EFFECT OF IMPROVING SOIL FERTILITY LEVELS ON TURFGRASS QUALITY

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Abstract: The more important soil factors appear to be pH, drainage, and fertility. All turf grasses respond extra fertility. Actually, none of the turf grasses can be grown well without plenty of plant food. We were examining the effects of the traditional and the controlled released Scotts fertilizers with regards to the quality, colour, density, species composition and the change of plant coverage of the sports grass of the FTC football field. The applied fertilizers for nutrient supply of the soil were the traditional NH_4NO_3 (34%); the long-term longevity (2-3 months) Sportmaster (26:5:11); the medium-term longevity (5-6 months) Sierrablen (28:5:5+Fe); and the long-term longevity (8-9 months) Sierrablen (27:5:5+Fe).
According to the research findings we can state that the nutrient treatments had a positive effect on the species composition of the football field grass. The growth of coverage is dependant on the nutrient supply, whereas the species composition varied subject to the effect of residue. The density of the grassland, the change in its green colour, the lasting of its colour are primarily defined, in addition to the grass species, by the durability of the effect of the nitrogen. As a result of the lasting effect of the Scotts fertilizers a gradual improvement occured within the available grass species.

Keywords: improving soil fertility, turf quality change, effect of fertilizer, soccer field.

Introduction

The sports grass is a special type of grasslands, as in line with the expectations of the target sports the application, the proportion composition, wear endurance and self-regenerative ability of the grass species are determined. (Hessayon, 2002; Szemán, 2007). The most important element of the intensively used football field sports grass is the nutrient supply of the soil of the pitch (N:P:K), which greatly adds to the colour, density, homogenity of the grass, as well as to the stress caused by drought and cold. (Voigt-Fermanian-Wehner, 1998); (Landry, 2000); (Hale–Camberato, 2002); (Landschoot, 2003); (Richard-Duble, 2005); (Németh, 2006); (Németh–Cséplő–Vida–Bedő–Veisz, 2006). For the effective quality maintenance of the football field the nutrient storage of the soil has to be considered when determining the applicable fertilizer quantity. (Steffanovits-Filep-Füleky, 1999). The nutrient supply has to meet the environmental protection requirements as well as tackle the ever more relevant problems of washout and nutrient loss. (Gombos, 2007).
In addition to the traditional fast and slow (lasting) effect fertilizers the Scotts controlled release fertilizers play a role. For shoot and root growth the adequate nitrogen level of the soil is essential. At each mowing we have to count with 1g.m^{-2} nitrogen agent need, (Gruber, 1964), but it leads to environment pollution, as the excessive nitrogen washes out from the root zone. This is why it is important to use the Scotts controlled release fertilizers, as they ensure the continuos presence of nutrients in the root zone and during the growth of the grass it uptakes the nitrogen not allowing time for it to leach out. In connection with the N-fertilization level of established turfs Benyovszky and Penksza

(2002); (Nagy, 2006); carried out researches. The results of examining pocaeae content in natural grasses are summarized in Centeri et al. (2007); (Tasi, 2007).
The number of the frequency of fertilizing times is determined by the mode and intensity of use. (Csathó-Árendás-Fodor-Németh, 2007). After the winter vegetation break a powerful growth can be expected lasting from March till May. The surfaces that are ruined, spoiled after the winter break and/or due to their winter use require the first fertilization this time. (Barcsák, 2004; Szemán, 2007). The sports grasses have the biggest nutrient requirements during the months of June-August. It is impractical to apply N-content fertilizer from the end of September onwards, as it facilitates strong growth of the grass before the winter rest. (Beard, 1964, 1973; Szemán, 2007; Kádár, 2007). The vegetation of the football field consisted of perennial ryegrass, Kentucky bluegrass, creeping bentgrass and annual bluegrass, as well as spreading meadow-grass, (*Poa humilis*), which spreads on all ruderal territories. (Penksza 2000a, 2000b, Penksza – Böcker 1999/2000; Penksza – Szabó 2004, 2005; Gyulai et al. 2003); (Gyulai-Mester-Kiss-Szemán-Idnurni-Heszky, 2003).
One of the aims of this experiment was to control the nutrient supplying ability of the soil through the evaluation of the state of quality of the sports grass.

Materials and methods

The SZIE MKK Department of Grassland Management started a three-year, banding fertilizer, multi-repetitive nutrient supply experiment on the center soccerfield of the FTC Football Club. The aim of this experiment was to study the effects of improving soil fertility levels on turfgrass quality. In order to ensure even nutrient spreading, we created parcels, we marked the playfield by the sidelines at every six metres. Each marked parcel was divided so that we can monitor the more even fertilizer spreading and the broadcast treatment design. The size of the FTC field is 105m x 68m, the size of a parcel is 408m^2. Before determining the fertilizer quantity of one parcel, we determined the annual N agent/kg. In the first year (2004), we applied Sierrablen 2-3; 5-6; 8-9; and NH_4NO_3 fertilizer treatment in the second half of March; in June, in July and in the middle of August. In the year 2005, we applied Sierrablen 8-9, Sierrablen 5-6, Sportmaster 2-3 type products, treatment dates: 12 April; 7 June; 30 August.
In the year 2006, Sierrablen 8-9, on 11 May; Sierrablen 5-6, on 11 May; Sportmaster 2-3, May-June, and traditional NH_4NO_3 treatment, May- July.

Results and discussion

We continuously observed the changes in plant coverage of the field. The greatest plant coverage was achieved where we had applied the Sierrablen 8-9 month longevity fertilizer, as the first treatment in May started the shoot count formation. As a result the coverage increased, mainly due to the excessive release of nitrogen agent at one application. With the Sierrablen 5-6 months longevity fertilizer we experienced 5 % of uncoverage after mowing as a result of the smaller nitrogen dose. With the application of three times 20 kgs of traditional NH_4NO_3 fertilizer the grassland did not become dense, and almost an additional 20% of the territory remained uncovered. In connection with the change in the vegetation, with the application of the Sierrablen 8-9 months longevity treatment we released the 224 kg N for the whole year with one application, hence the coverage showed a stronger growth compared to the other treatments.

The in-between nitrogen treatment slightly prolonged the effects but it can be observed that the nitrogen supply of the soil decreased in July-August (*Figure 1*).
Its use for sporting purposes and the frequent mowing strongly exploits the grassland and it cannot preserve its established coverage. After the treatment in May a strong recovery was experienced, but then the starting condition returned, which is not characteristic of the non-exploited grasslands. With the treatment in August the coverage of the grassland strengthened again, but since the growing strength of the grass is not strong at this time of the year, the same agent did not reach its springtime rate.
By applying nitrogen more frequently and in a bigger quantity, this fluctuation can be balanced, but the danger of leaching out has to be accounted for, and also, that the strong-blade grass cannot as well cover the mowned grassland therefore it is unsure that in the end the quality of the sports grass is better.

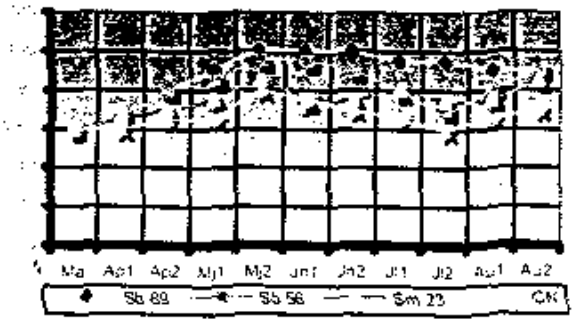

Figure 1. The percentage change of plant coverage for grass per treatment

Explication:
Ma= March; Ap1, Ap2=the first and second half of the April; Mj1, Mj2=the first and second half of the May; Jn1, Jn2=the first and second half of the June; Jl1, Jl2=the first and second half of the July; Au1, Au2=the first and second half of the August.

Conclusions

It can be stated about the football field sports grasses that are subject to intensive wear, that applying short-term longevity fertilizers more frequently results in a more balanced effect than applying long-term longevity fertilizers with one or two applications. The effect of Scotts fertilizers on coverage is better than that of the traditional fertilizers. With the Scotts Sierrablen and Sportmaster types a better effect can be achieved due to their slower nutrient release, as in these cases the grassland was not subjected to hunger as opposed to the CN fertilizer.
Based on the summarizing evaluation of the research data it can be stated that the change in the green colour of the grassland and the durability of the colour are determined by the longevity of the fertilizer, which is dependant on the time of release. The density and quality of the grassland are primarily defined, in addition to the species composition, by the durability of the continuous effect of the nitrogen. The plant coverage increase was dependant on the nutrient supply, whereas the species composition varied subject to the effect of residue.

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