MANAGING TURFGRASS IN SHADE

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Shade or low radiant energy (light) is an extremely stressful condition for turfgrass growth. Reduction in photosynthetically active radiation (PAR) effects turfgrass growth by causing a reduction in root growth, tillering, density, carbohydrate reserves, thinner longer leaves, and a change in the microclimate resulting certain disease activity. Our research has focused primarily on the effects of PAR on turfgrass growth.

The photosynthetically active radiation occurs within a narrow spectral band from 400 to 700 nm wavelengths. The peak spectral absorption of chlorophyll a is 410, 430, and 660 nm while chlorophyll b absorbs most effectively at 430, 455 and 640 nm. Carotenoids, including xanthophylls, absorb near 450 nm. PAR can be further divided into high activity and low activity wavelengths based on pigment absorption bands. PAR from 400 to 500 nm, referred to as blue light, and PAR from 600 to 700 nm referred to as red light, is active for photosynthesis, thus the beneficial wavelengths for turfgrass growth. PAR from 500 to 600 nm, generally called green light, is basically inactive for plant growth and development. Far-red irradiance occurs in a spectral band from 700 to 800 nm and is inactive for photosynthesis. Far-red light causes many of the changes in growth habit experienced by turfgrasses in shade.

Shade effects both the amount and quality of solar radiation hitting the turf. Thus, the density of shade can have a direct effect on turfgrass growth. In one study we looked at the amount and quality of solar radiation during a growing season in full sun and under shade from a conifer tree, a deciduous tree, and a building. We found that solar radiation is reduced in open (single trees) shade, but the quality change is minimal. We found no difference for blue/red light in the shade of deciduous tree and building shade because the shade density was similar. The lack of reduction in blue/red light is probably due to the diffuse light that hits the turf from all directions from a single tree versus a thick forest shade where diffuse light does not penetrate. From a management standpoint an open shade, spaced trees, do not alter the quality of light as much as a dense shade. Thus, openly spaced trees have less detrimental effect on turfgrass than closely (thick) spaced trees.

Within a shaded environment, we found that higher rates of nitrogen caused a quicker decline in turfgrass quality. Although this finding is not new (Dr. Rieke has shown this in past studies), we found the presence of Rhizoctonia solani the causal agent of brown patch to be prevalent. Thus, we think a major reason for the decline in high nitrogen plots is the enhanced activity of Rhizoctonia solani. Generally, nitrogen applications should be timed during periods when tree leaves are absent (late season fertilization is critical in shaded turf's) and minimal applications during the summer.