Management of Pastures During and Following Drought

Larry A. Redmon
Texas AgriLife Extension Service
U.S. Drought Monitor
Texas

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
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<tr>
<td>Current</td>
<td>51.5</td>
<td>48.5</td>
<td>35.8</td>
<td>28.5</td>
<td>24.9</td>
<td>16.1</td>
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<tr>
<td>Last Week (09/01/2009 map)</td>
<td>48.3</td>
<td>51.7</td>
<td>35.3</td>
<td>28.8</td>
<td>26.5</td>
<td>17.3</td>
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<tr>
<td>3 Months Ago (06/16/2009 map)</td>
<td>27.0</td>
<td>73.0</td>
<td>45.5</td>
<td>27.8</td>
<td>16.5</td>
<td>7.6</td>
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<tr>
<td>Start of Calendar Year (01/06/2009 map)</td>
<td>41.7</td>
<td>58.3</td>
<td>24.5</td>
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<td>9.1</td>
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<td>Start of Water Year (10/07/2008 map)</td>
<td>67.2</td>
<td>32.8</td>
<td>20.5</td>
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<td>3.6</td>
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<td>One Year Ago (09/09/2008 map)</td>
<td>52.9</td>
<td>47.1</td>
<td>25.1</td>
<td>10.0</td>
<td>3.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Intensity:
- Yellow: D0 Abnormally Dry
- Light Orange: D1 Drought - Moderate
- Orange: D2 Drought - Severe
- Red: D3 Drought - Extreme
- Maroon: D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

September 8, 2009
Valid 7 a.m. EST

Released Thursday, September 10, 2009
Author: R. Tinker, CPC/NOAA
Present Drought Timeline
What is drought?

- Meteorological, agricultural, hydrologic, and socioeconomic droughts.
- Agricultural drought occurs when there is inadequate soil moisture for the needs of a particular crop at a particular time.
- Generally, when precipitation is < 75% of the average amount (SRM, 1989).
Drought…

• **Reduces** vegetative ground **cover**.
  – Especially if stocking rate is not adjusted.

• Sets the stage for significant topsoil **loss** during precipitation events that follow.

• Creates a **downward** spiral of deteriorating conditions.

• Can cause a severe depletion in **cash assets** when trying to feed your way out of a drought.
  – Can result in loss of the ranch…
NOTE:

• Well-managed forages recover more rapidly and more completely than those that are not well managed.

• Well-managed means:
  – Fertilized appropriately
  – Stocked appropriately
  – Not grazed/hayed too short beyond Sept.
What are the effects of drought on forages?

- Reduced aboveground growth
- Reduced root development
- Reduced aboveground growth
- Dormancy/death
Which species are the most affected by drought?

- **Shallow-rooted** **annuals**
  - Grasses = crabgrass, small grain/ryegrass seedlings
  - Legumes = clover, burr medic, cowpeas

- **Relatively shallow-rooted perennials**
  - Common bermudagrass, bahiagrass, dallisgrass

- **Deep-rooted perennials**
  - Hybrid bermudagrass, kleingrass, Old World bluestems, weeping lovegrass, many rangeland species

**NOTE:** The first species to show up after rain begins will be the annuals!
Drought & Forage Nutritive Value

- If drought is not severe, forage nutritive value may actually be enhanced.
  - Slower development may actually improve forage nutritive value.
  - Drought has little effect on digestibility as long as leaves are intact.
    - Higher DM, less moisture content)
- Severe drought = reduced tillering, more rapid death of established tillers.
  - Perennial species may go dormant.
  - Nutrients (N & CHOs) are translocated from leaf to roots.
  - Leaf loss due to senescence.
During a Drought

• Landowners will be tempted to keep all of their cattle…DON’T!
Current Year and Long-term Historical Precipitation at Overton, TX

- April: 3.5 inches
- May: 3.5 inches
- June: 2.0 inches
- July: 0.5 inches
- August: 1.0 inch
- September: 2.0 inches
- October: 4.5 inches
Drought Effect on Forage Dry Matter Production as Influenced by Precipitation. 2006

Dry Matter Production (lbs/ac)
Drought Effect on Stocking Rate as Influenced by Precipitation. 2006

Number of Head

<table>
<thead>
<tr>
<th>Month</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
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</thead>
<tbody>
<tr>
<td>Head</td>
<td>37</td>
<td>20</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>23</td>
<td>36</td>
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</tbody>
</table>
Long-term annual precipitation at Overton, TX. 1968 - 2001

* Incomplete data
During a Drought

• Landowners will be tempted to keep all of their cattle…DON’T!

• Landowners will be tempted to graze pastures down to the soil surface…DON’T!
Forage Supply

Forage Demand

Forage Performance

Animal Performance
During a Drought

• Landowners will be tempted to keep all of their cattle…DON’T!
• Landowners will be tempted to graze pastures down to the soil surface…DON’T!
• Landowners will likely have to purchase hay to feed…GET A FORAGE ANALYSIS!
<table>
<thead>
<tr>
<th>Animal kind/class</th>
<th>CP (%)</th>
<th>TDN (%)</th>
<th>NEm (Mcal/day)</th>
<th>NEg (Mcal/day)</th>
<th>NEI (Mcal/day)</th>
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</thead>
<tbody>
<tr>
<td>Growing beef steer</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>450 lbs (1.7 lb/day gain)</td>
<td>11-13</td>
<td>65</td>
<td>2.0</td>
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<td></td>
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<tr>
<td>650 lbs (1.7 lb/day gain)</td>
<td>10-11</td>
<td>68</td>
<td>2.7</td>
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<tr>
<td>Beef cow</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Lactating</td>
<td>10-12</td>
<td>60</td>
<td>n/a</td>
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<td>Dry, pregnant</td>
<td>8-10</td>
<td>50</td>
<td>8.54</td>
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<td>Sheep</td>
<td></td>
<td></td>
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<td>Lamb (finishing)</td>
<td>12</td>
<td>70</td>
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<tr>
<td>Ewe (lactating)</td>
<td>13</td>
<td>65</td>
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<td>Ewe (maintenance)</td>
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<td>55</td>
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<td>Fallow deer</td>
<td></td>
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<tr>
<td>Doe (lactating)</td>
<td>14-6</td>
<td>66</td>
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<tr>
<td>Growing buck</td>
<td>12-14</td>
<td>60-64</td>
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<td>Meat-type goat</td>
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<tr>
<td>Doe (lactating)</td>
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<tr>
<td>Growing buck</td>
<td>12-13</td>
<td>62-66</td>
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<tr>
<td>Horse (maintenance)</td>
<td>10-11</td>
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1 Adapted from Southern Forages, 2nd ed., 1998.
<table>
<thead>
<tr>
<th>Forage Type</th>
<th>87008</th>
<th>87007 #1 Bryan Farms</th>
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<tbody>
<tr>
<td>Crude Protein</td>
<td>9.5</td>
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<tr>
<td>Acid Detergent Fiber</td>
<td>92.1</td>
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<td>TDN-based on ADF</td>
<td>60.1</td>
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<td>Net Energy Lactation (Mcal/lb)</td>
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<td>0.57</td>
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<table>
<thead>
<tr>
<th>Mineral Analysis</th>
<th>87008</th>
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<tr>
<td>Phosphorus</td>
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<td>Potassium</td>
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<td>Calcium</td>
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<td>Magnesium</td>
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<td>Sodium</td>
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<td>1067</td>
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<td>Zinc</td>
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<td>58.</td>
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<td>Iron</td>
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<td>72.</td>
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<td>Copper</td>
<td>8.</td>
<td>11.</td>
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<tr>
<td>Manganese</td>
<td>154.</td>
<td>61.</td>
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</tbody>
</table>

0.15
Warm-season Annuals

• *Can* provide good to excellent cattle performance.
• *Can* provide high quantities of fair to good hay.
• Are relatively expensive to use compared with perennial species.
• *Can* accumulate nitrates to toxic levels in hay.
  – Get a NITRATE analysis
• Some can cause prussic acid poisoning.
During a Drought

• Landowners will be tempted to keep all of their cattle…DON’T!
• Landowners will be tempted to graze pastures down to the soil surface…DON’T!
• Landowners will likely have to purchase hay to feed…GET A FORAGE ANALYSIS!
• When it rains again, landowners will be tempted to forget what just happened…DON’T!
Pasture Management Following Drought

- Soil Test!
- Apply fertilizer based on soil test recommendations.
  - $P = \text{Root growth/development}$
  - $K = \text{Drought tolerance}$

The element which is in shortest supply (in this case K), limits the yield.
Soil Test

• Without soil testing you:
  – Over-apply expensive nutrients
  – Under-apply needed nutrients
  – Never apply the correct level of nutrients
What about the HIGH price of fertilizer?
Fertilizer Price Changes

![Bar chart showing fertilizer price changes over years for different analysis types.](image)
Consider your forage base

- Bahiagrass, kleingrass, WW-Dahl OWB, others where adapted
  - Persistent under low-input management
- Transition to native forages
  - Reduced stocking rate…but
    - Enhanced profit?
    - Maintain ag exemption
    - Maintain Schedule F
    - Maintain lifestyle
    - Improve wildlife habitat
    - Reduced inputs
Pasture Management Following Drought

• Soil Test!
• Apply fertilizer based on soil test recommendations.
  – $P = \text{Root growth/development}$
  – $K = \text{Drought tolerance}$
• **IF** you have winter pasture on the warm-season perennial grass, get it off before greenup!
Pasture Management Following Drought

- Soil Test!
- Apply fertilizer based on soil test recommendations.
  - \( P \) = Root growth/development
  - \( K \) = Drought tolerance
- **IF** you have winter pasture on the warm-season perennial grass, get it off before greenup!
- **Reduce stocking or completely de-stock.**
  - Delay grazing as long as possible.
  - Chasing the green…
CHO reserves of a perennial ungrazed plant versus a repeatedly grazed plant.
Pasture Management Following Drought

• Pay attention to weeds.
  – Can inhibit recovery due to competition for moisture, sunlight, nutrients…

• Pay attention to insects…
  – Grasshoppers
  – Fall armyworms
Insect Pests

Even a moderate infestation of 10 grasshoppers m\(^2\) can typically consume up to 60% of the available forage.

Likewise, fall armyworms can be equally destructive.
Costs to Control Insects

- Control for Grasshoppers
  - Dimilin 2 oz/acre = $4.46/acre
    - Must be applied to young hoppers
    - Has ~ 30 days residual
    - 1 day hay restriction
  - Malathion 57%, 4 oz/acre + Sevin XLR, 4 oz/acre = $2.50/acre
    - 14-day grazing or haying restriction
    - Only apply 2 X per year

- Control for Fall armyworm
  - Malathion (57%) @ 4 oz/acre + Sevin XLR @ 4 oz/acre = $2.50/acre
  - Grizzly 2 – 3 oz/acre = $3.13 – $4.70/acre
    - 3rd generation pyrethroid, 7-day hay restriction
  - Intrepid 4 – 8 oz/acre = $7 – $14/acre
    - Dow AgroSciences, 14-day residual, 7-day hay restriction
http://forages.tamu.edu
Think forage…

Questions?
Always apply what is recommended...

Potassium: Split apply potassium fertilizer if recommendation is for more than 75 lbs K2O per acre.
Sulfur: Available sulfur may be found deeper in soil profile, thus limiting any response to added sulfur.
Evaluate Your Stocking Rate

Many are overstocked…
What Leads to Overstocking?

• Larger cattle
  – Grand dad’s cattle = 800 lbs
  – Today’s cattle = 1200 lbs
  – Same # head = 50% increase in SR

• Other factors reducing carrying capacity
  – Reduced soil fertility
  – Weed infestation

• Factors that reduce grazeable acres

• Brush encroachment
Brush Effect on Stocking Rate

Stocking Rate: Previous = 1 AU per 4 acres; Current = 1 AU per 8 acres
Back to the Past…

In general, ranges that were properly managed before and during the drought came through in fair to good condition; overstocked ranges were severely damaged and subsequent recovery has been very limited. Thus, ranchmen have evidence of the need for carrying out proper management practices year after year, not only to meet drought periods, but to build for an economic unit by capitalizing on the years of favorable moisture.

Thus the old rule still prevails that close grazing does not pay.

Vernon A. Young, Professor and Head, Department of Range and Forestry, Texas A&M College, 1956.
Alternatives to inorganic fertilizer

• Forage legumes
• Broiler/turkey litter
  – 60-60-40 per ton analysis on broiler litter.
• Class A Biosolids (municipal sludge)
  – 120-60-0 per ton analysis.
• Be aware of P accumulation over time.
• Availability???
Consider your forage base

- **Bahiagrass, where adapted**
  - Persistent under low-input management
- **Transition to native forages**
  - Reduced stocking rate…but
    - Maintain ag exemption
    - Maintain Schedule F
    - Maintain life style
    - Improve wildlife habitat
    - Reduce inputs
Drought Management Considerations

• Do…
  – reduce stocking rate and maintain until pasture recovery is complete.
  – leave some leaf.
  – give pastures longer rest periods.
  – use hay or energy supplements.
  – for introduced forages, apply fertilizer based on soil test recommendations.
  – control weeds.
  – control insects.
  – consider rotational stocking.

• Do Not…
  – graze to the soil surface.
  – graze recovering pastures too quickly…continue to feed…
  – fail to soil test for introduced forages.
  – apply herbicides during the drought. Look for periods of good growing conditions to apply the herbicide…or mow.
  – simply do nothing and expect things to get better.
Hay Sampling Program

• Samples obtained from **five counties in 2005**.
  – Calhoun, DeWitt, Goliad, Jackson, Victoria
• Samples obtained from **eight counties in 2006**.
  – Added Burleson, Milam, Leon counties.
• **Bermudagrass** hay only.
• Hay **sampler** used for obtaining samples.
• Hay was being sold at “**RETAIL**”.
• Comments regarding **how hay was represented** were recorded.
• Limited **physical** characteristics noted.
Purchased Hay Crude Protein

![Bar Chart]

- **Low**: 2.7%
- **High**: 12.8%
- **Mean**: 6.9%

**Legends**:  
- Medium green, heavily fertilized, no seed heads…  
- Light green, no seed heads…
Crude Protein Content of Retail Hay 2005
South Texas Samples

Sample Number

Crude Protein (% DM)

8%
30%
Pasture Herbicides to Consider

• Legume Program
  – 2,4-D
  – Weedmaster
  – Outlaw (Agri Star)
  – Range Star (Agri Star)
    • Generic Weedmaster

• Non-Legume Program
  – Milestone* (Dow)
  – Grazon P+D (Dow)
  – Gunslinger* (Agri Star)
    • Generic Grazon P+D
  – Cimarron Max (Du Pont)
  – Curtail (Dow)
    • Clopyralid + 2,4-D
  – Commando* (Agri Star)
    • Generic Curtail
  – Redeem (Dow)
    • Clopyralid + Triclopyr

* New
Brush Herbicides to Consider

- Grazon P+D
  - Gunslinger*
- Remedy
  - Remedy Ultra**
- Pathfinder II
- Vista*
  - Floroxypyr
- Reclaim
  - Pyramid*
- Surmount
- PastureGard
- Tordon 22K
  - Triumph 22K*

* New
** 2007
Also...

- **Maverick***
  - Section 18 through June 20, 2007 for control of johnsongrass in bermudagrass.
  - Little detrimental effect on bermudagrass.
- **Stem (basal) treatment***
  - 30-35% PastureGard + diesel.
  - Less expensive than Remedy + diesel.
- **Cut stump treatment***
  - Use PastureGard at rates above.
  - Use Pathfinder II undiluted.

* New
Drought

• What is drought?
• What are the effects of drought on forages?
• Which species are the most effected by drought?
• What should I do to encourage forage recovery from drought?
Class A Biosolids

- Available from municipalities.
- Low cost, “organic” product.
- Good N & P content, low to no K.
  - Sustanite
    - City of Houston product.
    - 120-60-0 per ton for $41 delivered.
  - Waco
  - Georgetown
  - Others
- May require an inorganic N “boost”
Left. A properly stocked pasture on the Texas Range Station near Barnhart in good condition, Feb 1951. In 1955 this area had made a remarkable recovery from the drought.

Right. A heavily stocked adjacent pasture after two years of drought. In 1955 this pasture, stocked at a rate common to the general region of the Edwards Plateau, had only partially recovered from drought.

Cattle eating prickly pear as soon as the rancher burns off the spines. Note absence of grass plants and loose condition of soil. Young, 1956.
Grasshopper Facts

- Grasshoppers eat approximately one-half of their body weight in green forage per day.

- Seven or eight grasshoppers per square meter in a 10-acre field will consume as much forage as a cow.¹

- Even a moderate infestation of 10 grasshoppers/square meter can typically consume up to 60% of the available forage.

Armadillo Burr Medic

- Blacklands ecoregion
- Soil type: clay loam
  - Well drained
- Soil pH: 6-8
- Limited cold tolerance
  - Best use south of Waco
- Use: overseeding pastures 5-10 lb/A
Devine Little Burr Medic

- Blacklands ecoregion
- Soil type: clay loam
  - Well drained
- Soil pH: 6-8
- Limited production
  - 1500-4000 lb/A
- Use: overseeding pastures 3-5 lb/A
White Clover

- Best adapted to bottomland sites (wet and poorly drained)
- Generally a reseeding annual in east Texas
- Late spring forage production
- Economical establishment
Apache Arrowleaf Clover

• Apache arrowleaf is a new, disease tolerant cultivar released by Texas A&M Univ. System from the Overton Clover Breeding Program

• Forage production season starts (almost) as early as crimson and continues through May

• Can be managed for reseeding
Rose Clover

- Overton R18 developed at Overton
- High hard seed percentage
- Planting rate can be reduced from 16 to 8 lb/ac for more economical establishment
- Early spring forage production not as good as crimson
- Good choice for reliable reseeding on upland sites
- Not adapted to wet, poorly drained sites
Ball clover

- Soil type: loam, clay loam
- Soil pH: 6.5-8
- Adapted to wetter sites
- High bloat potential
- Use: overseeding pastures 2-3 lb/A
- Excellent reseeding
<table>
<thead>
<tr>
<th>Clover Species</th>
<th>Preferred Soil Characteristics</th>
<th>Plant Characteristics</th>
<th>Seeding Rate (lb/ac)</th>
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<tbody>
<tr>
<td>Arrowleaf</td>
<td>pH 6.0-7.0</td>
<td>Texture sandy-loam</td>
<td>Maturity late</td>
</tr>
<tr>
<td>Ball</td>
<td>pH 6.5-8.5</td>
<td>Texture loam-clay</td>
<td>Maturity late</td>
</tr>
<tr>
<td>Berseem</td>
<td>pH 6.5-8.5</td>
<td>Texture loam-clay</td>
<td>Maturity late</td>
</tr>
<tr>
<td>Crimson</td>
<td>pH 6.0-7.0</td>
<td>Texture sandy-loam-clay</td>
<td>Maturity early</td>
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<tr>
<td>Persian</td>
<td>pH 6.0-8.0</td>
<td>Texture loam-clay</td>
<td>Maturity medium</td>
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<tr>
<td>Red</td>
<td>pH 6.5-8.0</td>
<td>Texture loam-clay</td>
<td>Maturity late/biennial</td>
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<td>Rose (Overton R18)</td>
<td>pH 6.0-8.0</td>
<td>Texture sand-loam-clay</td>
<td>Maturity early-late</td>
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<td>Subterranean</td>
<td>Subterranean spp. (Karridale, Denmark)</td>
<td>Brachycalycinum spp. (Clare, Nuba)</td>
<td>pH 6.0-7.3 loam-clay</td>
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<tr>
<td>White</td>
<td>pH 6.0-7.5</td>
<td>Texture loam-clay</td>
<td>Maturity late</td>
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</table>

[http://aggieclover.tamu.edu/cool/species.htm](http://aggieclover.tamu.edu/cool/species.htm)