AgriLIFE EXTENSION
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# EFFECTS OF DROUGHT ON PLANT GROWTH

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Because of the potential seriousness of a drought whenever and wherever it occurs, landowners and managers need to be aware of the effects of drought on forage growth. Obviously, lack of soil moisture restricts plant growth, both in terms of the total quantity of tissue produced and the time that the plant tissue is produced. The extent to which forage production is decreased by drought varies with the soil type, temperature, vegetation type, and current and past grazing management. Every situation is different and it is impossible to present management guidelines that will be universally applicable especially for a state as large as Texas.

Productivity of annual plants generally will be reduced by drought more than that of perennial plants. In a drought, annuals produce little or no forage. Annuals are not as deeply rooted as perennial grasses and woody forbs or shrubs and trees and therefore cannot tolerate the same degree of moisture deficit. In a drought, annuals will be very short with fewer leaves present and will use available water to produce flowers and a viable seed crop earlier than is normally the case. Typically there are two peak germination periods for annuals in Texas. Germination in the late summer through fall (September to December) will produce cool season annuals that grow roots during winter and spring, with seeding maturing in the spring or early summer before the plant dies. With a lack of fall moisture, some cool season annuals may germinate later as warmer temperatures are encountered. While the drought effects on forage production of annual species is more pronounced compared with perennial species, annuals are well adapted to dry years where they can escape periods of drought by remaining in the seed stage. Warm season annuals typically germinate in the spring as warmer conditions arrive and persist. Annuals such as one-seeded croton, wooly croton and spurges germinate under favorable moisture conditions and by-pass much of the rosette type growth of cool season annuals. Of particular interest is the fact that many annuals are the first plants to emerge following drought. This is due to their ability, again, to survive drought in the seed stage and germinate when the drought is broken. Some annuals will be desirable plants while others may not. Be prepared to control unwanted annual species with either herbicides or mowing if warranted.

Typically warm season, perennial sod grasses and bunchgrasses support above ground growth for six to nine months out of the year, depending on where in the state they are located. When initiating growth following the winter dormant season, the plant must draw on food reserves (carbohydrates) that were produced during the previous growing season and stored in the roots or crown of the plant. About 20 percent or more of the current year's growth will occur using these stored reserves before the plant stops using reserves, begins to fully photosynthesize, and maintain itself with mature leaves produced during the current season.

In a drought the plant has to rely on the stored reserves for a longer period of time, thus reducing stored nutrients for future use and increasing the plant's susceptibility to damage in extended

periods of drought and grazing uses. A healthy root system is of paramount importance to the growth of a forage plant when we realize that 50% to 80% of the plant exists below the soil surface. An old range science rule of thumb is “if you take the shoot, you kill the root.” Whether due to excessive grazing pressure or drought, lack of aboveground photosynthetic material (green leaves) will decrease root production, thus, decreasing the plant’s ability to fully exploit the soil profile for badly need moisture.

The lack of available moisture usually reduces the length of the growing season. Warm season perennial grasses will initiate growth in the spring, but produce less forage and go dormant sooner under drought conditions. During drought plant growth begins to slow before carbohydrate reserves (sugars and starches) are replaced. Because of this, grasses may enter a longer than normal dormant period with less reserves. Once rainfall does come, the plant is slower to respond. If heavy grazing has occurred, this may hinder the accumulation of new root reserves. A perennial grass that is heavily grazed during the growth period could stop growth altogether. If soil moisture were declining rapidly at the same time, the grazed plant would not have an adequate opportunity to recover from the combined effects of heavy grazing and drought. In drought years, grazing should be light to enhance the plant's ability to make maximum use of soil moisture available. Plant loss or death occurs in periods with several growing seasons with below normal precipitation.

Effects on forage nutritive value due to drought are variable. If the drought is not so severe as to cause the plant to go dormant or be destroyed, there may actually be an increase in nutritive value. Because plant growth rate is reduced, maturity does not have as great an effect on the plant nutritive value as under more favorable growing conditions. If, however, the drought is severe, nitrogen and carbohydrates will first be mobilized away from the leaf material to the crown or root area with a resulting reduction in nutritive value. If the drought continues, there will be senescence and associated leaf shatter that completely eliminates any potential for the plant to serve as forage for grazing animals.

The effect of drought on forage plants is a function of both the intensity and duration of drought and the general health and vigor of the vegetation before the drought. Plants with healthy root systems and adequate carbohydrate reserves will fare much better during and after drought than plants that have been struggling to maintain themselves continuously. This illustrates the need for a soil test and fertilizer application based on soil test recommendation so that the plant has all of the opportunity to tolerate drought that it is genetically capable of.