

Adaptation of Forage Species to Drought

Definitions

- Drought
 - Meteorological
 - Biological
 - Sociological
- Drought resistance
- Drought tolerance
- Drought adaptation

Drought is a human phenomenon, quantified by a negative impact on society without people there would be no drought

Scales of Response

1. Community

examples

A) Aspect

Sunny face.....

Shady face.....

B) Climate zone

Tall grass prairie, Nebraska - Big blue stem, switchgrass, indiangrass

Short grass prairie, Nebraska - Blue grama, needle-and-thread

2. Morphological Responses

- Leaf loss
- Smaller leaves
- Reduced shoot growth
- Greater absolute and/or relative root growth
- Senescence and death rates

3. Physiological responses

- Concentration by dehydration
- Osmotic adjustment

- Proline accumulation
- ABA increase
- C3 vs C4 metabolism
- Cell wall elasticity

4. Molecular responses

Altered enzyme activity - (a-amylase) is the result of molecular control

Heat shock proteins

Multiple genes

Water soluble carbohydrates

Unique Aspects of forages

1. Pasture perenniality

- Anticipated vs unexpected water deficit
- Dilemma whether or not to continue growth into drought

2. Defoliation (cutting or grazing)

- Close grazing usually occurs, but impairs
- Benefits from reducing the transpiring surface are unclear

3. Severe environments

4. Endophyte

5. Quality

- Green:dead ratio
- Loss of legumes
- Increased fiber, reduced protein
- Anti-quality