GRASS CLIPPINGS 11

1.0 INTRODUCTION

One of the lasting memories of my early school years was the constant reminder that I could not expect advancement to a higher standard if I had not mastered the 3 "R"s reading, (w)riting and (a)rithmatic.

20 Years later when I first became interested in Green keeping I was told that I could not expect to advance as a green keeper(GKP) until I had mastered the three Primary Cultural Practices (Mowing, Irrigation and Fertilising)

Now, much later I have become disillusioned – the sacred cows of yesteryear are no longer sacred – everyone seems to want to "run before they can walk" In greens management the tendency to ignore the "basics" is, probably the prime cause of the deterioration of our greens in the RSA.

The demands for finer turf, the establishment of turf under extremely unfavourable conditions, and the severe stress from traffic and use require the highest level of cultural expertise which would include an extensive knowledge of plant nutrition and fertilisation

As fertilising has become the main casualty in this new trend the next two issues of Grass Clippings will, therefore, be devoted to the least understood of the Primary Cultural Practices –

FERTILISING

2.0 FERTILISING AND FERTILISERS

2.1 DEFINITION - *The process whereby essential plant nutrients are supplied to the soil as part of a cultural programme.*

The cultural programme referred to includes –

- The regular replacement of nutrients which have been used up by the grass plant plus the rectification of imbalances found in the soil sample
- The regulation of the growth rate of the grass plant according to the nutrients applied.

In this issue we will be concentrating on the use of fertilisers to regulate growth in the Grass Plant

The plant nutrients are called fertilisers and perform the same function as Vitamins in the human body

2.2 NUTRITIONAL REQUIREMENTS

Like any human being the grass plant cannot survive unless his daily diet includes.-

- Energy – giving Substances - Carbohydrates to replace the energy (or calories) used up during the day
- Vitamins / Nutrients – Substances which control many functions in the grass plant.

Carbo-hydrates (CHO)– Unlike a human being where the Carbo-hydrates are included in his daily diet the grass plant has to produce it's own CHO by the process of photosynthesis which takes place in those leaves which are exposed to sunlight.

Nutrients – Thirteen nutrients (mineral elements) are recognised as being essential for plant growth These nutrients regulate certain functions in the plant - including the growth rate - they are the **vitamins** of the grass plant.

2.3 WEAR AND TEAR

When a GKP opens a green for play the machines used to prepare the bowling surface and the traffic of players adds up to a considerable amount of damage to the grass

The damaged leaves, stems and roots must be repaired or replaced quickly

It is therefore incumbent on the GKP to maintain a growth rate which enables him to repair or replace the damaged grass at a faster rate than it is being broken down by players and machines.(Wear and Tear)

Let us, therefore, assess "wear and tear"

2.3.1 The Grass Plant in the Veld

Let us start off by looking at the grass plant growing unhindered in the veld. It will tend to be a few centimetres tall and have a root system to match. The large amount of green leaves coupled with this exceptional root mass can produce all the CHO the plant needs –

Some of the leaves are growing vertically while the majority are growing horizontally forming a mat which is spreading all the time

The grass plant is actually self-regulatory It regulates it's growth according to the rainfall and the nutrients available in the soil.

The supply of nutrients is augmented by animal droppings and the breakdown of old leaves which have fallen off the grass plant or other bushes or trees. With the addition of rain water these leaves decompose on the surface and form a mulch which finds it's way to the root zone thereby making up for the nutrients taken up by the grass plant originally.

2.3.2 The Grass Plant on a Bowling Green

This image of a grass plant growing in the veld is a far cry from what we, in bowls, expect from the grass.

The Bowls GKP's objective is to create a perfect bowling surface for his members. His first priority would be to plant a grass which forms a contiguous plant community tolerant of mowing and traffic. Once the grass has completely covered the green with an even mat he can proceed with the preparation of the bowling surface. His prime objective, at this stage, is to maintain a uniform rate of growth which will create turf which is able to handle intensive wear.

The grass grows vertically and horizontally – excess growth needs to be removed regularly by mowing i.e. the horizontal mower will limit the vertical growth while the vertical mower (verticut, groomer, scarifier and brush) will limit the horizontal growth by thinning out the mat.

In contrast with the grass plant in the veld the GKP –

- Mows the grass regularly
- The clippings are taken up in the bin.

Note - As many of the nutrients are stored in the tips of the leaves and by taking up these clippings in the bin he is removing some of the nutrients he so carefully applied to the green . It is estimated that up to 15 Kgm of Nitrogen is "lost" from a green every year in the clippings.

- Removes the dead leaves and dry grass which would previously have formed a mulch
- He does not allow animals on his green.

The natural processes which occurred in the "veld ", where the grass plant regulated it's own growth no longer apply. **The destiny of the grass plant is now completely in the hands of the GKP.** He has two concerns –

- He has removed the grass plants natural source of nutrients.
- By mowing he is causing a considerable amount of damage to the grass –
  - Horizontal mower – the cut leaves have to heal quickly before the green is mown again
  - Vertical Mowing – Some of the live leaves are torn from their stems while others are raised and later cut by the horizontal mower - all this is rather traumatic and the damaged leaves have to heal as quickly as possible

So much has been said about Vertical Mowing and the need to control the proliferation of the Mat that we should now pause for a moment and look at the MAT

2.3.3 The Mat

On a bowling green the mat would be composed of the following-

- Live Leaves, Stems and Stolons
- Dead Leaves
- Grass Clippings which did not fall into the mower bin

Live Leaves Stems and Stolons - These leaves are responsible for the production of CHO the plant relies on for it's energy needs

Dead Leaves - As new leaves emerge from the nodes of the stolons they will seek sunlight and tend to lie on top of the other horizontal leaves in the mat. As the bottom leaves are deprived of their sunlight they will turn brown as they lose their chlorophyll – these leaves are no longer of any use to the grass plant and only thicken the mat unnecessarily.

Grass Clippings - It is estimated that up to 25% of the clippings taken off by the mower fall on the green instead of in the mower bin. These, also, only serve to thicken up the mat.

A GKP should first remove all the superfluous material after which he must assess how much of the live leaves must be removed to stem the proliferation of the mat. Only by experience can the GKP decide how many of the live leaves can safely be removed without reducing the CHO producing potential of the grass plant to a dangerous level – not so easy considering the equipment available.

Of all the equipment available the Brush is probably most likely to remove the dead material without tearing off the live leaves and stems. While the brush is throwing out brown material into the bin the GKP can be satisfied that he is not reducing the Leaf Area

It is when he starts using the Groomer and the Verticut that he might be removing too many live leaves – It is vitally important that the GKP should always look at the contents of the bin so that he can estimate what percentage of the material is brown and how much is green. .

When the bin shows a preponderance of green leaves the GKP has not only removed the CHO-producing leaves but the increased trauma has put the defence (or stress) mechanism of the grass plant under severe stress.

Like the defence mechanism of the human body that of the grass plant has to seal off and repair any damage inflicted on the grass plant

2.3.4 Defence (or Stress) Mechanism

This mechanism of the grass plant is normally well-developed. It is based on the presence of stress-fighting compounds - Amino-acids, proteins and enzymes being available.

CHO is an essential component of these compounds which are produced in the roots of the grass. The production of these substances depends on there being a well – developed root system and adequate reserves of CHO to supply the energy used up in the process.

The GKP must always be aware of the fact that the very existence of the grass plant on the bowling green depends on the Defence Mechanism being able to cope with the wear and tear he is inflicting on the grass plant.

2.3.5. Assessing Wear and Tear

- Possible variations

Machines – Mowers –

- Horizontal Mowing
  The damage can vary according to –
  The expertise of the operator of the machinery eg the operator who allows the

back roller to "churn" away while turning the mower

The adjustment of the Mower - A well-adjusted-mower cutting the leaves cleanly will cause the minimum amount of trauma to the grass plant and encourage early healing in the leaves whereas a badly adjusted mower will "slash" the leaves leaving extensive bruising, tearing and loss of fluids before the open parts can be closed. This will not only result in much more energy (CHO) being burnt up but loss of time while the damaged leaf is repaired .

There is, also, the possibility of germs (fungi/bacteria) entering the plant via the open wound

- Vertical Mowing – Groomer, Verticut, Scarifier Teaser Comb and Brush

  While vertical mowing (thinning out the mat) is an essential part of good greens management it is still very traumatic for the grass plant

One can say that apart from the edges where the mower is turned, the wear and tear caused by the machines is not only constant but also fairly evenly spread over the whole green

Players - The wear and tear of most concern to the GKP is that caused by the players

Here we have a completely different dimension - the wear and tear is mostly concentrated on the perimeter of the green where the mat is laid.(In a normal rinks game players will get on and off the mat 88 times at each end) The extent of the damage will; vary according to the number of players using the greens every month – the player count

Player Count – The number of players using the greens every month–Three Categories

- Less than 150 /green /month - Low Count
- 150 – 250 / green / month - Medium Count
- More than 250 / green / month - High Count

The intensity of cultivation would vary according to the Player Count eg.

Low Intensity - 3.0 Kgm Nitrogen / month

Medium Intensity – 4.5 Kgms Nitrogen/ month

High Intensity – 6.0 Kgms Nitrogen / month

From the above it is obvious that the amount of wear and tear the defence mechanism of the grass plant is expected to handle or replace is not constant from club to club and that no GKP can actually plan his fertiliser programme unless he knows how many people are using the greens every month i.e. The Player Count

2.4 THE INTERACTION BETWEEN FERTILISING AND PHOTOSYNTHESIS

If a person, driving a motor car, wants to go faster he will "stimulate " the car by putting pressure on the accelerator.- BUT.- The car will only go faster if there is enough fuel to meet this additional demand.

Fertilisers will "stimulate "the grass plant to grow faster but the growth will only come about **if there are adequate reserves of CHO to supply the energy required for this increased growth.**

It is most important that the GKP appreciates this – blindly applying fertilisers to stimulate plant growth is futile if the leaf area is not capable of providing the CHO needed to maintain that rate of growth

Warning - While excessively close mowing will reduce the CHO reserves excessively high rates of nitrogen fertilisation, on it's own to increase the growth rate, can also exhaust all the CHO reserves so that the grass plant is solely dependent on the photosynthetically produced CHO which might not be enough to sustain the desired growth rate..."Turfgrass Management" (A.J.Sturgeon)

Every time a GKP has to increase the growth rate to accommodate increased wear and tear he must, also, increase the CHO production

2.5 EXPERTISE

Over the years bowlers have been more vociferous in their demands that their GKP should be able to produce a bowling surface of the highest order. It is a fact that in most clubs the demands of the members for better and faster surfaces has far outstripped the ability of the GKP to produce such a surface.

Note A well-respected Australian GKP once told me that to lower the mowing height by one millemetre required three times the expertise.

Nowhere has this become more obvious than in those clubs where the player count is touching 350 – 400 players /green /month mark.

To negotiate the tightrope which requires the GKP to manipulate his green management in such a way that the grass recovery is one step ahead of the damage caused by wear and tear requires the highest level of expertise. Not only is he required to know how to use his fertilisers correctly but he must also know his green and be able to "distribute the load of the wear and tear" in such a way that every part of the perimeter of his green is equally affected.

Each plant is an entity on it's own and if one small area is exposed to more wear and tear it is that part which must receive more attention.

It is imperative that he maintains adequate reserves of CHO in each plant.

2.6 DISTRIBUTING THE LOAD

So much has been said about the need to equalise the load on the perimeter of the green that I thought it fitting to discuss it now..

- Move the rinks regularly
- Alter the direction of play regularly even if it means playing " against the sun "..
- Place the boards on the other side of the green – it is amazing how many players stand on the edge of the green and "vroetel" in their bag during a game
- Have a local rule that on Tabs – in days the mat is placed where the jack was in the previous end. This will ensure backward and forward movement of the mat.
- In Australia on Tabs-in days only the player delivering the bowl and the skip stand on the green – the others are on the bank.
- Nominate which rinks can be used for practising – it is amazing how often they go to the same rink.
- Increase the leaf area over the perimeter of the green. (See 2.7.2.)

2.7 SELECTIVE FERTILISING

We have by now concluded that wear and tear can be General or Localised.

General - The wear and tear from the machines and the players walking to the other end is evenly spread over the whole green

The GKP can safely fertilise the whole green at a prescribed rate

Localised - With every session of play more wear and tear would be concentrated in that small area where the mat had been placed and it's immediate surrounds .

Even if the GKP moves his rink numbers regularly it is still on the perimeter of the green

Generally one can say that the perimeter would need an additional dose of fertiliser to enable those grass plants to cope with the extra damage

A prudent GKP could, therefore fertilise the whole green according to it's needs and then apply some more fertiliser and water either to the mat position specifically or to the perimeter as a whole..

The easiest way out for the GKP is, after having fertilised his whole green he mixes a more dilute solution of fertiliser and then applies it to the perimeter of the green. The amount of fertiliser applied would depend on Player Count. This would produce a faster rate of growth on the perimeter than that of the centre portion of the green

2.8 CARBO-HYDRATES

2.8.1 Energy Requirements – The grass plant is alive and being alive it uses up energy – this energy is derived from the CHO manufactured in the leaves of the plant. The main areas where CHO would be required are the following –

- To enable the plant to grow i.e. leaves stems and roots
- Energy is needed for certain basic activities eg. to convey water from the roots to the leaves and CHO from the leaves to other parts of the grass plant
- The substances which make up the Defence Mechanism can only be produced in the presence of CHO
- The micro-organisms in the root zone break down the fertilisers to make them acceptable for absorption by the roots. They also use up energy and, strangely enough, receive their CHO from the roots of the grass plant

2.8.2 Rate of CHO production - The rate at which CHO is produced varies with the age of the leaf. A young leaf exposed to the sun will produce the maximum amount of CHO and produce enough CHO to build up the reserves. As the leaf gets older the CHO production diminishes until it is hardly able to produce enough to support itself

If the GKP is going to increase the growth rate over the perimeter he must also increase the CHO production by increasing the leaf area.- Two Possibilities

- Increase the mowing height over the perimeter by one millemetre
- Mow the perimeter only once a week.

Immediately after horizontal mowing, apart from the leaves being cut, the grass plant feels bruised and photosynthesis (and CHO production) will be arrested for a few hours.

If,.therefore, you mow the centre of the green 4 – 5 times per week and only mow the perimeter once a week there is an appreciable increase in CHO production over the perimeter compared with the centre of the green. (The grass density over the perimeter will increase)

Increasing the leaf area on the perimeter would not appreciably slow down the green.

2.9 GROWTH STIMULATION

Theoretically the GKP is only required to adapt his fertilising programme to the growth rate required to cope with the wear and tear.

There are, however many GKP's who maintain a growth rate in excess of that required.

If they do so they would have to maintain sufficient CHO reserves and cope with excessive mat formation.

This state of affairs would obviously be preferable to under-stimulation where the GKP would have created a position where the grass

plant is not growing fast enough to cope with the wear and tear.

2.10OTHER BIO - STIMULANTS

Apart from the Nutrients there are other growth stimulants available on the market eg. Auxins, Gibberlins, and Cytokinins (Kelp) Unless the GKP has exhausted all the other options he should approach these stimulants with care

There are a number of new products available which serve to increase the root density, prolong the life of the leaves, or improved water uptake. All will enhance the quality of the turf and must be considered in certain instances – funds permitting

2.11 GROWTH RATE IN GRASSES

Until now we have assumed that all grass plants will grow at the same rate. This is not the case eg. Bayview is probably the fastest – growing grass commonly used on our greens while Silverton Blue is probably the slowest. This might have an important bearing on how successful the GKP is in managing the wear and tear.

2.12 MAJOR TOURNAMENTS

Few GKP's realise how much additional wear and tear comes with a Major Tournament.

Assuming your player count is in the region of 200/green/month and you are now going to host a 5-day tournament in which your greens will be full for the full 5 days then in those few days your green will have to carry about 480 players

The Defence Mechanism of the grass plant will be sorely pressed to repair the damage before the next day's play unless substantial CHO reserves had been built up before the Tournament

A prudent GKP would start about 5 weeks before the Tournament and raised the mowing height to increase the leaf area. The roots would think it is Xmas and start expanding to cope with the increased demand from the leaves. This would result in a build up of CHO reserves.

Two weeks before the tournament the GKP can safely reduce the mowing height and start speeding up the green so that it runs at about 12.0 – 12.5 secs. on the opening morning.

As a result of the traffic the grass leaves will lose their resilience and not resist the passage of the bowl. The green will speed up to 13.5 secs. within 5 days.

One must never forget that it is up to the GKP to ensure that his green is still playable when the greens are handed back to the host club at the conclusion of the tournament

2.12 SPEED

The GKP must at all times temper the demands for speed with the Player Count

Let us look at the following scenarios –

1 Player Count of 350 / green/month

To cope with this kind of wear and tear the GKP would have to maintain a high rate of CHO production which, in turn, would need an increase in the leaf area.

This would run counter to his attempts to speed up the green

If, in deference to the demands for speed, he reduces the leaf area to a level where the

CHO reserves are compromised and the photosynthetic capability of the grass is reduced to the level where the defence mechanism can no longer repair the damage caused by wear and tear then worn areas will appear on the perimeter of the green - the emergence of new horizontal leaves will stop and as the old ones die off all one sees on the green is white runners lying on bare ground.

2 Player Count of 150 / green /month.

The GKP can opt for a lower growth rate – and reduced CHO production

It would, then, .be possible for him to get by on a lower leaf area and greater speed.

There will, obviously be many clubs with a Player Count between these two extremes .The ability of the GKP to produce fast greens will depend solely on his level of expertise. It is an unfortunate fact that many of our GKP's when assessing their own expertise are driven by optimism rather than rational thinking..

2.13 CONCLUSION

In this issue of "GC10" I have tried to remind the GKP that he can stimulate the growth rate of the grass plant by applying certain fertilisers at such a rate that it enables him to repair the damage done by the players and the machines used in the preparation of the green.

At the same time I hope I have been able to impress on him that any increase in the growth rate **must** be accompanied by a concomitant increase in CHO production.

If I have achieved this our slide to mediocrity will have been stemmed and, hopefully turned round.