

GRASS CLIPPINGS - 40

THE DYNAMICS OF DROUGHT MANAGEMENT

In the RSA water is becoming a very precious commodity. With the demand for domestic water increasing every year and our rainfall less predictable the authorities have to start looking at their options to control and regulate consumption.

Unfortunately, when it comes to deciding where to apply restrictions, sports turf facilities will be among the first casualties. As the majority of bowling clubs in the RSA obtain their water from the local authority, they must accept the fact that their regular supply of water would be at risk and that they have no control over that decision. As the drought persists water restrictions will become more stringent culminating in a complete prohibition in water being supplied to sporting bodies.

It is a very frustrating time for the GKP but there are still some management techniques which he should apply to ensure that when the drought eventually breaks the grass on the green would have survived and still be viable.

To achieve this the GKP must be conversant with how the grass plant adapts to a reduction in the water supply and what he should do to accommodate these changes.

A drought is an insidious process which should be recognised in its early stage. If a GKP, only reacts when water restrictions have been imposed then he has lost the opportunity to prepare the green for the stresses associated with long periods of water rationing.

A drought can be divided into three phases -

- 1 The Anticipatory Phase where you know the rainfall has been well below average and the Local Authority is contemplating imposing water rationing.
- 2 Water rationing is in force and will become more stringent as the drought intensifies.
- 3 Complete ban on the use of water on sports fields.

The Passage of Water in the Grass Plant

Water applied to the surface of the green will percolate through the various layers of the soil. In its passage it will “pick up” various soluble elements and convey them to the root layer.

Water in the root layer will be absorbed and conveyed to the leaves where that which is not required for the process of photosynthesis will be freed again into the atmosphere by the process of transpiration. Transpiration allows for a layer of “moist **cooler** air” being available immediately around the leaves. Wetting agents might improve the passage of water through resistant soils but might reduce the soil's water- holding capacity.

Photosynthesis

Photosynthesis is the process whereby the energy derived from sunlight is absorbed by the grass plant, and used to combine atmospheric Carbon Dioxide and Water, to synthesise sugar. The sugar will provide the energy the plant needs to survive and grow.

Photosynthesis can only take place in the presence of chlorophyll (Identified as the green pigment in the leaves of the grass plant). The chlorophyll molecule will absorb light energy from sunlight and convert that energy into heat energy which is required to synthesise Carbon Dioxide, and Water into sugar. Magnesium is an essential ingredient of chlorophyll.

Note Photosynthesis can only take place in daylight and, also, only take place in green leaves

In perfect conditions there will be a surplus of sugar. This surplus is stored in the roots and stems.

Basically, it is a process involving the transference of one form of energy into another form i.e. light energy is converted into chemical energy in the form of sugar.

The amount of sugar produced would be influenced by -

- 1 The total surface area of the green leaves. - Cutting a green too short and “thinning out too vigorously can reduce the number of green leaves to a level where the viability of the grass plant is at risk.
- 2 The amount of water available. Whilst water is freely available the GKP can afford to be “aggressive” in maintaining a high rate of growth but once water rationing is in force he will be forced to restrict his greens maintenance to less energy-intensive procedures.

Note The GKP would like to manage his green by regularly removing old leaves and debris (e.g. scarifying, verti-cutting) and then stimulating growth to produce a surface made up only of new young leaves. Both procedures involved are energy- intensive -

- 1 The energy used by the defence mechanism of the grass plant repairing the damaged stem and roots.
 - 2 The energy used when new growth is stimulated to produce many young leaves.
- Such procedures cannot be considered when water is not freely available. There is no assured supply of sugar. (*Would a motorist undertake a long journey if he has doubts about the availability of fuel*)
- The GKP must be able to estimate how much sugar he can expect from the water available and modify his management programme accordingly to a low intensive more conservative form of cultivation.

DROUGHT MANAGEMENT PLAN

At the first sign of an impending drought a prudent GKP would formulate a Drought Management Plan (DMP) which would cover all the problems associated with a gradual reduction in the amount of water available to the club.

The crisis facing the club is not only for the GKP but involves the whole club because a successful resolution of the problem would entail the co-operation of all the members.

Phase One – Once the GKP is aware of the fact that the existing dry conditions might lead to water rationing there are certain management techniques which he should apply while water is still freely available.

Cultivation

(1) Promote deep rooting –

- (a) Deep infrequent irrigation so that the roots seek water at a lower level – only irrigate again when there are signs of “wilting”.
- (b) Aeration by hollow-tining. If there is compaction and shallow rooting there will be the danger of heat stress. **Such a green must be aerated to encourage deeper rooting and removal of thatch.**

(2) Avoid any major cultural practices (eg Renovation) where the grass might not have recovered by the time water restrictions are imposed.

(3) Apply whatever fertilisers are recommended in soil analysis but avoid quick acting Nitrogen (Ammonium Sulphate)

(4) Do not apply any Growth Stimulants, Herbicides or Pesticides

Irrigation System – Avoid Waste - Ensure that there are no leaks and that all faulty connections are repaired. The sprinklers must be placed correctly to get uniformity of distribution - avoid unnecessary overlapping. Avoid irrigating in the middle of the day – too much water is lost through evaporation. Divert more water to the areas which carry the greater load – mat area.

Mowing Raise the mowing height by 1.00mm or more. The GKP should appreciate the fact that he can only afford to reduce the mowing height during periods of maximum growth. When he has to resort to drought management, he must increase the leaf area so that the grass can get the maximum benefit from the limited amounts of rain which might fall.

Equalise Wear and Tear - Move rink numbers regularly and encourage players to vary the mat placements.

Alternative water supplies Explore alternative water supplies

Phase Two - Use of water strictly rationed and as the drought becomes more acute so will the amount of water available to sporting bodies be reduced still further. The grass plant goes into survival mode and initiates a form of voluntary dormancy – slowing down most of its functions.

Heat stress as the amount of water reaching the leaves is reduced there might still be sufficient water for photosynthesis but not enough left for transpiration. The “envelop” of water vapour protecting the leaves disappears. Loss of this envelope of high humidity around the leaves would expose the grass plant to greater heat build-up and even heat injury.

Mowing - Only mow when needed and single-cut the outer 3.0m (The act of mowing a green is very traumatic to the grass plant. The tips of the leaves are cut leaving a wound which must be sealed off immediately to avoid hostile organisms gaining entry into the grass plant – the healing process can use up a considerable amount of energy.

It is important that the GKP should minimise the damage to the leaves by checking on the adjustments to the mower every time it is used. a well-adjusted sharp reel making a clean cut

would leave the smallest wound while a badly adjusted **A badly adjusted blunt reel and bottom blade would slash the leaves and cause extensive bruising which could double the amount of energy (sugar) required.**

Fertilising Apply molasses and Seaweed emulsions but avoid any growth stimulants. Making sugar (in the form molasses) available in the root zone might make it possible for the grass plant to absorb some sugar directly without having to produce it.

Greens Management Damage caused by the players is unavoidable. Most of it will occur in that part of the green where the mat is placed and the players wait their turn to play.

The speed at which the damaged grass will be repaired will depend on the availability of sugar to provide the energy for this process to take place. The GKP must ensure that the damage is repaired before the next session of play on that portion of the green. The GKP might be forced to restrict the number of playing days per week

Defence Mechanism - The defence mechanism is a very complex entity. It is manufactured in the roots and composed of enzymes, amino acids, and proteins.

It has a protective, healing and restorative function. Sugar not only provides the energy to manufacture the defence mechanism but, must, also provide the fuel for the various repair processes involved.

When sugar is in short supply the defence mechanism is one of the first casualties. With a limited amount of “new” sugar being produced the leaves tend to hoard it leaving the roots with a deficit. Root growth is restricted and the manufacture of the defence mechanism discontinued. The grass plant can, now, no longer repair damaged areas neither can it protect the plant against invasive virulent organisms.

If the GKP can no longer repair the damage caused by the mower or the traffic of players because the defence mechanism is non-existent then the GKP should stop mowing and try to avoid playing where there are any signs of previous damage.

When a grass plant goes into drought mode it tends to restrict the use of the little sugar left over to maintain only the essential functions while any other functions become dormant.

Salinity - Any large expanse of water will lose water through evaporation. - if the inflow of “fresh” water is restricted the salinity of the dam will gradually increase. The same could apply to underground water. The GKP should regularly have the water tested or enquire at the Local Authority re the salinity of the water. If the tests show an increase in the Electrical Conductivity, then he should consider an application of Gypsum to remove the excess Sodium.

Phase Three Complete prohibition on the use of water on the bowling green. The survival of the grass now becomes the main priority. If the green is still green then there can still be some photosynthetic activity but as soon as it turns brown it will signify that there is no more chlorophyll and “food” (sugar) can no longer be produced.

Use of the Green the GKP should avoid the temptation of allowing play on a brown green

The GKP should enlist the co-operation of the Club Executive and members and desist from playing unless it rains. If a little rain produces green leaves, then it would be a sign of photosynthetic activity and some “sugar” having been produced. A limited amount of play can be allowed, while the grass is green.

Recovery - If the GKP closes the green timeously and avoids mowing the grass can go into a dormant phase for a prolonged period using only a minimum amount of energy (sugar).

Once it starts raining that little bit of stored sugar might be enough to initiate new growth – green leaves will appear on the green.

If it has rained and after a few weeks new green shoots have not appeared on some portions of the green the GKP will have to replant the bare areas.

Underground Water Some clubs are fortunate enough to have a substantial supply of water underground. The only drawback being how much water is available and what is the quality of that water. As the salinity of underground water might change the GKP would be well advised to monitor the salinity of the water regularly before changes in the grass tell him that something is amiss.

Conclusion Taking a green successfully through a drought is an achievement all green keepers should strive for. I hope this article helps them to do so.