



Pastures

How Plants Grow



What

A basic question facing a livestock producer is how close plants can be safely grazed or mowed and still produce maximum forage over an extended period. This question is complicated by varying climatic conditions, growth habits of different plants, and livestock preferences for different plants. The time of year and age of the plant when leaf removal occurs also affects plant growth.

The Leaf Growth Miracle

Plants manufacture their food in the leaves through the use of solar energy. This is one of the great miracles of nature. However, some people still wrongfully assume plants produce food in their roots. True, plants pull water and minerals from the soil, but the food factory is located above ground in the leaves and green stems. Minerals from the soil make up about 5 percent of the solid material in plant roots, stems, and leaves. Carbon, hydrogen, and oxygen from the air and water intake up most of the other 95 percent.

The leaves take in carbon dioxide gas from the air through tiny pores. Using solar energy, the leaves recombine the carbon with oxygen and hydrogen to make sugars and starches. The sugars then combine with elements from soil to make fibers, proteins, plant oils, and fats. The plant uses these sugars, starches, proteins, oils, and fats to grow and reproduce.

The ability of perennial grasses and legumes to recover quickly after grazing or mowing makes these plants extremely valuable for forage production and soil protection. Removing too many leaves will retard forage production and damage the plant's root system. The plant will eventually die if overharvest of the leaves continues.

Leaf Removal and Growth

Root growth is closely related to forage production. Plants maintain their maximum root vigor and growth when no more than 50-60 percent of their leaves are removed by grazing or mowing during a single harvest interval. The plants then need an interval of rest to send out the new leaves and stems which reestablish the "food factory". Depending on the time of the year, this rest interval varies from 3-6 weeks.

In all grasses, the amount of leaf volume removed has a direct effect on the growth of new roots. Roots are the vital supply lines of moisture and minerals to the leaves. Perennial grass plants store food in the roots after seasonal growth. They use these reserves to subsist while dormant, to make the first new growth the next spring, and to restart new growth after green leaves and stems are too closely grazed at any time during the growing season.



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In each growing and harvest cycle, a grass plant produces twice the volume of leaves that it needs to complete its growth and remain healthy and productive. Generally, when up to 60 percent of the plant is grazed during a single harvest interval, root growth continues unimpaired. When 70 to 90 percent of the plant is removed, from 50 to 100 percent of the root growth is temporarily stopped.

Other Growth Factors

Other factors influence plant growth. Proper or light grazing use is usually more beneficial to plants than several years of non-use. Heavy plant residue depresses growth of many grasses.

Growing Points of Grasses

All plants have growing points where new cells are developed. There are two types of growth form. "Jointed" grasses are those in which the growing points are located just above the last completed joints of each stem. Early in the season, the growing points are situated at the base of the plant. As the season progresses, the joints elongate and push upward to produce a seed stalk. At this time, the growing point is elevated and in a vulnerable position. Removal of the point by grazing or mowing forces the plant to pause in its growth to send up new leaves from its base, just as when it starts growth in the spring. This causes additional drain on root reserves and can weaken the plant. Examples of jointed grasses are timothy and smooth brome.

In "non-jointed" grasses, the growing points always stay near the base of the plant. If a proper stubble height (generally 3-4") is maintained when grazing or mowing, the leaves will continue to elongate from the base, providing continuous growth. Examples of non-jointed grasses are orchardgrass and ryegrass.

Where to Get Help

For more information on pasture plants and management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service. SCS personnel provide technical assistance to landowners and operators through local conservation districts.

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