



## **Maintenance of Bentgrass greens in the shade**

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Managing bentgrass under golf course conditions is a challenge. Managing creeping bentgrass in shade under the same conditions is frustrating and may be impossible. Shade not only influences the amount of light available for plant photosynthesis but also affects light quality.

Plants absorb solar radiation as energy particles called photons. The energy of a photon depends on the light wavelength from which it originated. Blue, green and red wavelengths provide energy for photosynthesis. Far red wavelengths help manage plant responses to the environment. Light quality refers to the proportions of particular wavelengths in the light environment. Changes in the proportion of red and far red – and possibly blue – light trigger plant responses that affect plant health.

In shade, a greater proportion of the light present is in blue and far-red wavelengths. These excesses in blue and far-red light and a deficiency in red light cause turfgrass plants to produce thin, delicate leaves and rapid, vertical shoot growth. These plants are usually more succulent and commonly have a poor root system.

These circumstances and a decline in photosynthesis, combined with frequent low mowing and nearly constant traffic, make it difficult to maintain healthy creeping bentgrass in golf course shade. Thin, weakened leaves are easily damaged, but they regenerate slower than healthy plants. When pressure is applied to succulent plants, cell membranes can rupture.

Turf in shade grows vertically faster, to compete with neighbour plants for light. This is a disadvantage from an agronomical point of view. Because shoot growth is encouraged in shade, root systems on shaded turf are shallow and sparse. Turf density is poor, and damaged areas are slow to recover because stolon growth is poor.

The high canopy humidity, poor air circulation and daily temperature moderation commonly found in shade increase the likelihood of disease.

### **What are the risks?**

- Dying of single plants or parts of a green through traffic damage (by golfers and machines).
- Growth of algae

- Triplex Ring
- Damage caused by disease
- Bad performance by over fertilizing and over watering

## **What can be done? – Basic shade management**

### Nitrogen fertilization

Application of high amounts of nitrogen to shaded turf worsens the existing imbalances among shoot, root and stolon growth. Leave growth is pushed even more and leads to even thinner and less resistant leaves. It is a big mistake to fertilize greens in the shade with the same amount of nitrogen as greens in the sun. A USGA trial shows, that a green more than half a day in the shade, needs maybe less than half the amount of fertilizer of a green in the sun.

It has to be found out individually how much nitrogen is actually needed for a specific green, but the above rule of thumb can be used.

### Irrigation:

During shade periods, photosynthesis is severely restricted, so water-use rates for plant cooling are much lower. The turf canopy temperatures in the shade remain low. The air circulation is usually poor and canopy humidity high. These factors reduce ET rates and are not conducive for turfgrass growth and increase disease susceptibility. Also, shaded turf has a poor root system as it enters a summer season.

Basically little irrigation is required.

Irrigation should be adjusted to deliver the amount of water necessary to reach the bottom of the existing root zone. Because the roots are less and not as deep, the area which is to be irrigated is less. The frequency should be adjusted that this area is kept damp, but the soil above is allowed to dry before the next irrigation is applied.

In practice it means, that the irrigation of the shaded greens must be adjusted different in the computer than the other greens.

### Reducing traffic damage:

The use of hand mowers is recommended on shaded greens. If this is not possible because of a limited budget, the hand mower can be used for the final round only. By increasing the number of pin placements available on a shaded green, it's possible to allow more time for a particular area to recover before the pin is placed there again. Daily pin movement is essential.

Verticutting is especially a stress to the grass plant, and sometimes skipping it, can help to keep the plant more healthy.

### Better air circulation:

It is important to work from both sides: improving the light conditions and improving the air circulation by removing low growing brush and trimming tree limbs to a height of around 2 meters. Research suggests, that increasing the air circulation in a shaded environment leads to improved

growing conditions and more manageable turf, even if the amount of shade remains the same. Opening east to west corridors through existing vegetation or structures can help air circulation immensely.

### **How to keep up the energy status of the plant?**

Low light and little reserve storage are a serious problem for the grasses. The direct and best way would be to get rid of the cause, by cutting the trees which prevent the sunshine. Research suggests, that shade duration is more important than the shade density. This means, that it is better to cut a few trees in order to shorten the time of the shading, instead of thinning canopies. Another option is to

- raise the cutting height.

This is an additional possibility to give the grasses more energy by photosynthesis. Even small differences in the cutting height lead to more leaf area which provides more photosynthesis.

By raising the cutting height from 3 mm to 3,5 mm, the turf gains 16% more leaf area and photosynthesis potential. An increase to 3,8 mm creates 26% more photosynthetic potential.

To maintain creeping bentgrass in the shade under greens conditions is not easy, it includes permanent monitoring and individual maintenance. Even if it is most possible not to get the same quality as with greens in the sun, it is possible to maximise the quality by adjusting the maintenance individually.

A good rule of thumb for the general maintenance is to do less of everything you would do on a green in the sun like fertilizing, watering, verticutting and others.

#### Literature:

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