

conditions. Of the warm season grasses, Zoysiagrass, variety 'Emerald,' is the most shade tolerant. However Zoysiagrass, 'Meyer' ('Z-52' or 'Amazoy') grows best in the state. Bermudagrass will not tolerate shade and should be grown only in full sun.

Of the cool season turfgrasses the fine fescues have typically been recommended for shady areas. Although they grow quite well in cool, dry shade, they are not recommended for poorly drained soils or in parts of the state where summer temperatures are above 85° F for prolonged periods. Pennlawn and Biljart are two varieties of fine fescues recommended for use in shady areas.

Several of the improved Kentucky bluegrass cultivars have shown superior shade adaptation. Of these 'A-34,' 'Birka,' 'Nugget,' 'Bristol,' 'Glade' and 'Touchdown' perform quite well in the shade. These cultivars exhibit a high level of resistance to powdery mildew, a disease particularly active under cool, shady conditions.

Most of the common types of Kentucky bluegrass as well as many of the improved cultivars are susceptible to powdery mildew and leaf spot which is a limiting factor to their use in the shade. The susceptibility to these diseases is not the only explanation for poor shade performance of many Kentucky bluegrasses. Several cultivars appear to lack the physiological capability to utilize the available light in the most effective way. Roughstalk bluegrass (*Poa trivialis*) does extremely well in cool, wet, shaded areas. However, this species will not persist under hot and dry conditions.

Another turfgrass such as perennial rye may be considered. The cultivars 'Polis' and 'Sabre' are two ryegrasses which perform well under shade. However, it should be noted that perennial ryegrass will give a good cover in the beginning but is usually severely thinned by the end of the season. If perennial ryegrass is to be used successfully, it should be treated as an annual and sown into the shaded area each year.

### **CULTURAL PRACTICES**

Since the amount of light reaching the turfgrass is greatly reduced it is important that the plants intercept as much of the available light as possible. This may be accomplished by raising the cutting height to three inches. The height of cut encourages deeper and more extensive rooting which aids the turf in competing with tree roots for water and nutrients as well as having a greater leaf surface to intercept more light.

The rate of nitrogen fertilizer is extremely important as high rates of nitrogen will encourage rank, succulent tissue which is more susceptible to disease and traffic injury.

Nitrogen also encourages shoot growth at the expense of root development. Some suggested annual rates of nitrogen include: 2.5 to 3.0 pounds of actual nitrogen per 1000 sq. ft. per year for Kentucky bluegrass, Roughstalk bluegrass and tall fescue; 1.5 to 2.0 pounds of actual nitrogen for fine fescues per 1000 sq. ft. per year. Only the minimum rates should be applied to cool season grasses during hot summer months. If trees are to be considered in the fertilization program, it is advisable to place the fertilizer below the root zone of the grass in order to minimize the possibility of excessive growth of the turfgrass.

Watering turfgrass in shady areas should be carefully managed. Light, frequent sprinklings, especially in the evening, should be avoided as this results in shallow rooted grasses. Heavy application of water allows the surface of the soil as well as the turfgrass to remain wet longer. Watering should be done in the early morning to allow a maximum amount of time for evaporation of free water from the turf and soil surface. Sufficient water should be applied to wet the soil to a depth of six to eight inches, and should be applied over a period of four to six hours.

Turfgrass grown in the shade should be checked regularly for the presence of disease in order that fungicides may be applied early to prevent spreading of the disease and its becoming established and killing the grass.

### **MODIFICATIONS**

In many cases the shade environment may be modified by removing the lower branches of trees to allow for better air circulation and to allow more of the morning and/or afternoon sunlight to reach the turf. This is especially true of trees whose branches are below ten feet above ground. The crown of the trees should be thinned to allow more light to filter through the branches increasing the quality as well as the quantity of light.

If dense shrubs or undergrowth impede air movement, they too should be removed or thinned.

Of course the most drastic action would be to remove the tree. It could be replaced with a finer textured tree which will allow greater light quality and quantity penetration.

### **ALTERNATIVES**

One of the most common alternatives is to plant ground covers such as ivy, pachysandra, periwinkle, liriopse or ajuga. From the standpoint of aesthetics as well as maintenance this may be one of the better alternatives as a definite change in plant form, texture and color is obtained. This is more aesthetically pleasing than having a thick stand of turfgrass in sunny areas and a thin stand of grass in the shade.