

response to increasing rates of application of nitrogen are generally observed. This positive response does not continue indefinitely because at a certain point there becomes insufficient carbohydrate produced by photosynthesis to convert all the available nitrogen to protein. At this point there is a distinct suppression of root growth and depth and carbohydrate reserve storage. Likewise rhizome and stolon growth are reduced. At the same time there may be no discernable reduction in top growth.

Phosphorus increases root development. Due to the low solubility of phosphorus in soil and the restricted downward movement from surface applications, phosphorus may be restricted to the surface one or two inches. Therefore, the full effect of phosphorus on root development, particularly for deep rooting may be lost. Thus in the construction of new facilities it is important to mix adequate phosphorus in the root zone material before putting it in place.

Potassium also influences root development, particularly the branching of the root system. It also plays a role in synthesis of carbohydrate required for root growth.

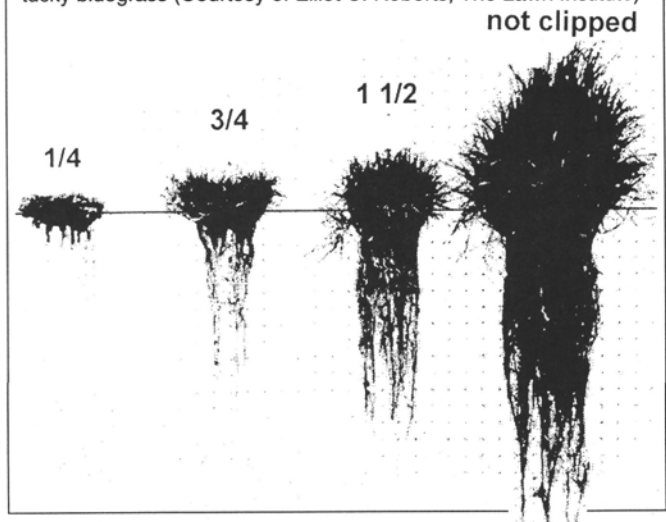
Mowing

The cutting height used for a given sport use is a compromise between the demands of the specific game involved and the physiological principles that influence the health and vigour of the turf species.

Few turfgrass species tolerate continued mowing below 10 mm or maintain adequate turfgrass uniformity and sod cover at cutting heights above 100 mm. Close mowing not only reduces the density and depth of the fibrous root system, it also reduces the rate of rhizome and stolon elongation (Fig.1).

Cutting height has a greater effect on root growth and carbohydrate reserves than cutting frequency. Minimal effect on root

Fig. 1: The influence of cutting height on the root growth of Kentucky bluegrass (Courtesy of Elliot C. Roberts, The Lawn Institute)



growth occurs when less than 1/3 of the total leaf area is removed. This rule of thumb establishes the frequency of mowing; the higher the cut, the less frequent the mowing. Bentgrass maintained at less than 10 mm may need daily mowing, whereas bluegrass mowed at 100 mm may need mowing every 7 to 10 days.

Irrigation

Frequent, light irrigation has been known to cause shallow rooting. At the inception of a water stress there is an increase in root growth, however, as the plant approaches a wilting condition photosynthetic activity declines with a corresponding reduc



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