



OUTLINE

- Restoration or Conservation
- Ecological Communities
- Plant Identification
- Warm season grass (WSG) establishment guidelines

Reclamation and Restoration Professionals indicate --

- **Increasing need for local ecotypes**
- **Superior or unique characteristics are no longer only factors considered**
- **Desire for minimal or no genetic manipulation**
- **Need to insure source and genetic purity for harvested/collected materials**

Reclamation/Critical Area Seedings

- Conducted in areas that have been disturbed by human activity or natural events
- Not in a condition that will permit restoration or natural succession without further harm to the resource base, infrastructure or water bodies
- Allows for soil quality improvement, some wildlife benefit.

Partners in Developing Pre-Variety Germplasm Release and Certification Procedures

Association of Official Seed Certifying Agencies (AOSCA)
U.S. Forest Service
Natural Resources Conservation Service
Agricultural Research Service

Source Identified

- **collected from natural stands, seed production areas, orchards**
- **no selection or testing of parent population**
- **collection site data is specified (i.e. soils, elevation, precip., legal description etc..)**
- **species literature review**
- **documentation usually less than one year (generally not applicable to NRCS PM program)**
- **no limitations on number of generations from natural stands**

Selected

- species literature review
- phenotypically selected plants of untested parentage with selections based on promise or observed superior performance
- documentation, testing and release process may involve several years-i.e. 3 years or less
- collected from natural stands, production areas or orchards
- for field production, generations cannot exceed four and will be indicated as G1, G2, etc.. for generation one, generation two, etc..
- original collection site data (soils, elevation, precip. etc..)

Ecological Communities of New York State

Second Edition
A revised and expanded edition of Carol Reschke's *Ecological Communities of New York State*

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Ecological communities which warm season grasses inhabit

VI. Terrestrial System (27)

A. Open Uplands

- 1) Sand Beach
- 5) Maritime Shrubland
- 8) Hempstead Plains
- 9) Riverside Ice Meadows
- 13) Coble Shore
- 15) Alvar Grassland

Ecological communities which warm season grasses inhabit (Cont.)

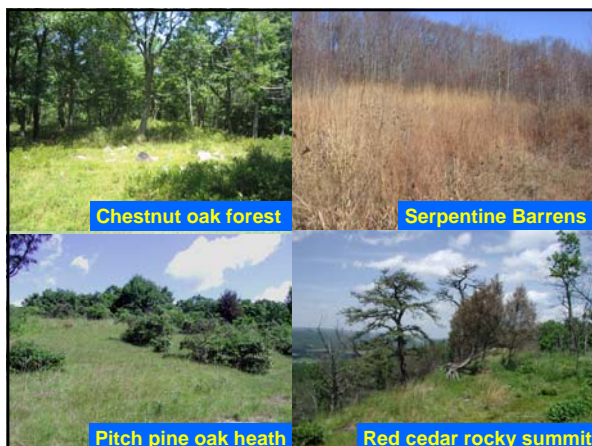
B. Barrens and Woodlands (24)

- 1) Serpentine barrens
- 5) Pitch Pine Scrub Oak Barrens
- 6) Pitch Pine-Oak-Heath Woodland
- 7) Post Oak-Blackjack Oak Barrens
- 11) Oak openings
- 19) Pitch Pine-Oak-Heath Rocky Summit
- 22) Red Cedar-Rocky Summit

C. Forested Uplands (13)

- 4) Maritime Red Cedar Forest

II B. Estuarine intertidal (4 of 14)





Conservation Uses of Warm Season Grasses (Ecosystem Function)



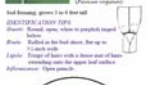

- Carbon sequestration and soil quality
- Long term erosion control on retired crop land
- Wildlife habitat
- Mined land/ critical area stabilization
- Biofeedstock production
- Grazing
- Water quality
- Invasive plant control?





ESTABLISHING NATIVE WARM-SEASON GRASSES FOR CONSERVATION

Some warm season grasses and their identifying features

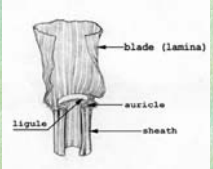
Native Warm Season Grasses

 <p>LITTLE BLUESTEM (Sporobolus vaginifolius)</p> <p>Stems 2 to 3 feet tall Inflorescence (panicle) Sheath: Flattened, open, often purple Ligule: Broad, membranous Peduncles: Short, hairy and bent</p>	 <p>PAVICUM CAPILLARE (Panicum capillare)</p> <p>Stems 2 to 3 feet tall Inflorescence (panicle) Sheath: Flattened, open, often purple Ligule: Broad, membranous Peduncles: Short, hairy and bent</p>
 <p>PAVICUM POLYANTHEMUM (Panicum polyanthemum)</p> <p>Stems 2 to 3 feet tall Inflorescence (panicle) Sheath: Flattened, open, often purple Ligule: Broad, membranous Peduncles: Short, hairy and bent</p>	 <p>PAVICUM CAPILLARE (Panicum capillare)</p> <p>Stems 2 to 3 feet tall Inflorescence (panicle) Sheath: Flattened, open, often purple Ligule: Broad, membranous Peduncles: Short, hairy and bent</p>

Guide to Identification Tips



Guide to Identification Tips



SWITCHGRASS
(*Panicum virgatum*)

Sod forming, grows 3 to 6 feet tall

IDENTIFICATION TIPS:
Sheath: Round, open, white to purplish tinged below.
Blade: Rolled in the bud shoot, flat up to 1/2-inch wide.
Ligule: Fringe of hairs with a dense mat of hairs extending onto the upper leaf surface.
Inflorescence: Open panicle.

BIG BLUESTEM
(*Andropogon gerardii*)

Bunch grass with short rhizomes
Grows 6 to 9 feet tall

IDENTIFICATION TIPS:
Sheath: Round to somewhat flattened, open purplish at the base, usually hairy.
Blade: Rolled in the basal shoot, silky hairs widely dispersed on the upper leaf surface.
Ligule: Small membranous.
Inflorescence: Turkey foot shaped seed head.

A Successful Seeding requires Proper:

- Site selection
- Seed Quality
- Weed Control and Seed Bed Preparation
- Timing of Seeding
- Seed Placement
- Weed Control and maintenance

Site selection

- Soils – moderately well drained or better, some ecotypes tolerate wetter conditions
- Slope – avoid steep slopes (erosion)
- Aspect – avoid North slopes at higher elevations

Seed quality

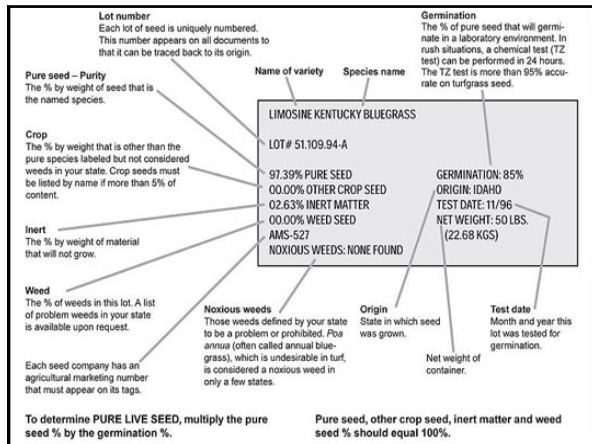
- *PLS* – Pure live seed = % live seed X % purity
- Live seed = germinable + dormant seed
- Dormancy – Need to avoid seed lots with high dormancy rate
- Weed seed – use certified seed to reduce weed seed
- Size and texture – Switchgrass flows through conventional seeding equipment easier than most other warm season grasses

Labeling, Protection, and Marketing of Certified Seed

Pre-Variety Release



- Identified on tag by species name
- Optional identification (number or descriptive designation) not to be construed as variety name
- Tags for Natural germplasms must list geographic location of seed collection site or field production site
- Not eligible for protection under the Plant Variety Protection Act
- Only seed meeting certification requirements and properly tagged may be represented as certified seed



Seeding Weights and Texture

	Approx. Seeds/lb	Seed shape	10 lbs pls seeds/ft ²
■ Prairie cordgrass ¹	106,000	smooth	24 seeds/ft ²
■ Switchgrass	259,000	smooth	59
■ Eastern gamagrass	7,000	smooth	1.6
■ Deertongue	350,000	smooth	80
■ Va. Wildrye ²	75,000	chaffy	17
■ Sideoats grama	191,000	chaffy	44
■ Indiangrass	175,000	chaffy	40
■ Big bluestem	145,000	chaffy	33
■ Ca. wildrye ²	114,000	chaffy	26
■ Little bluestem	240,000	chaffy	55

- difficult to establish from seed
- Native cool season grasses



- ### Seed Mix Development
- Pure Live Seed (PLS)=live seed X Purity /100
 - Should have at least 40% non-dormant germinable seed
 - Total of 10-15 PLS #/ac. = ~ 30-50 seeds/sq. ft.
 - Good establishment is 6-8 seedlings/sq. ft.
 - 1 mature warm-season grass plant may occupy 1-2 sq. ft. when mature.
 - Select species mix based on site and soil conditions.
 - Individually packaged seed allows for optimal seeding

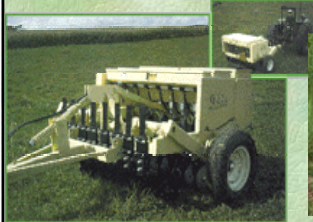
- ### Weed Control Prior to Planting
- Herbicides:**
- Follow cropland with history of good weed control or use smother crops
 - Roundup + 2,4-D or Banvel in fall before to help decompose sod if no-till seeding, should mow once summer before and then spray, respray in spring if necessary.
 - Round up + 2,4-D or Banvel in fall or spring for conventionally tilled fields
 - Stale seed bed, prepare field early allow weeds to emerge spray with additional low rate (1 pint/ac) of roundup.

- ### Weed control Post Planting
- Mowing – if annual grass is a problem no registered herbicides available, mow 2X when weeds are overtopping WSG.
 - Use 2,4-D or other registered broadleaf herbicides as per label after WSG have reached 5 lf stage.
 - Mowing early second year may be necessary.
 - Following year spray Roundup in early spring when WSG is dormant to control cool season grass
 - Burning – has been reported to be better at controlling woody vegetation, other benefits. Also liability and regs.

Seeding Native Grasses



- Native grass drill
- Truax, Tye, Grasslander



Timing of seeding

Fine Textured Soils/Heavily Weed Infested Sites

Late spring seeding (June 15th limit) may be best for heavily weed infested sites to allow for adequate weed control well ahead and just prior to seeding.

- **Well Drained soils**
Seed early spring when moisture is available.
- **Avoid September**
Seeds germinate but will not grow enough to survive winter.
- **Dormant Seeding**
 - Naturally stratifies seed, but can be difficult to seed into
 - soil that is not to wet or not frozen. May allow for weeds to
 - germinate in large numbers and prior to desired species.



Equipment choices based on site conditions

Seeding

- *Machinery – need native grass drill for best results for diverse seed mixes. Can use pendulum spreader may have issues with uniform distribution.*
- *Seeding date – Early corn planting time to June 7th. No dormant seeding*
- *Seed depth – ¼ - ½ inch*
- *Seed rate – 8-12 lb/ac pls*
- *Spacing – 8 Inch, broadcast*
- *Nurse crop – No, or maybe 15-20 lbs/ac oats*
- *Legumes - No*

Seeding Method

- **No-till**
- Primes the least amount of weed seed /erosion control
- Seeding Depth: 0.25 to 0.5 inches for most seeds
- Combine seeds by size and shape
 - Large seeds such as gamagrass are placed in grain box
 - Small, smooth seeds are placed in legume box.
 - Fluffy seeds are placed in fluffy box.
 - Very Fine seed should be surface broadcast
- Bulk up the volume of seed using rice hulls, kitty litter, sawdust, or other inert material for easier and more accurate drilling or broadcasting

Seeding Method

- **Broadcasting**
 - Requires open and loosened soil and special attention to achieving good seed-to-soil contact. Firm soil before and after seeding.
 - Tilling will encourage more weed germination than no-till
- **Hydro-seeding**
 - Requires 50 to 100% more seed
 - Tracking is recommended for warm-season grasses to produce good seed-to-soil contact.
 - Mulch application should be applied after seed application. Seeds will not have good seed to soil contact if applied with mulch

Companion (Nurse) Crop

- Use when erosion control is an issue
- Companion crop options:
 - an annual such as oats or barley (20 lbs./ac.)
 - Canada and/or Virginia wildrye at 5-10 lbs./ac.
 - a fine fescue (hard, chewings, sheeps) at 5 lbs./ac.
 - No introduced legumes

Establishment of Warm Season Grasses (Summary)

- Follow a row crop with good weed control or control sod or excessive perennial weeds previous fall
- Roundup to kill old sod and perennial weeds fall before
- Band or broadcast with 0-20-20 fertilizer according to soil test, pH to 6.0, No nitrogen
- Firm seed bed before and after planting
- Process seed or use appropriate planter
- Use certified seed 8 - 10 lbs/ac PLS when drilled or 10 -12 lbs when broadcasting



Weed Control/Management

- **Chemical Control**
- **Burning** in late winter/early spring (green up) releases nutrients and kills some weed seeds.
- **Mowing** to a height just above seedlings 2-3 times in establishment year. Do not mow growing grasses below 6-8 inches.
- **Mowing** after establishment if having problems with quackgrass and other cool season grasses mow in Mid to late July at 8-10 inches this will favor the WSG. Periodic removal of residue is helpful.
- **Herbicide** a dormant spraying of RU can kill cool season weeds and some desirable forbs when the WSG is dormant (no green-up)

Weed Control in Established Mixed Plantings

- Use selective herbicides when possible
- Very targeted application: spot spray, wick applicator, cut stump or basal bark treatment, to protect forbs.
- Reseed large bare areas to prevent reestablishment of weeds.



Mowing, Burning, Haying or Grazing

- **Timing of Treatment**
 - Late-spring promotes warm-season grasses
 - Early spring maximizes wildflowers but also weeds and woody vegetation
 - Do not treat between April 15 to August 15 to avoid nesting season.
 - **Burning can be the most effective against weeds, but requires considerable planning and personnel. Follow all laws and regulations**
 - Removing residue with a biomass harvest after August 15th may be beneficial

Warm-Season Grass Safety

- Do not plant large masses of warm-season grasses near buildings. If necessary mow dormant biomass to reduce fire hazard
- Incorporate fire breaks into large plantings
 - Cool-season turf
 - Bodies of Water
 - Pavement



Disking or Harrowing for Wildlife

- Performed on older dense stands of mature warm-season grasses
- Reduces density of stand and creates openings, incorporates residue.
 - Increases wildlife value
 - Increases plant species diversity
- Some experience has shown revitalization of stand while mixing residue.

Get to Know Your Enemies

- Identify the greatest threats to the long term sustainability of the planting
 - Often perennial or woody species with abundant seed production and/or with a vegetative ability to spread aggressively
 - Concentrate on controlling these invasive plants before they become a much larger problem