Research Technical Note
Urban Greenery Series
RTN
05-2012

Selecting Right Soil Type for Turf

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'Choosing Right Soil Type for Turf' is a basic management guide for selecting suitable soil type to overcome traffic stress.

Soil Type

Figure 1 Four types of soil used to test the performance of three warm season turfgrass speices

One of the main factors that influence the growth of turfgrasses is the type of soil, also known as the root zone medium. The classification of soils is dependent on the composition of sand, silt and clay particles. For turfgrass to achieve optimal growth, it is important to maintain its fertility, moisture holding capacity, infiltration rate, and pH at appropriate levels. Whilst the optimal pH for turfgrasses is between five and seven, the levels of the other parameters vary according to species and abiotic stress conditions.

Soil Type in relation to Traffic Stress

Root zone medium plays a key role in determining the level of compaction. Soil compaction takes place when soil particles are pressed together by vehicular and pedestrian traffic. It results in reduced amount of pore spaces and increase in bulk densities. Like all plants, turfgrasses need air (oxygen) for root respiration. When the amount of pore spaces are reduced, the air present in the soil is lost and as a result, turfgrasses become stressed. This also reduces infiltration rate and prevents water movement. Thus can result in a decline in growth.

The level of compaction is dependent on the soil composition. Soils with high clay and moisture content have higher potential for compaction. Soils with high sand and low moisture content tend to have lower potential for compaction. High organic content in soil aids aggregation of soil particles and increases the amount of pore spaces. Combining high organic and clay content results in a relatively higher potential for compaction, as compared to sandy soils.

Study on Traffic, Fertility and their interaction on Warm Season Turfgrasses under different Root Zone Media

In a recent study, the Centre for Urban Greenery & Ecology (CUGE) identified a number of tolerant turfgrass species and suitable soil types under traffic stress.

Three turfgrass species, Cowgrass (*Axonopus compressus*), Seashore paspalum (*Paspalum vaginatum*), and Manilagrass (*Zoysia matrella*), were evaluated under different traffic and fertility levels and grown in four different root zone media. The effect of traffic was created using a motorized traffic simulator weighing 250 kg designed specially to generate tearing and shearing actions. The number of passes determined the level of traffic stress. The experiment details and results are presented in tables 1 and 2 respectively.

Figure 2 Traffic study on tolerance of three warm season turfgrass species

Table 1 Experiment details

Factors	Levels
Turfgrass species	*Axonopus compressus* - Cowgrass
	Paspalum vaginatum - Seashore paspalum
	Zoysia matrella - Manilagrass
Fertility	Zero
	Medium - 0.2 kg N/100 m²/month
	High - 0.4 kg N/100 m²/ month
Traffic level	Zero
	Medium - equivalent to 3 high intensity football games or 6 refers school level football games
	High - equivalent to 6 high intensity football games or 12 refers school level football games
Root Zone mix / soil type	75/25 - 75% Sand + 25% Pure soil
	50/50 - 50% Sand + 50% Pure soil
	Pure soil
	ASM - 3:2:1 (3 parts pure soil + 2 parts compost + 1 part sand)

Table 2 Results

Maintenance Level	Suitable soil type
Low maintenance (fertility - 0.2 kg N/100m^2/month)	ASM
High maintenance (fertility - 0.4 kg N/100m^2/month)	75/25 - 75% Sand + 25% Pure soil
	50/50 - 50% Sand + 50% Pure soil

Application

Traffic stress is a major problem on site with utility turfgrass. To maintain good turf quality under severe traffic stress, the selection of appropriate species and soil type during establishment is important.

Sand based soil types are good for overcoming traffic stress because of their bigger particle size and high porosity. However, it should be noted that these need high maintenance, such as higher rates of fertilizer application and increased frequency of irrigation, as they are relatively weaker in moisture and nutrient retentions.

For sites with lower rate of fertilizer application and irrigation frequency, ASM (Approved Soil Mix) is recommended. However, it is important that the site must be constructed with proper drainage and the compost used must be matured, as lack of proper drainage will "flood " the pore spaces and will aggravate the traffic stress.

Addtional References

1. RTN 07 - 2012: Selecting the Right Turfgrass Species for Traffic Stress Tolerrance.
2. CUGE Standard. CS A02:2010. '*Specifications for Composts & Mulches*'.