TURF

Rootzone Construction and Drainage Principles

By Steve Baker

We were pleased that Dr. Steve Baker was able to join us for the 1997 Ontario Turf Grass Symposium. He is an Associate with the Sports Turf Research Institute in Bingley of Yorkshire, England. The Institute started in 1929 and is situated on a 5-hectare site. A staff of 50 conducts research on a whole range of sports. They receive 1000 mm of rain per year. Lowest winter temperature would be just above or below 0C. The following article contains excerpts from his talk on turf rootzone construction and drainage principles for sand playing fields.

On soccer fields, wear is concentrated in the goal mouths and in the centre area. Play with rugger, soccer and field hockey is from early May to August, and very little grass growth occurs between September and April. Shade problems exist in many stadia due to low sun angles; thus, some stadia can receive almost no sun for a three month period. Wear is contributed by players and by maintenance machinery. Under these conditions, a well structured soil is required with sufficient pore space and air. With heavy compaction, the pore space becomes much smaller.

Uncompacted soil is composed of 25% air, 25% water, and 50% solids. In contrast, compacted soil contains 25% water, 5% air, and 65% solids. In a compacted state, soil becomes anaerobic, and root penetration suffers. Root zone material is sand-dominated. Larger pores are lost, the soil drains poorly, and the soil becomes waterlogged. Why? Because the compacted top layer of 2.5 cm in depth does not allow rainfall to disperse. Another characteristic common to natural soil fields is a significant decrease in ball bounce with longer playing seasons. All of the above result in player dissatisfaction, poor playing conditions and cancellation of games.

Not surprisingly, many more sand fields are coming into play. They require less laborious mixing of sand and soil, and result in better drainage and consequently, better plant growth. Advantages to the sand root zone are superior drainage, airfilled pore spaces, increased root development and consistencies of playing conditions. The major disadvantage is that natural soil fields are prone to the vagaries of weather. Potential problems with sand that Baker noted were drought, lack of balanced nutrition, and decreased stability—particularly if grass cover is lost.

Tips for constructing sand playing fields

- sand topdressing - use sand that has been carefully selected for size and uniformity of grains - this allows for a high rate of drainage and adequate aeration for plant and/or root growth
- slit drainage - get the water off the surface by way of slit drainage - this is usually negated if no sanddressing has been applied to the surface

Specifics

- Pipe drainage - install 5-15 m apart, 60 cm in depth, backfill gravel close to surface, then add 15-20 cm sand
- Slit drainage (50 mm diameter) - sand at surface, gravel underneath, heavy sand topdressing (150 tons), trenching 30 cm deep, remove the material taking caution not to cap slits

Research Abroad

In England, they use a mixture of three different ryegrasses, and an angular type of gravel rather than rounded (not limestone).

In 30 soccer fields that have been built, an underheating system was installed consisting of pipes filled with water connected to a heating system, and seeding was used instead of sod.

The Research Institute has tried several plastic support systems which help to reinforce the surface when grass cover is lost. Their mesh element trial is the first ever. Care must be exercised as cleats get locked in the material. Desso System from Holland, a polypropylene, is recommended.

With slit drainage and heavy application of sand, fields were usually still in good condition after three months (using once a week aeration). 225 kg/ha of nitrogen per year was proposed for sand-dominated root zones—applications much above this figure are considered wasteful and promote excessive top growth and very little root growth. Below this level, growth is too weak to counter the rigors of play.