



native warm season grass for restoration



Ramona Garner, Ph.D.
plant materials specialist



a species that occurs naturally in a particular habitat, ecosystem, or region of the United States and its Territories or Possessions, without direct or indirect human actions.

Federal Native Plant Conservation Committee

with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

Executive Order 13112 National Invasive Species Council

a native species is one that occurs naturally with respect to a particular ecosystem, rather than as a result of an accidental or deliberate introduction into that ecosystem by humans.

USLegal.com

uses

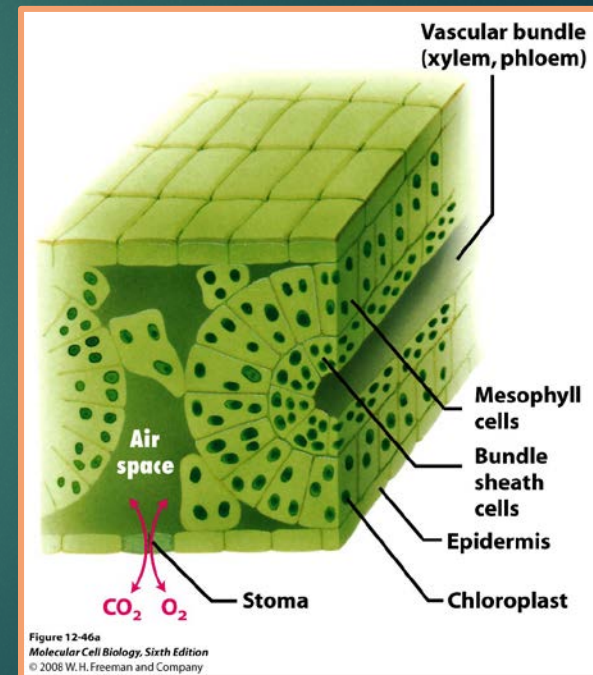
- forage
- biofuel
- soil and water conservation
 - buffer strips, filter strips, windbreaks, vegetative barriers
- wildlife habitat
- re-establish grasslands

warm season grass

characterized by the C_4 photosynthetic pathway

an adaptation to:

- high light intensities
- high temperatures
- suppress photorespiration



kranz leaf anatomy

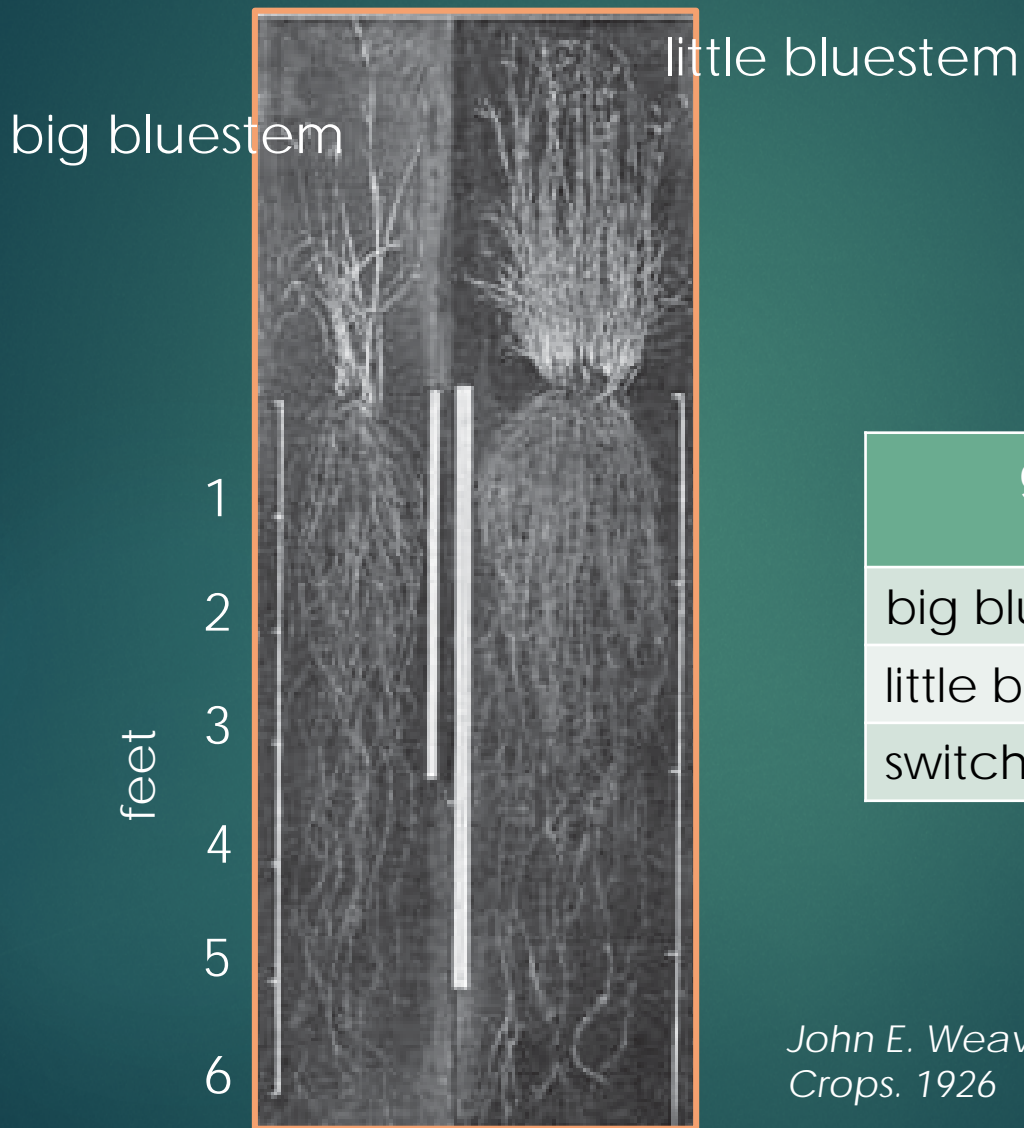
- most growth in spring and fall
- water/nutrient needs moderate to high
- utilize 15 to 30 % of sunlight
- rapid establishment

cool season

warm season

- most growth in midsummer
- efficient water & nutrient usage
- utilize 80% of sunlight
- slow establishment





grass	root depth
big bluestem	>9
little bluestem	5.5
switchgrass	9

John E. Weaver. Root Development of Field Crops. 1926

water use efficiency (WUE)

a unit of dry matter produced with one-third to one-half as much water as a C_3 grass

this does not mean drought tolerance, but that they use available water more efficiently



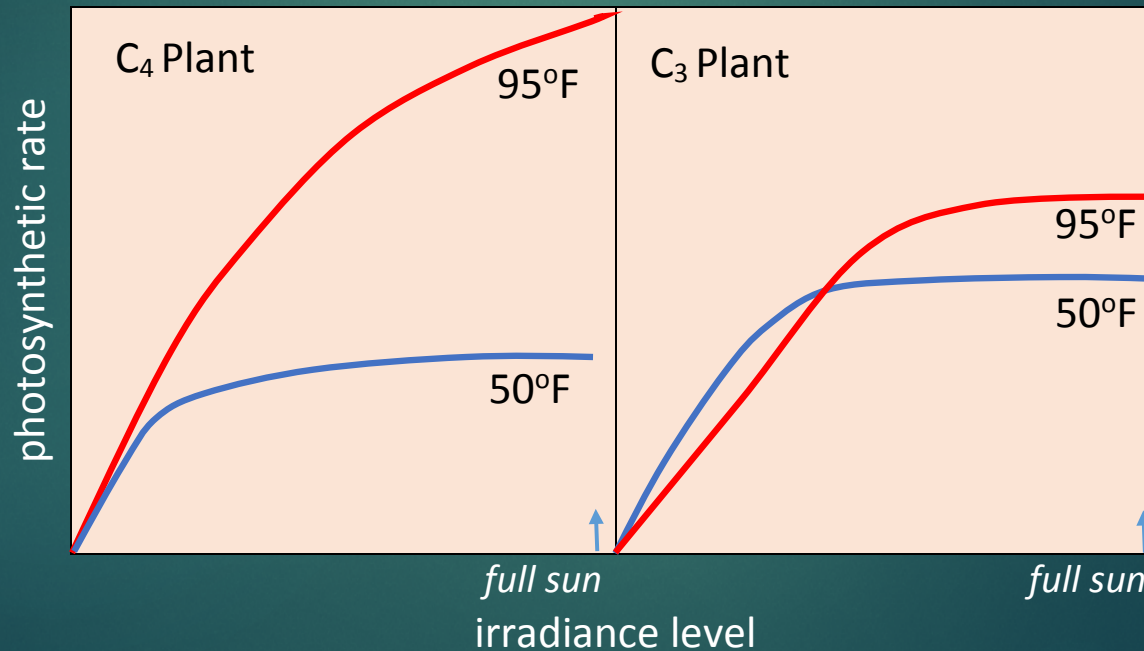
nitrogen use efficiency (NUE)

similar rates of leaf photosynthesis can occur with one-half or less nitrogen as compared to C_3 plants

high NUE does not mean they do not respond to N fertilizer, where water is adequate warm season grasses respond well to nitrogen

use of light

photosynthetic rates per leaf are still rising at full sunlight in C_4 plants, where in C_3 rates peak at one-third full sun or less





chaffy/fluffy seed

many C_4 grasses have seed with various appendages related to dispersal that give them a fluffy appearance

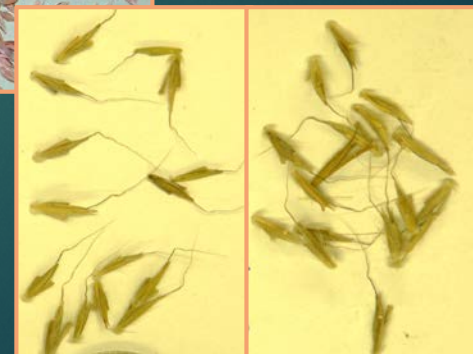
- awns and hairs on seed intermesh causing the seed to clump and not flow well when seeding
- fluff can be removed during seed conditioning, but often reduces seed viability and because it is time consuming and requires specialized equipment seed cost rises.



splitbeard
bluestem



broomsedge

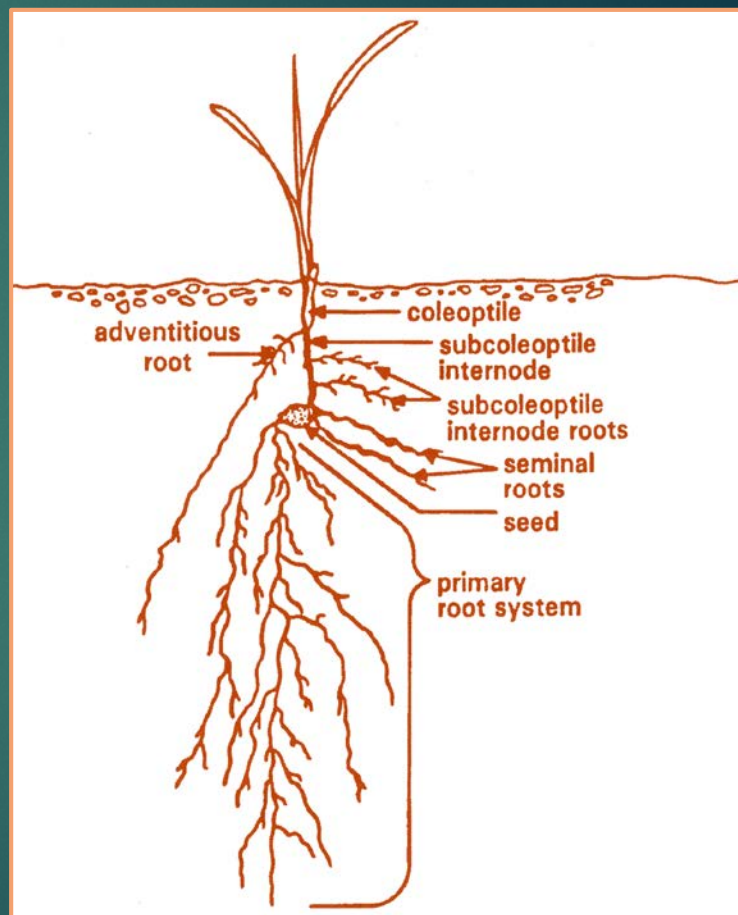


slow to establish?

grass seedlings are established when they have adventitious roots and leaf area to provide enough water and nutrients to sustain growth

in the first year of growth energy is used to develop strong root systems, only reaching 66% or less of potential aboveground biomass

aboveground biomass potential may not be reached until second or third year.







questions to ask



what are your
management objectives?

what are your management objectives?

- conserving soil and water resources
- improving forage availability and quality
- enhancing wildlife habitat
- etc.



what is your desired plant
community?

what is your desired plant community?

design a plant community that meets
your management objectives





Practice Standard	stem diameter	stems/sq. ft	plant height	crop yield next to barrier	herbicide tolerance	tolerant to sediment deposition	dry matter yield	% nutrient content	canopy cover	ground cover	ease of termination	% air porosity	shade tolerance	flood tolerance
Vegetative Barriers - 601	x	x	x	x	x	x			x					
Filter Strips - 393	x	x	x		x	x							x	
Field Border - 386	x	x	x	x	x		x		x				x	
Cross Wind Trap Strips - 589C	x	x	x	x	x	x						x		



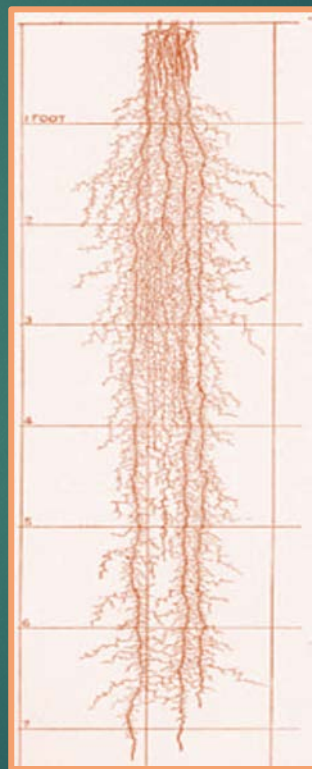
what is your planting site
like?

what is your planting site like?

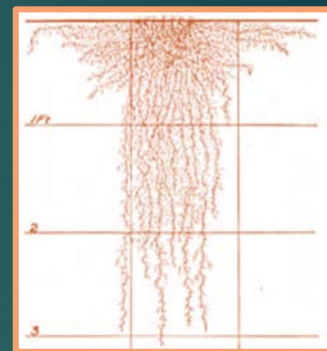
- topography
- soils
- compaction
- hydrology

what is your planting site like?

1. is soil depth sufficient for root development and water and nutrient storage?



switchgrass



blue grama

what is your planting site like?

2. will there be enough moisture to support the species planted?



what is your planting site like?

3. what is the slope and orientation?





preparing the seedbed

getting seed to a place that is suitable for germination is more important for establishment than the total number of seed



ideal seedbed

- firm below the planting depth
 - allows movement of water by capillary action
 - provides for consistent planting depth
 - enables good seed to soil contact
 - supports plant roots

ideal seedbed

- fine and friable above the planting depth
- not cloddy
- reduced competition from weeds and other unwanted vegetation
- controlled weed seed

no-till seeding

- need proper equipment
- need to suppress existing vegetation by use of appropriate herbicides or partial disturbance





planting techniques

drill seeding

- Provides the best seed to soil contact and the most uniform distribution on seed
- Need the right equipment for the type of seed you are planting
- Can be done with conventional tillage or no-till
- drills are available that have different types of seed boxes for different types of seed.
- Fluffy seed can be planted using a fluffy seed box that has an agitator to prevent seed from bridging and picker wheels to push fluffy seed that will not flow into the drop tubes

broadcast seeding

fast and may be cheaper

but,

- no control of seeding depth
- no control of spacing
- increased predation
- Increased seed and seedling desiccation
- reduced stand density

broadcast seeding

- need to plant at least twice as much seed
- works best in loose soils where settling may cover seed
- seed following a mechanical treatment that disturbs the soil
- success is increased by packing seed after broadcasting
- With some types of seed like fluffy or small seed you will need a carrier such as rice hulls or cat litter for even distribution

hay mulch seeding

- grasses are hayed before seed completely shatters and the hay is spread on seedbed
- works well on sites that are denuded of vegetation and with grasses that have seed that is difficult to clean.



plant selection

- species that are adapted to the site and the intended management
- species that are compatible

seed quality

purchase the best quality seed available

Always purchase seed with a seed tag

Americus Indiangrass
Lot # GAPMC2010-F23

83.29% PURE SEED

00.00% OTHER CROP SEED

16.71% INERT MATTER

00.00% WEED SEED

NOXIOUS WEED SEED: NONE FOUND

GERMINATION: 73%

ORIGIN: GEORGIA

TEST DATE: 11/10

NET WEIGHT: 10 LBS

-1.7 lbs

-2.2 lbs

$$PLS = .83 \times .73 = .60 \text{ or } 60\%$$



seeding rates

- dependent on species
- increase seed rates for seedbed that is less than ideal
- increase seed rates for broadcast seeding
- seed to achieve 10 established plants per m²

weeds

Try to control to reduce competition. Weeds need to be removed either mechanically or chemically before planting and during establishment



common warm season grasses (east)

big bluestem

Andropogon gerardii

found on a wide variety of soils

Uses: erosion control, forage, wildlife habitat, ornamental

Rountree (Iowa)

Niagara (New York)

Kaw (Kansas)

Hampton (Arkansas)



Indiangrass

Sorghastrum nutans

found on a wide variety of soils

uses: restoration, erosion control, forage, wildlife habitat, ornamental

Newberry (South Carolina)

Osage (Kansas & Oklahoma)

Americus (Georgia)

Rumsey (Illinois)



little bluestem

Andropogon gerardii

found on a wide variety of soils, typically occurring on dry upland sites

Uses: erosion control, forage, wildlife habitat, ornamental

Aldous (Iowa)

Cimarron (Kansas & Oklahoma)

switchgrass

Panicum virgatum

found on a wide variety of soils, moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam soils are best.

Uses: erosion control, forage, wildlife habitat, ornamental

Kanlow (Oklahoma)

Timber (North Carolina)

High Tide (Maryland)

Shelter (West Virginia)

Alamo (Texas)

Cave-in-Rock (Illinois)

coastal panicgrass (*Panicum amarum*)

Eastern gamagrass (*Tripsacum dactyloides*)

broomsedge (*Andropogon virginicus*)

purpletop (*Tridens flavus*)

deertongue (*Dichanthelium clandestinum*)

bushy bluestem (*Andropogon glomeratus*)

splitbeard bluestem (*Andropogon ternarius*)

Thank You

Ramona.Garner@gnb.usda.gov

