Eastern Forage Agronomy

John Andrae
Forage Specialist
Clemson University
Clemson,SC

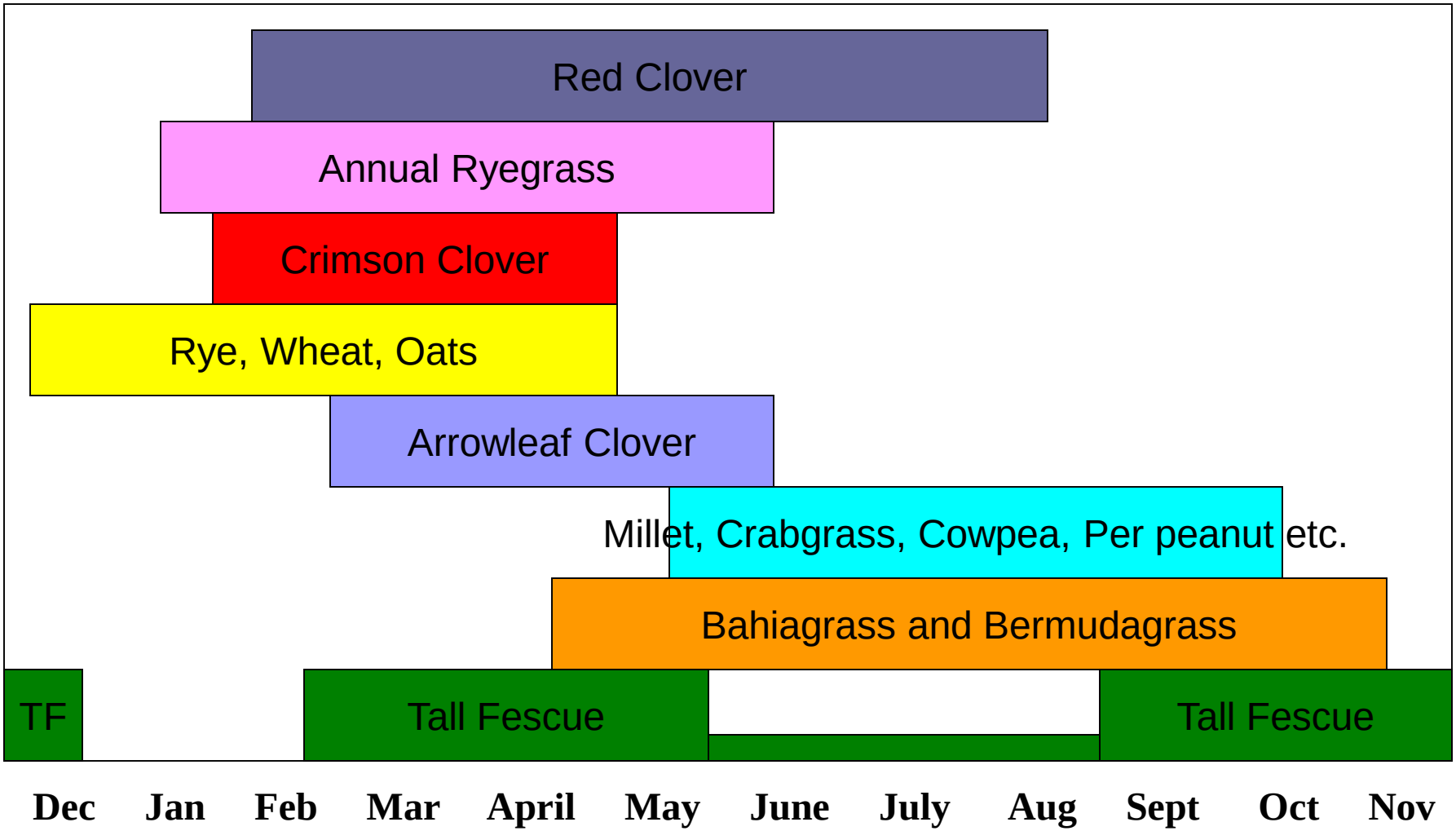
Points to Consider

- How will the forage be used?
  - Pasture
    - Type of livestock ?
  - Hayfield
    - For sale or feed to own livestock?
- What is the soil type?
- What is the availability of moisture?
- What is my management style?
  - High input, fertilize etc.
  - Low input, “take what comes”
- Acreage to establish
- When do I need the grass?

Which of the following is the most important thing to consider when establishing a forage crop?

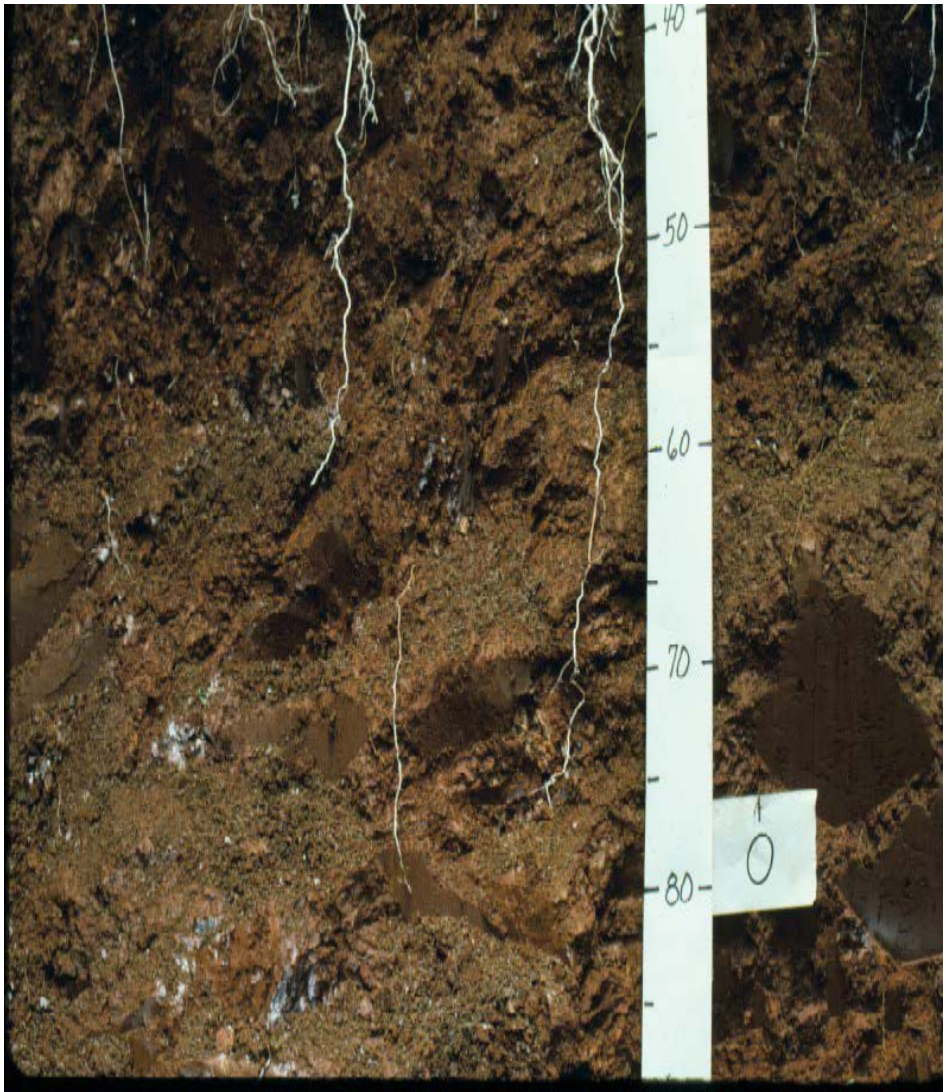
A. Forage Quality
B. Yield
C. Persistence/Dependability
D. Production Distribution
E. Establishment Costs

Consider Yield, Dependability, and Distribution



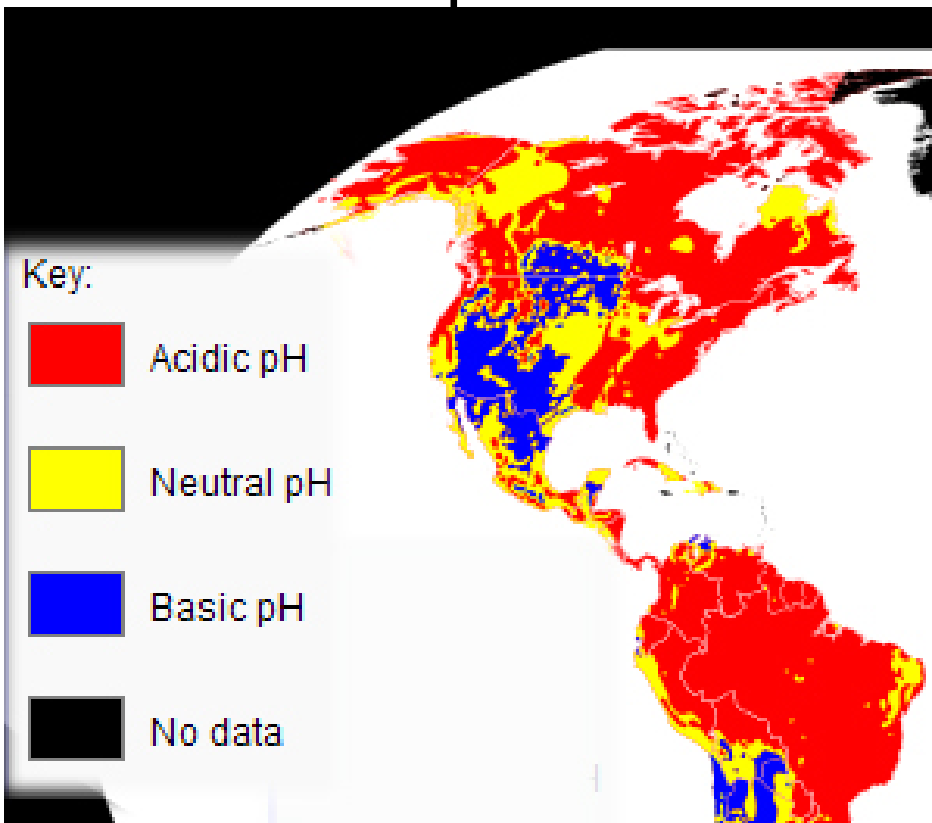
Don’t underestimate soil type, fertility and drainage

- Soils provide nutrients, rooting substrate and water reservoir
- Persistence and Production Impacted By:
  - Water availability
  - pH
  - Fertility
  - And more…



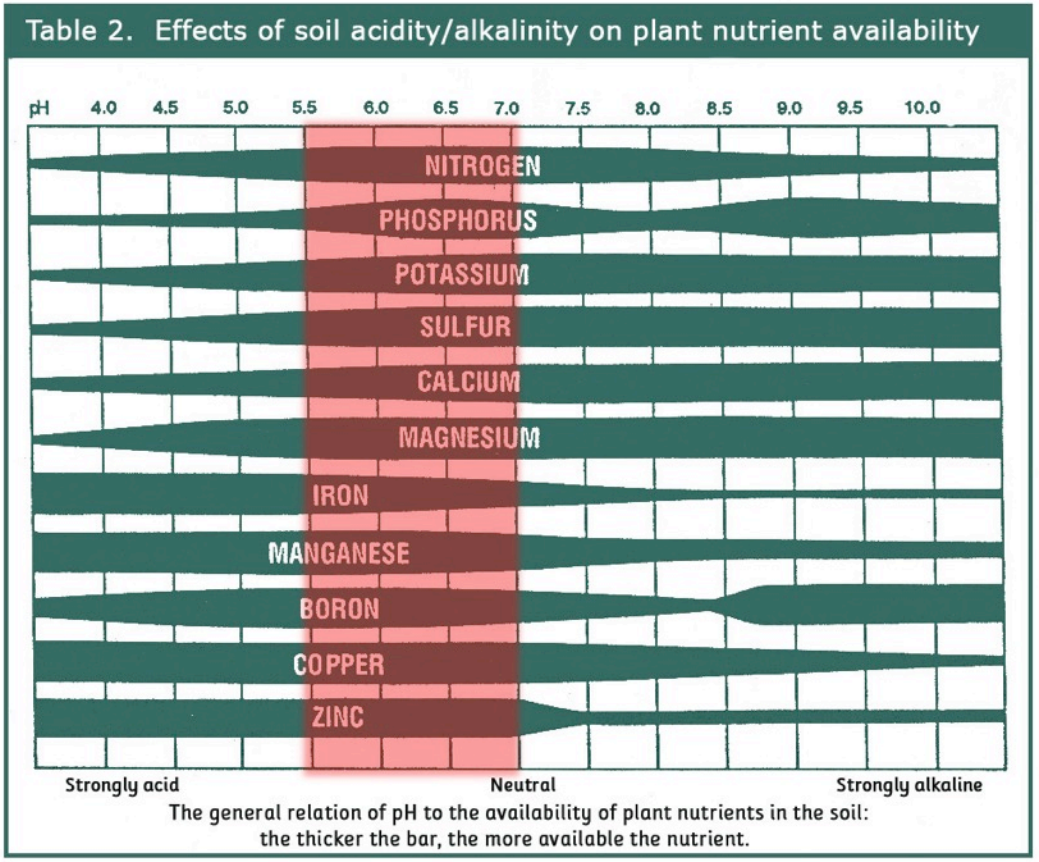
Soil pH

- Most soils in the East naturally acidic
  - In forested areas pH 3.8 to 5.5
  - Most crops need pH of 6.0 to 6.5 for optimum yields



Low soil pH (below 5.5)

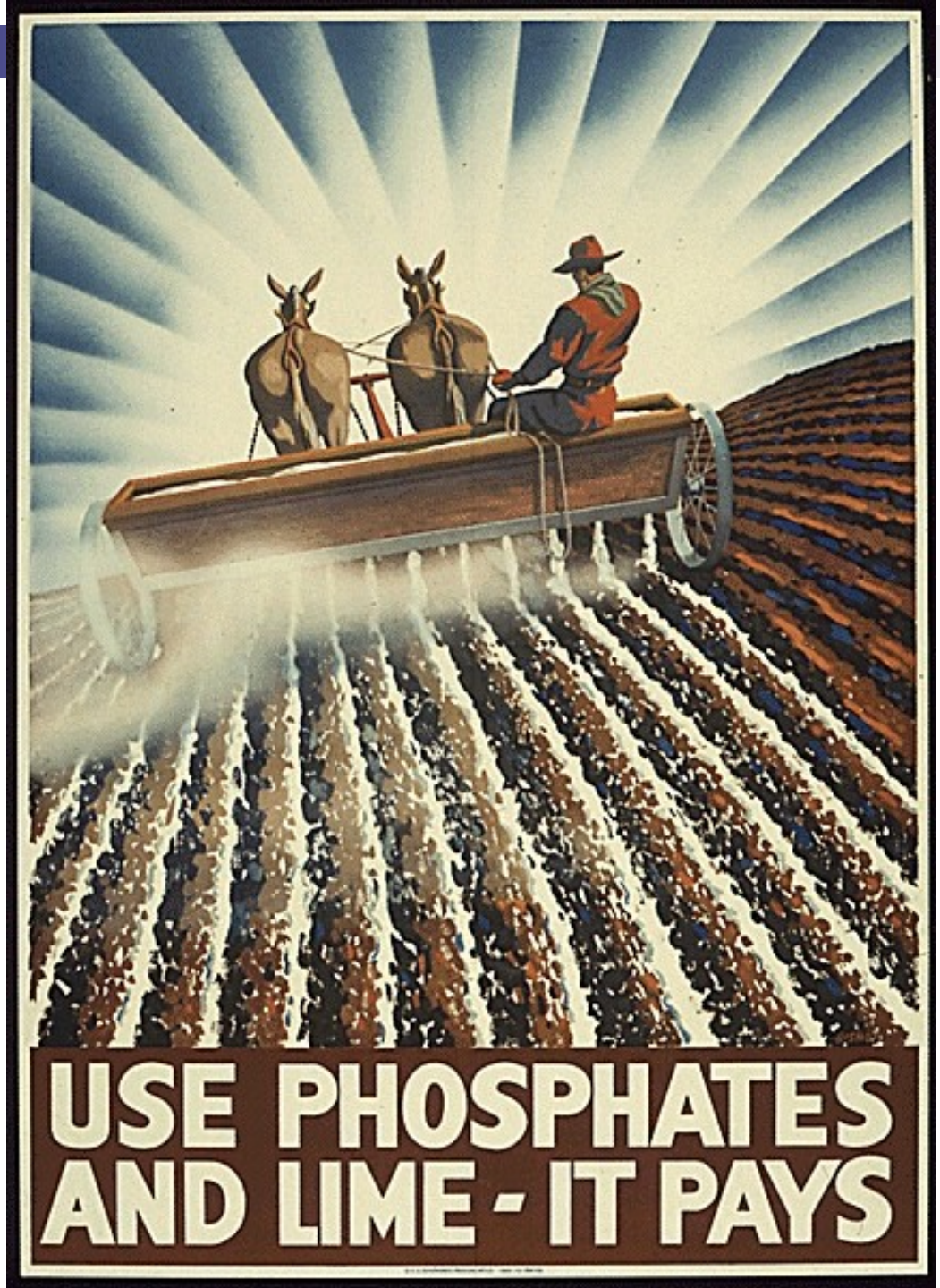
- Reduced nutrient availability
  - Phosphorus***
  - Nitrogen
  - Potassium
- Poor legume growth
  - Decreased activity of N fixing bacteria
  - Reduced P availability



S. Forages Chp 9

Characteristics of Low Fertility Soils

- Reduced yield
- Reduced nutrient availability
- Unreliable establishment and persistence of desirable species
- Reduced forage quality
- Increased dependence on fertilizer N (legume persistence)


USE PHOSPHATES
AND LIME - IT PAYS

Forage Options for Upper South and Mid-Atlantic

- Backbone:
  - Tall Fescue with or without a clover
  - Orchardgrass with or without clover
- Supplements:
  - Warm Season Perennial Grasses
    - Bahiagrass
    - Bermudagrass
    - Natives?
  - Cool Season Annual Grasses and Clovers
    - Cereals, annual ryegrass, crimson, arrowleaf, ball clover, vetch
  - Warm Season Annuals
    - Millets
    - Sorghum-sudan
    - Crabgrass

Forage Options for Lower South and Coastal Plain

- Backbone:
  - Warm Season Perennial Grasses
    - Bahiagrass
    - Bermudagrass
    - Dallisgrass
    - Natives?
- Supplements:
  - Cool Season Grasses
    - Tall fescue (perennial?)
    - Cereals and annual ryegrass
  - Warm Season Annuals
    - Millets
    - Sorghum-sudan
    - Crabgrass

Cool Season Perennial Grasses

- Tall fescue is most persistent and productive CSP species for region
- Orchardgrass can work well- particularly as hay
- Timothy, KY bluegrass, perennial ryegrass, reed canarygrass

Tall fescue overview

Tall fescue is an excellent fall forage to compliment bermudagrass

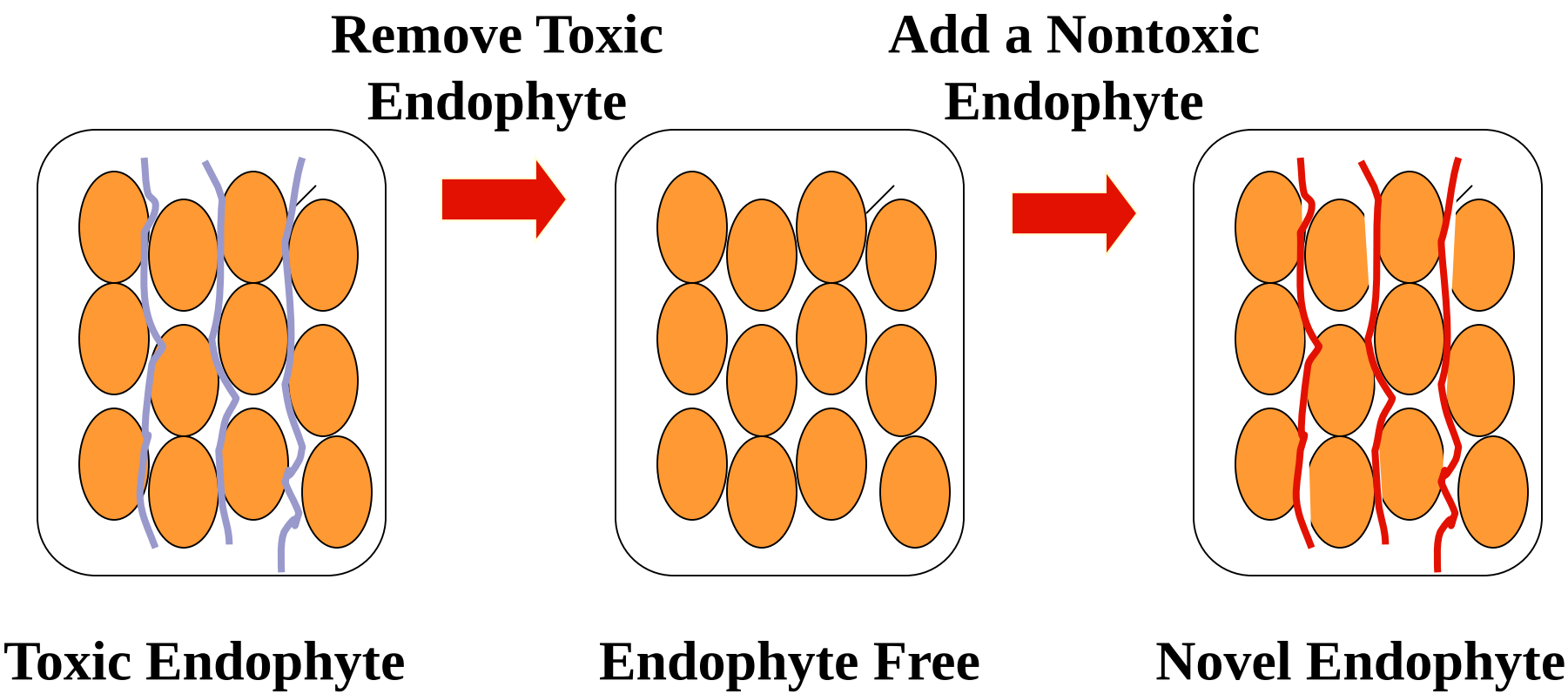
- Fall forage production exceeds small grains
- No annual establishment costs
- Excellent weathering

- MUST be established on heavier soils
- Should defer grazing in summer where possible
- Must be endophyte-infected to persist
- **Pure stands or mixtures?**

Toxic tall fescue overseeded into common bermudagrass
Farmington, GA

Photo: Dr. Joe Bouton

Novel Endophytes Take the Best from both E+ and E-



Craig Roberts, University of Missouri

Stocker Steer Gain Response to MaxQ

	E+	Nontoxic E+	Improvement
Spring			
ADG, lbs	0.68	1.72	+153%
Gain/acre, lbs	102	249	+144%
Autumn			
ADG, lbs	1.23	1.78	+45%
Gain/acre, lbs	113	160	+42%

Adapted from Parish et al., 2003
3 yrs data from Calhoun and Eatonton GA

Stocker steers on MaxQ
Phil Hamm, Monroe Co., GA
Many new combinations available

A wide range of productive, improved legumes are adapted to the region

Alfalfa “The Queen of Forages”

- High pH and fertility requirements for establishment and persistence
- Needs well drained soils
- Requires excellent management
- Extremely drought tolerant!
- Good summer quality and quantity
- Grazing tolerant, RR, RL varieties are available.
- More advances on horizon

Forage finished trial
2.7 lbs/d; higher gain/acre than all other forages including pearl millet

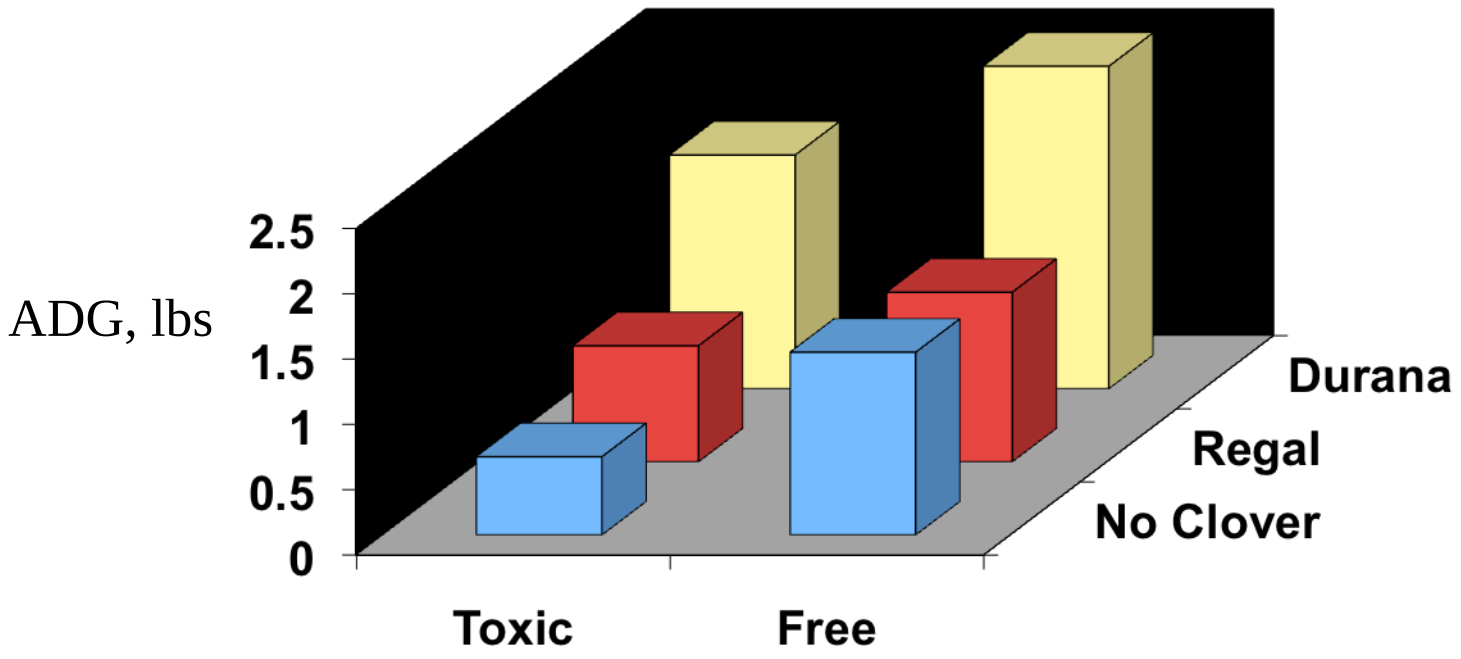
What can/should be added to tall fescue and/or orchardgrass?

- Perennial clovers:
  - Lengthen grazing season
  - Increase overall forage production
  - Eliminate nitrogen requirements

White clover vs Red Clover

  - More grazing tolerant
  - Longer lived
  - Tolerates wet soils

Feeding Rocket Fuel: Removing Toxins and Increasing Quality in Tall Fescue Pastures

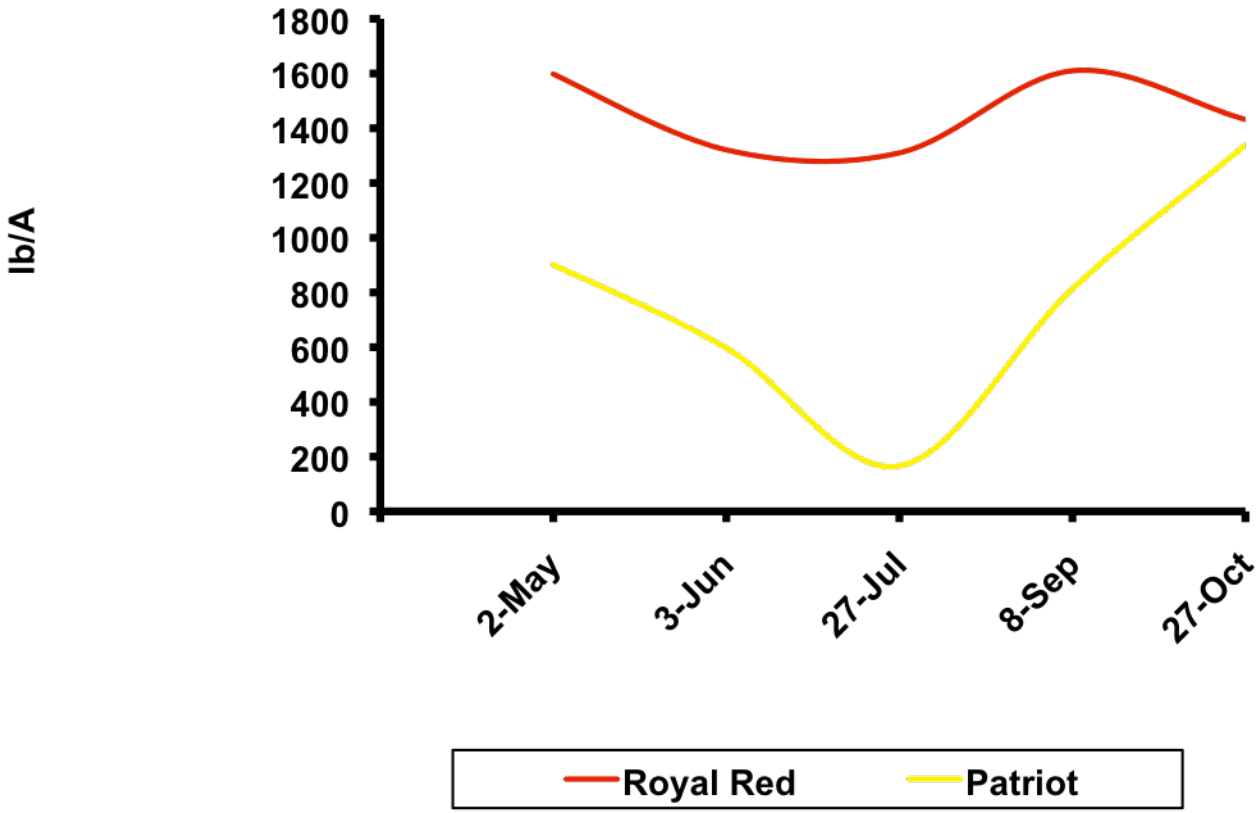


Hoveland et al., 2003

Don’t forget red clover!

- **Produces far more summer forage than white clover**
- Less bloat risk than alfalfa or white clover
- Better seedling vigor than alfalfa or white clover
- Susceptible to disease (1-2 yr life)
- Should be rotationally stocked
- Needs good drainage

White vs Red Clover- Summer Production



Athens Ga

Birdsfoot trefoil

Perennial Peanut

- Pros: High quality, nonbloating, productive as alfalfa in summer, persistent in subtropical environments, beautiful hay
- Cons: vegetative propagation, SLOW to establish, must capture value due to expense

Questions - Cool Season Perennials?

Warm Season Perennials Mid-Lower South

- CSPG aren't universally adapted to Eastern US
- Persistence and production are concerns
- WSPG are well suited
- Drought tolerant and most are grazing and treading tolerant
- Bahiagrass,Bermudagrass

Hybrid Bermudagrass

Must be established from sprigs
Can be slow
Expensive
Requires attention to N and K
Hard to establish small acreages

Benefits:
Higher yields
Good quality
Excellent for hay production

Hybrids:
Coastal, Russell, Tifton 85,
Jiggs, Florakirk,
Alicia, Tifton 44 etc.

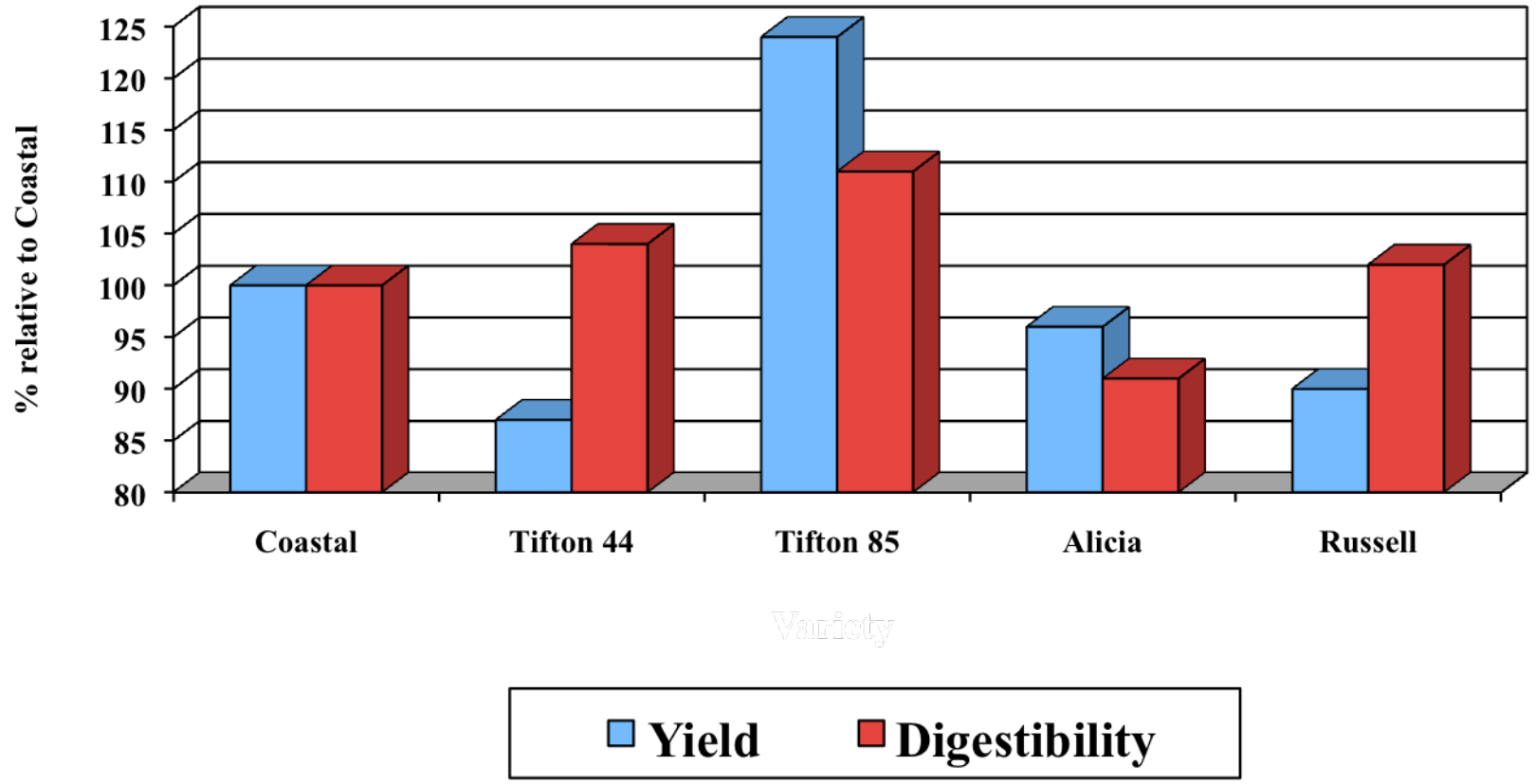
Typically sprigged in 3 or 4 ft rows
30 lbs N at emergence
~50 lbs at lapping

Expensive to establish

Bermudagrass Variety Selection

1. Persistence
2. Establishment method
3. Disease resistance
4. Yield and Quality

Yield and Digestibility of Bermudagrass Hybrids



Seeded bermudagrass are available…

- Often the only option- infrastructure etc.
- Particularly appropriate for rented land, steep land, small acreages
- Not as productive as hybrids
  - How do yields compare at marginal fertility levels?
- Use caution on sandy soils

Bahiagrass

- Tolerant of low fertility, low pH and wet soils
- Seed established
- vs. Hybrid BMG:
  - Slower to establish
  - Lower producing
  - Denser sod
  - Longer grazing season

What about native species?

- Native species beyond the scope of presentation.
- Slow to establish, but with good grazing management can fit well into many operations.
- Region, soil productivity and management determine fit

ANNUAL FORAGE CHOICES

Summer Annual Forages

Pearl Millet, Sorghum/Sudan, Sudangrass, Forage Sorghum, Crabgrass, Teff, Browntop Millet

Typically used to meet special needs:

Rapid growing, high quality forage

Can be used in pasture renovation cycle

Stored forage

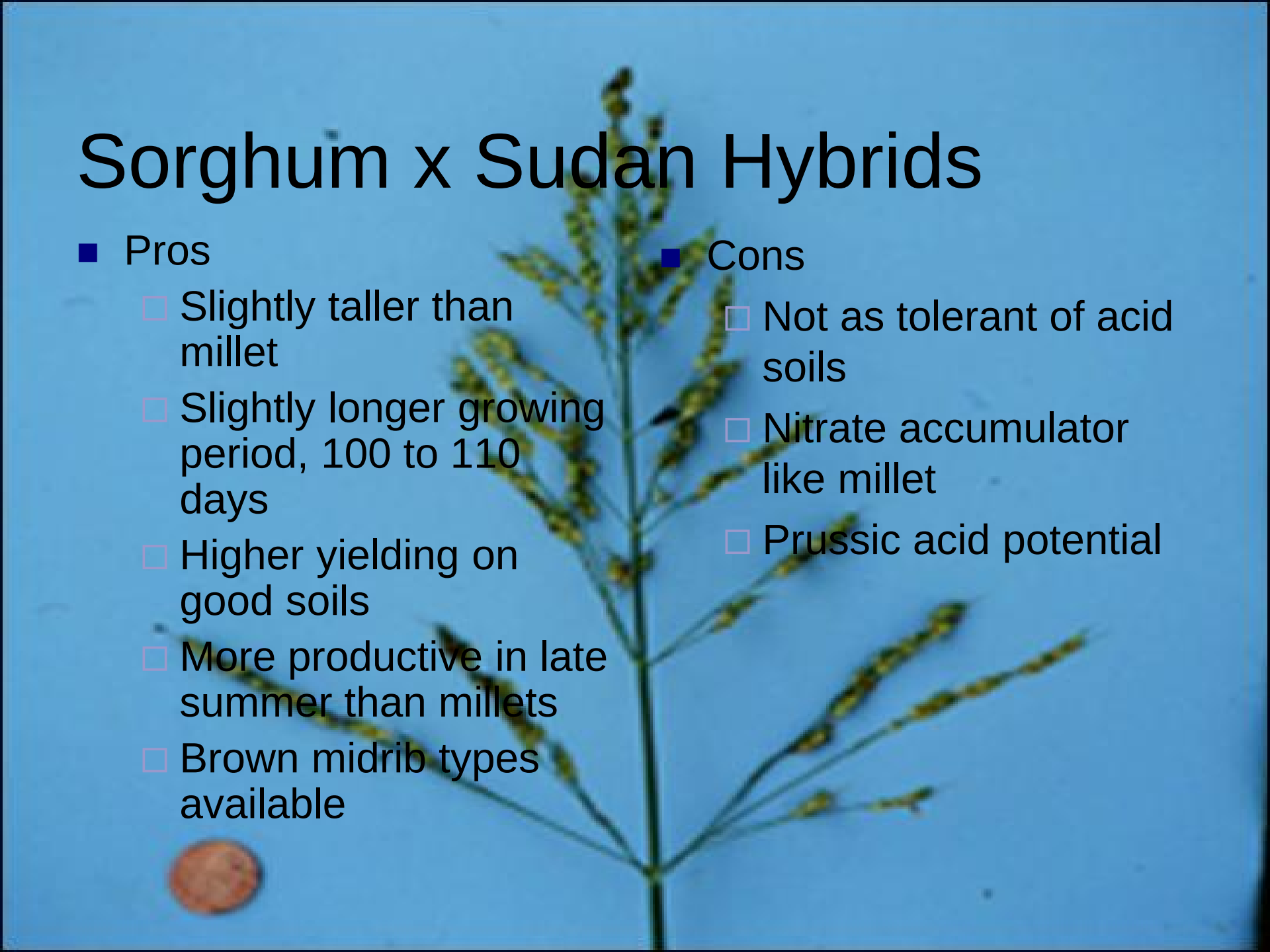
Most effectively grazed by stockers, first-calf heifers, dairy

Pearl Millet

- Likes well-drained sandy soils, pH of 5.8 or better
- Tolerates acid soils better than sorghum-sudan
- BMR types now available
- Heavy N user
  - 45 to 60 lbs at planting and then 45 to 60 lbs every 4 weeks
- If moisture is limited, reduce N applications
  - Nitrate accumulator
- No prussic acid concerns

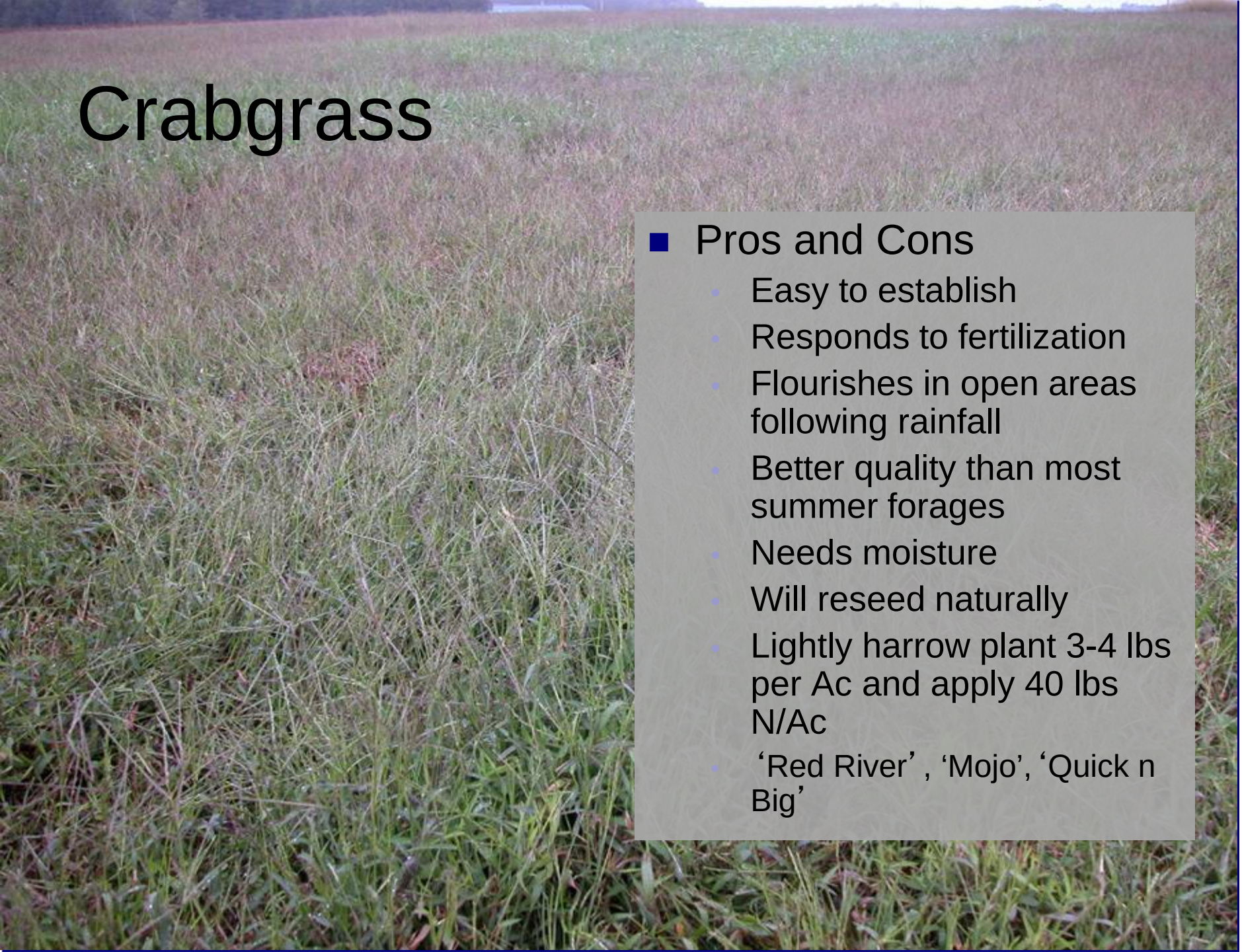
Sorghum x Sudan Hybrids

- Pros
  - Slightly taller than millet
  - Slightly longer growing period, 100 to 110 days
  - Higher yielding on good soils
  - More productive in late summer than millets
  - Brown midrib types available
- Cons
  - Not as tolerant of acid soils
  - Nitrate accumulator like millet
  - Prussic acid potential



Tifton GA, Dr. Wayne Hanna

Crabgrass



- Pros and Cons
  - Easy to establish
  - Responds to fertilization
  - Flourishes in open areas following rainfall
  - Better quality than most summer forages
  - Needs moisture
  - Will reseed naturally
  - Lightly harrow plant 3-4 lbs per Ac and apply 40 lbs N/Ac
  - ‘Red River’ , ‘Mojo’, ‘Quick n Big’

Browntop Millet

- Can be used for hay or grazing
- Very tolerant to low pH and low fertility
- Produces less forage than millets, 60 day maturity
- Wide planting window:
  - early May through August
- Excellent seed producer
- May become a weed on crop land
  - Has reseeding ability
  - Long period of seed viability

Teff

- Plant clean till in May/June
- Can be difficult to establish
- Grazing in 30-45 days
- Hay analysis has been surprisingly low (9-12% CP and low 50s TDN)
- Appears to fit in Upper South as hay or hay/graze crop
- Not well suited for southern regions

Finishing steers grazing Teff
Beaver, WV Dr. Bill Clapham

Cool Season Annual Grasses

- Flexible use
- Overseed into dormant bermudagrass pastures
- Clean till
- Mixtures or alone
  - Rye
  - Wheat
  - Oats
  - Annual ryegrass
- Competition vs Collaboration:
  - Tall fescue vs Bermudagrass

Annual ryegrass + white clover sodseeded in dormant bermudagrass

Forage Production Differences
Cool Season Annuals

Cold tolerance

- Rye>Wheat>Ryegrass>Oat

Tolerance to soil acidity

- Rye>Ryegrass=Oat=Wheat(keep above 6.0)

Maturity

- Rye<Wheat~Oat<Ryegrass

Fall Production

- Oats>Rye>Wheat>Ryegrass (mgmt dependent!)

Annual Clovers

- Crimson clover
  - Early spring production
  - Performs well in combination with ryegrass
- Ball clover
  - Dependable reseeder and performs well on poorly drained soils
- Arrowleaf clover previously one of the most popular annuals in Coastal Plain
  - Good late spring forage producer and does not cause bloat

What about diverse mixtures? -- Bring on the ‘Crazy’

Summary

- Choose forage “base” carefully
  - Dependability and grazing persistence are important for grazing!
  - Quality and yield important for mechanical harvest
  - All must fit soil type, environment, and management
- Compliment these base forage with appropriate species to improve forage distribution, minimize hay needs and optimize fertilizer needs

Twitter: @CUForages

Facebook: Clemson Forages