Potential Native Species for Mitigating Fire and Weed Invasion

## Considerations from the components of Colorado's flora

- ❖ 506 introduced species (USDA Plants Database)
- ❖ 2685 native plant species (133 species endemic to Colorado, Colorado Heritage Program)
- ❖ 1929 native forbs (393 annuals)
- ❖ 415 graminoids (378 perennial 36 annual)
- ❖ 275 shrubs
- ❖ 25 tree species
- ❖ 39 vines  
(7 annual vines 32 perennial vines)



# Annuals... stigma?

- ❖ Many native annuals unfortunately have the name "weed"

- ❖ For many native annual and biannual forbs (also graminoids) the pre-settlement range and extent is not well known nor documented as many have been extirpated out of much of the native rangeland. Therefore the native annual seedbank in many cases has been eliminated.

# Characteristics of annuals/biennials

- ❖ Easy to establish
- ❖ Abundant seed producers
- ❖ Tasty to herbivores
- ❖ Their job is to move or colonize when the opportunity presents itself!

# Impacts on Plant Community Assembly

- ❖ Soil primers for mycorrhizae (arbuscular mycorrhizal fungi AMF)
- ❖ Soil stabilizers
- ❖ Higher N tolerance
- ❖ Facilitation of regeneration of post-disturbance plant communities
- ❖ Adverse effect on non-native annuals
- ❖ Ecosystem function and interaction (plants continually interact and compete for space)

# A disturbance evolved human influenced landscape continues.....

- ❖ Re-introduction of prescribed fire
- ❖ Wildfire
- ❖ Wildlife
- ❖ Development
- ❖ Conservation easement programs



We select plants and develop plant technology for the successful conservation of our nation's natural resources.

What's our role in conservation, plant community restoration, plant materials development, rangeland restoration.

Not for every conservation application

.....

Perhaps for some????



# Potential Applications

- ❖ Agronomic applications – one on one combat -no
- ❖ Long-term easement programs (WRP)
- ❖ Restoration Projects (WHIP)
- ❖ Post-Fire (EWP Emergency Watershed Programs)

# FO Application?

- ❖ Demonstrations
- ❖ Field Trials
- ❖ Seed Collections
- ❖ Partnerships



# Thank You!

**Steve Parr**, Upper Colorado Environmental Plant Center  
**Greg Fenchel**, NRCS Los Lunas Plant Center  
**Loren St. John**, NRCS Aberdeen Plant Center  
**Susan Winslow**, NRCS Bridger Plant Center

**Jim Briggs**, NRCS Regional Plant Materials Specialist  
**Pat Davey**, NRCS Vegetation Specialist NPS  
**Dan Ogle**, NRCS Plant Materials Specialist  
**Jim Jacobs**, NRCS Plant Materials Specialist

**Tom Jones**, ARS Logan Utah  
**Jack Staub**, ARS Logan Utah

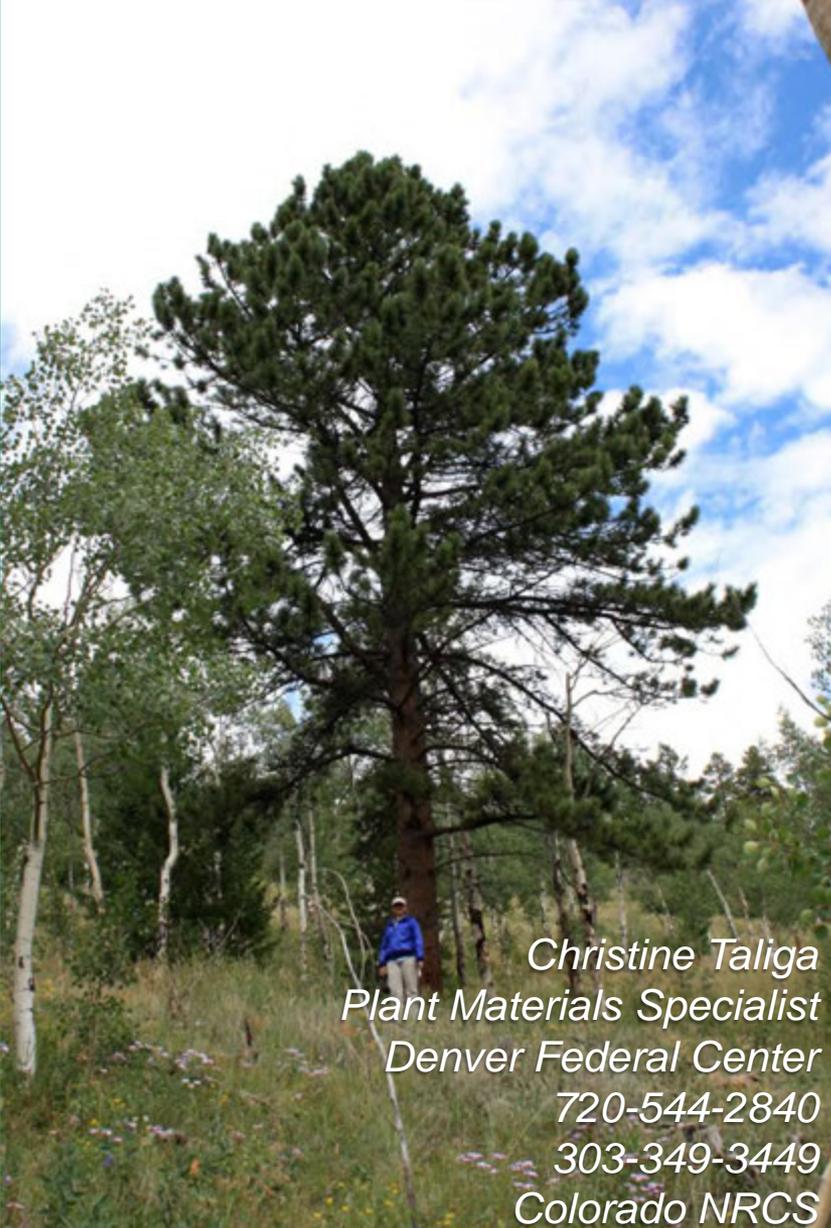
**Jim Spencer**, NRCS Biologist, Roosevelt Utah  
**Terri Sage**, NRCS Biologist, Denver, Colorado  
**Tim Steffens**, NRCS Range Conservationist, Baca County, Colorado  
**Sylvia Hickenlooper**, **Don Graffis**, NRCS Longmont Field Office

**John Fusaro**, NRCS, Fort Collins Field Office  
**Rachel Murph**, NRCS, State Range Conservationist Denver

**Mark Paschke**, Colorado State University  
**Claire De Leo**, Boulder County

**David Anderson**, Colorado Heritage Program  
**Dina Clark**, Denver Botanic Garden

**Ron Hartman and Ernie Nelson**, Rocky Mountain Herbarium



*Christine Taliga*  
*Plant Materials Specialist*  
*Denver Federal Center*  
*720-544-2840*  
*303-349-3449*  
*Colorado NRCS*

# Equal Opportunity

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer."