TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE BOISE, IDAHO SOIL CONSERVATION SERVICE

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ROOT-GROWTH STOPPAGE

Resulting from Defoliation of Grass

Removals during the growing season of half or more of the foliage of grasses - cool and warm-season species, including bunch, rhizomatous, and stolonifierous stypes - caused root growth to stop for a time after each removal, with one exception. The exception was orchardgrass (Dactylis glomerata) after the first clipping.

Aside from orchardgrass, a single clipping that removed most of the foliage caused root growth to stop for periods ranging from 6 to 18 days. Stoppage occurred usually within 24 hours and continued until recovery of the top growth was well advanced. When these clippings were repeated periodically, as in a system of rotation grazing, root growth of all grasses stopped for periods that ranged from 25 to 45 days during the growing season.

The percentage of roots that stopped growth varied in proportion to the percentage of the foliage that was removed.

A single clipping of 90 percent of the foliage resulted in complete root-growth stoppage for 17 days, and removal of 80 percent of the foliage caused complete stoppage for 12 days. At the end of the 33-day test, 40 and 45 percent, respectively, of the roots still were not growing. Partial stoppage occurred after single clippings at the 70-, 60-, and 50 percent levels.

Effects of such clippings repeated frequently - similar to continuous grazing - were much more severe. All root growth stopped after the first clipping of 90 percent of the foliage, and the 3-times-a-week clippings that followed prevented root growth during the whole test. Root-growth stoppage was somewhat less as lesser amounts of foliage were removed, but where 70 percent or more of the foliage had been taken repeatedly, no roots were growing at the end of the 33-day test. Stoppage was also severe with repeated clippings at the 60- and 50 percent levels, showing maximum stoppage of 100 and 63 percent, respectively, at the close of the test.

Stoppage of root growth failed to take place in both the single and repeated percentage-clipping tests only when 40 percent or less of the foliage was removed. The balance point in the relation of top reduction and root-growth stoppage was found to lie between the 40- and 50 percent clipping levels.

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Parts of bunchgrass plants were found to function independently so far as the effects of foliage removal on root growth were concerned. Clipping of the foliage of halves and individual culms of plants stopped root growth for only those parts. The habit of cattle grazing only part of a plant at a time seems desirable.

Reduction of the foliage of the grasses affected root production adversely. In the single-clipping series, the number of growing roots at the end of the 33-day test ranged from only 32 when 90 percent of the foliage was clipped to 132 when 10 percent was clipped. In the repeated-clipping series, the range was strikingly greater - from 0 at the 90-, 80-, and 70 percent clipping levels to 156 at the 10 percent level. Among the 7 types of grasses that were clipped periodically, 2 to 4 times during the growing season - the ovendry roots of the unclipped plants weighed 8 times as much as those of the clipped plants.

The drastic effects of the higher percentages of foliage removal in causing complete and prolonged root-growth stoppage, and correspondingly reduced root production, was reflected in poor development of the grass plants.

These data have particular application to soil conservation and pasture-management practices. They emphasize that the growing top cannot be reduced more than half without adversely affecting the functioning of the root system and the plant as a whole. They are striking evidence that close grazing or mowing during the growing season is at the expense of stand establishment and maintenance.

The complete stoppage of root growth is of particular significance in conservation farming. Because of the continuous suppression of aboveground growth and the inability of the plant to replenish food reserves, the effects of root inactivity are lasting. Thus weakened, the plant is less able to resist grazing, erosion, drought, cold, and disease.

The conclusion is, therefore, that the successful use of grass for soil conservation and pasturage is contingent in large measure on the employment of practices that preserve the closest possible balance between top and root development.

Summary from: U.S.D.A. Technical Bulletin No. 1102
Root-Growth Stoppage; Resulting from
Defoliation of Grass.

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