TURFGRASS ACADEMY

Green Performance Explained

John Quinn

John Quinn Turfgrass Academy

Contents

Key Attributes of High Performance Greens

- The turf should have a low, creeping growth habit with erect leaves
- There should be tolerance to close mowing (<5 mm)
- There be a high shoot density
- The grass should have a fine leaf texture
- The turf as a whole should be uniform
- There should be freedom from excessive grain, mat or thatch
- The turf should have a good recuperative potential
- The turf should have good disease resistance
- There should be good wear tolerance and colour

Surface Uniformity

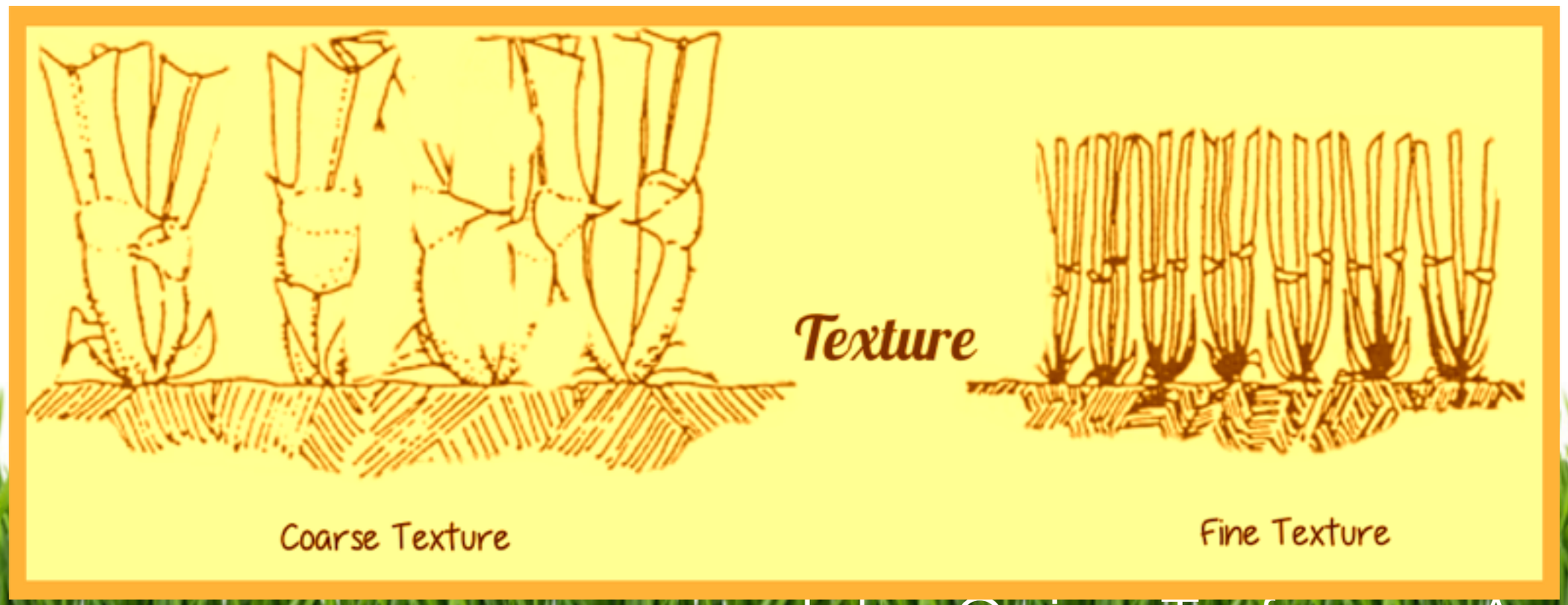
- Factors that detract from Uniformity include the presence of bare areas, weeds and scars from disease, disorders and insect damage.
- Weeds in this sense could include unwanted grasses like Yorkshire Fog, Annual Meadow Grass or Rye Grass.
- Even the desired grass species can cause problems with Uniformity when they develop irregular growth habits, causing grain or excessive thatch.

Turfgrass Density

- Turfgrass Density is a measure of the relative numbers of grass shoots in a given area which can vary widely.
- Bentgrass greens, can produce over 1,700 shoots per square decimetre (10cmX10cm). 165 billion bentgrass shoots per acre!
- Can you see what physiological attributes of grass plants influence Density?

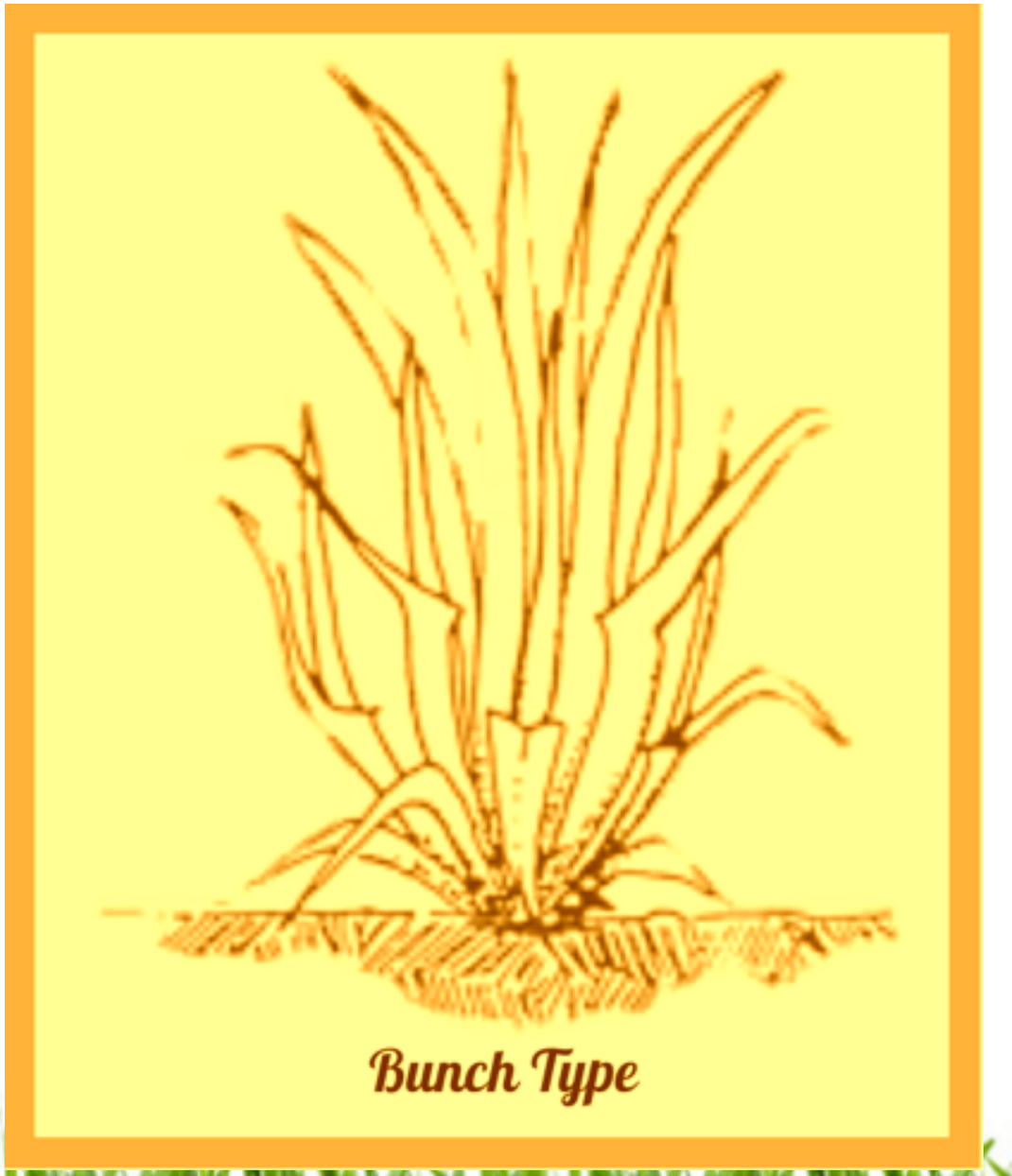
Leaf Texture

- The preferred leaf texture for fine turf playing surfaces (golf and bowls) is a medium-fine to medium texture, ranging from 1.5 to 3 mm in width.
- Variability isn't necessarily inherent, but a result of the greenkeeper's direct influence. Particularly mowing frequency and height.
- Creeping bentgrass and annual meadow grass can be reduced by as much as 50% simply by lowering the height of cut from 37.5 mm to 7.5 mm

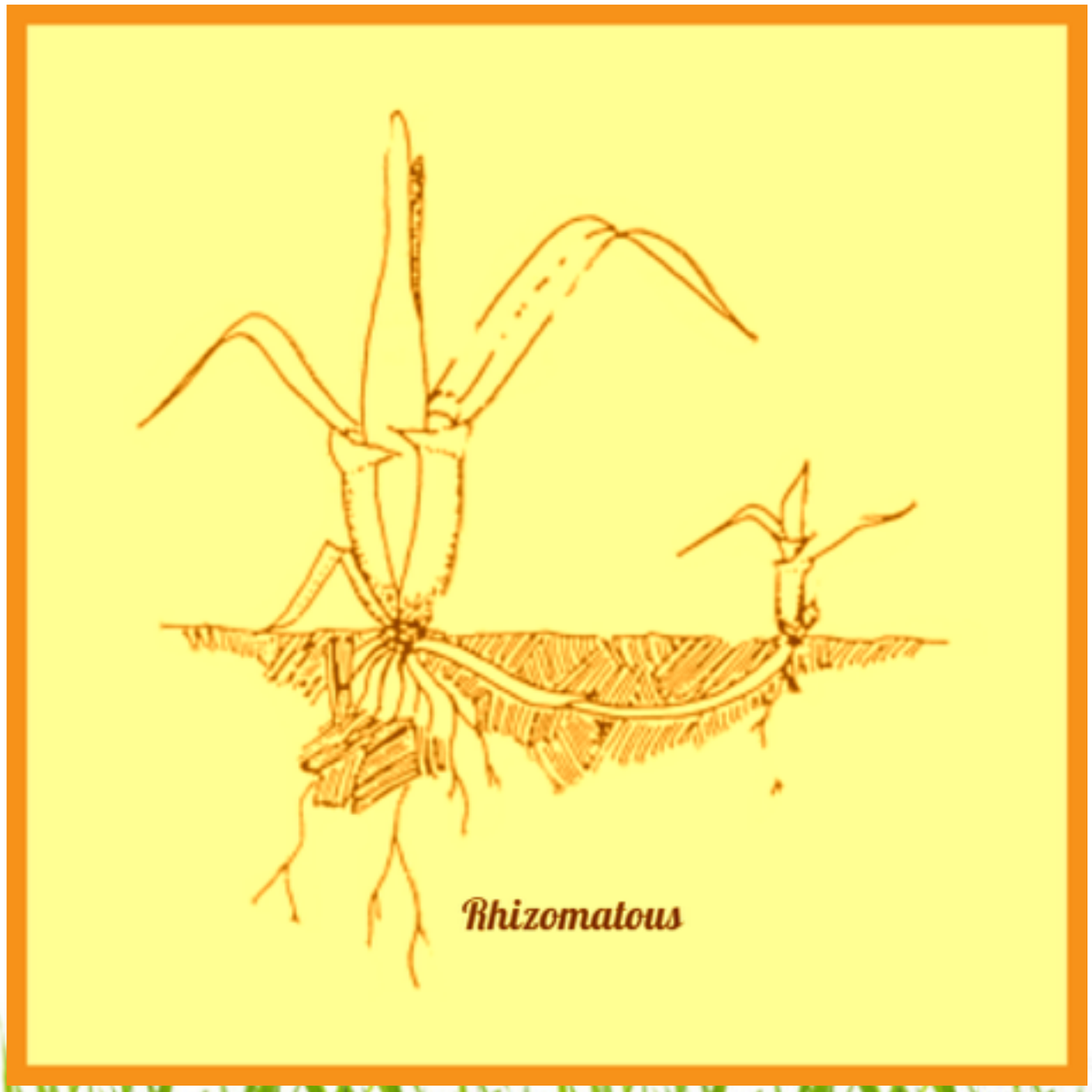


Growth Habits-Bunch Type

- Bunch types spread exclusively by tillering.
- Each shoot originates in a grass plant crown.
- Each time a shoot is injured, a new shoot is initiated.
- Clumpiness is inherent in perennial ryegrass, Chewings fescue, annual meadow grass and other bunch-type turf grasses.
- Chewings fescue usually mixed with other spreading types to form turf.



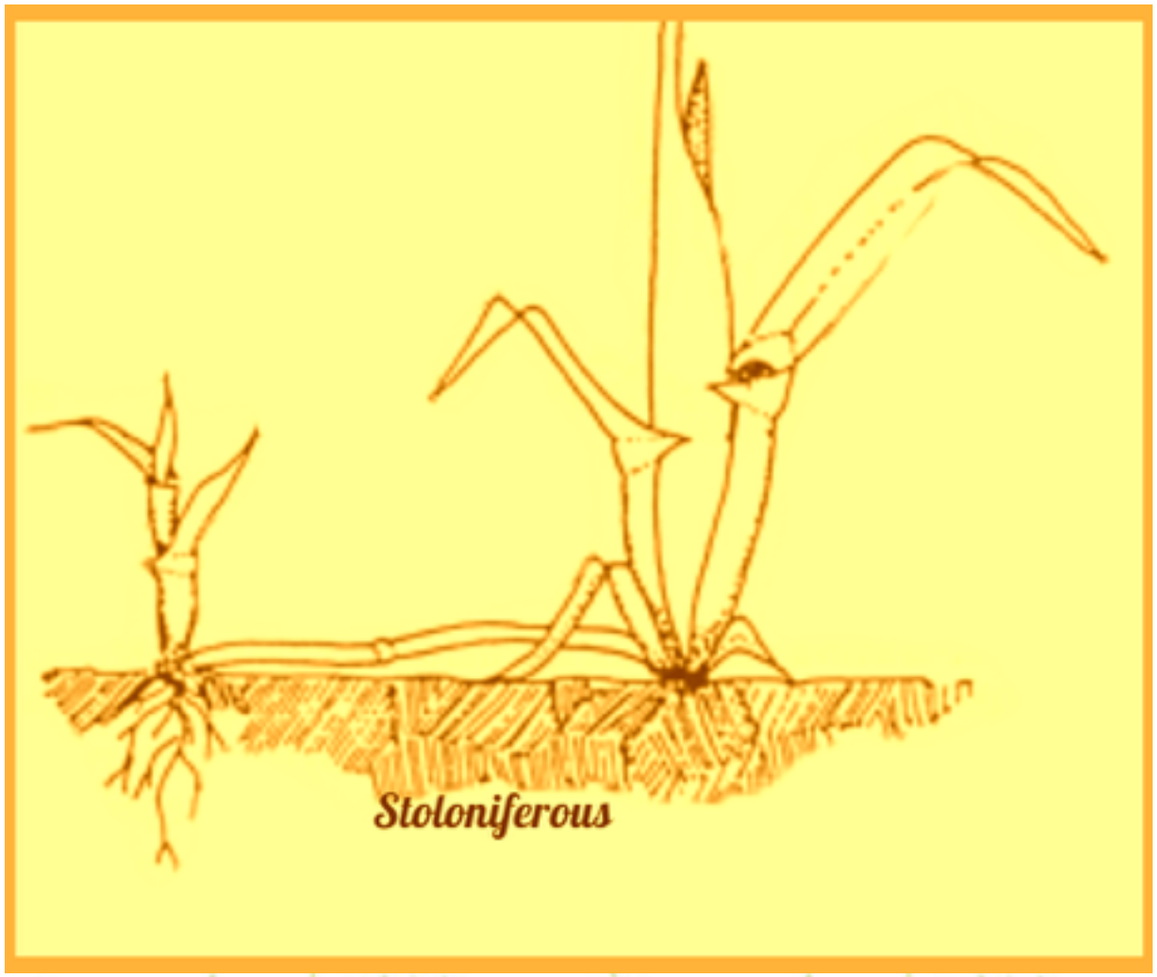
Rhizomatous



- Rhizomatous turf grasses spread by below ground shoots called rhizomes
- Nodes (crowns) are created and from each of these crowns a new plant will grow
- Spreading growth habit results in new plants are far removed from the original parent.
- Strongly rhizomatous turf grasses tend to form uniform turf with aerial shoots orientated in more or less upright position

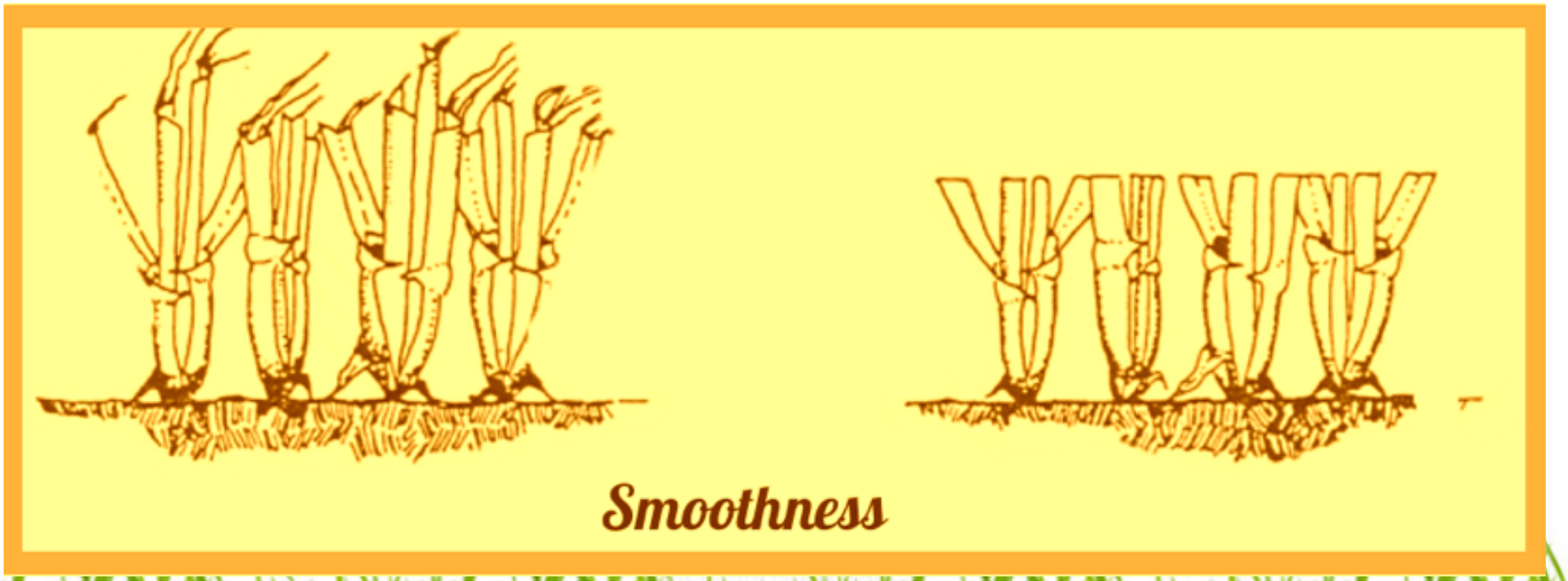
Stoloniferous

- Spread above ground using lateral shoots called stolons, same as rhizomes do below ground.
- Agrostis stolonifera (Creeping Bent) most vigorous turfgrass with densest and smoothest greens.
- Lateral/procumbent growth a problem
- At higher mowing heights >7 mm forms a grainy turf with most shoots growing horizontally



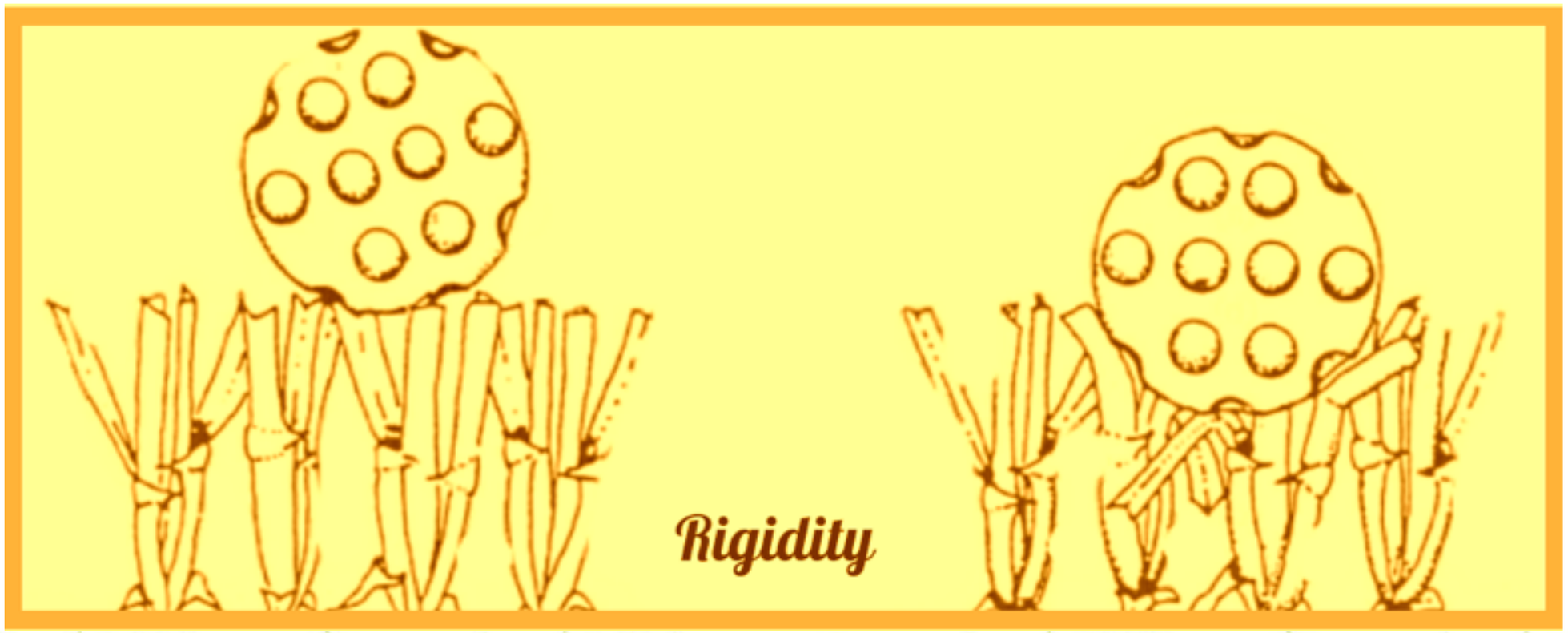
Turfgrass Smoothness

One of the key contributors to compromised smoothness is bad mowing and by that I mean mowing with poorly adjusted and/or poorly sharpened blades. This can cause a tearing action on the grass leaf which can lead to a ragged and discoloured end on the leaf. Amplified over millions of plants/shoots, this can lead to poor performance, particularly in terms of trueness.



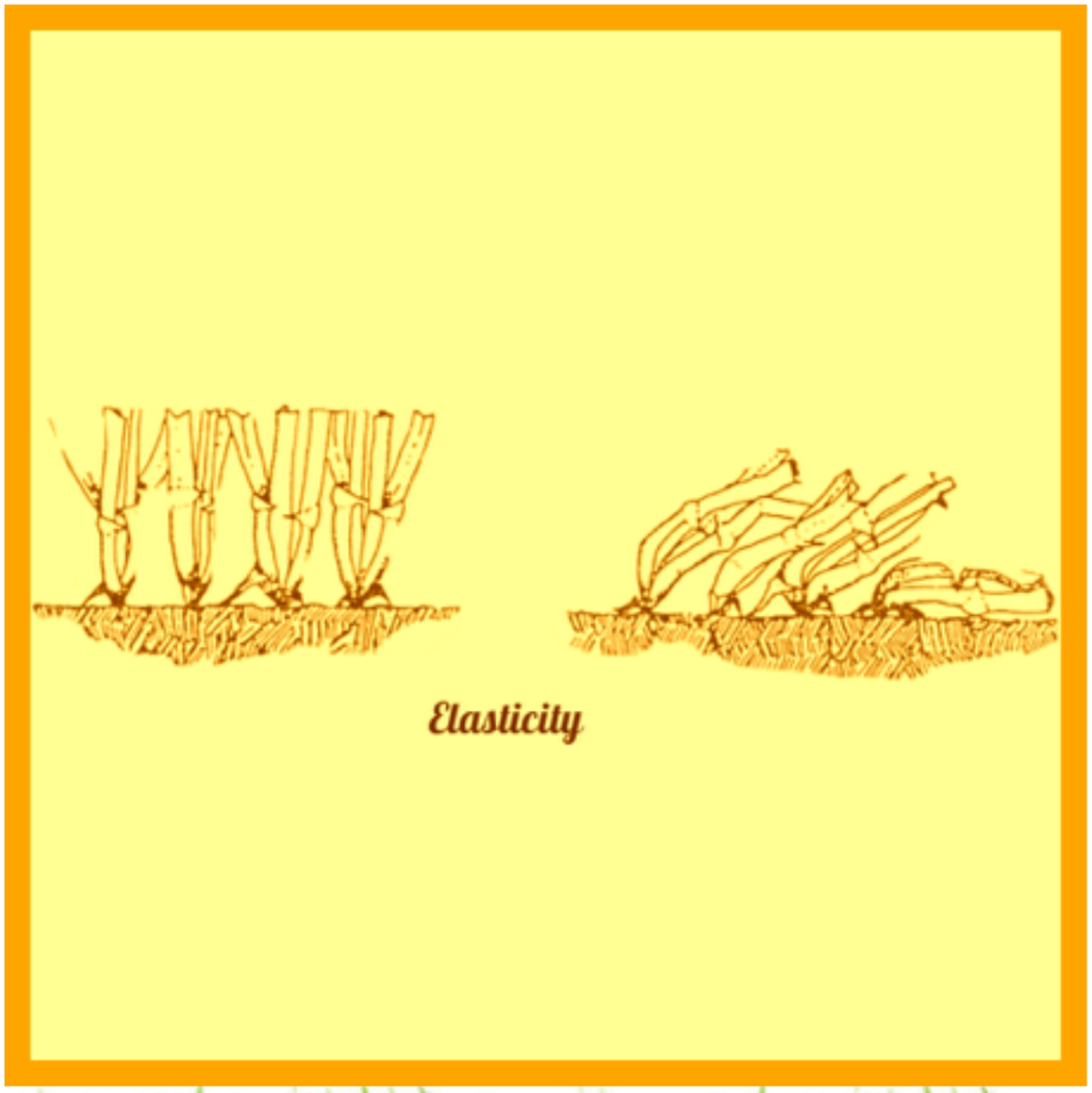
Functional Properties-Rigidity

Turf Grass Rigidity is an assessment of the grass plant's ability to resist compression from downward forces like feet, machinery and play. It is closely correlated with the relative turgor of the internal cells of the plant.



Elasticity

- Elasticity, which is a measure of how able the turf grass is to bounce or spring back to an upright position after being pushed down flat by a ball, a bowl, a foot or a mower for example.
- When the pressure is removed, how readily do the grass leaves spring back to their upright position?
- Turgor, or the grass plant's relative content of water, the strength of cell walls and the general health of the plant will all influence this. In dry conditions when transpiration is rapid, it might be difficult for the plants to remain turgid throughout the day and some loss of elasticity will result.

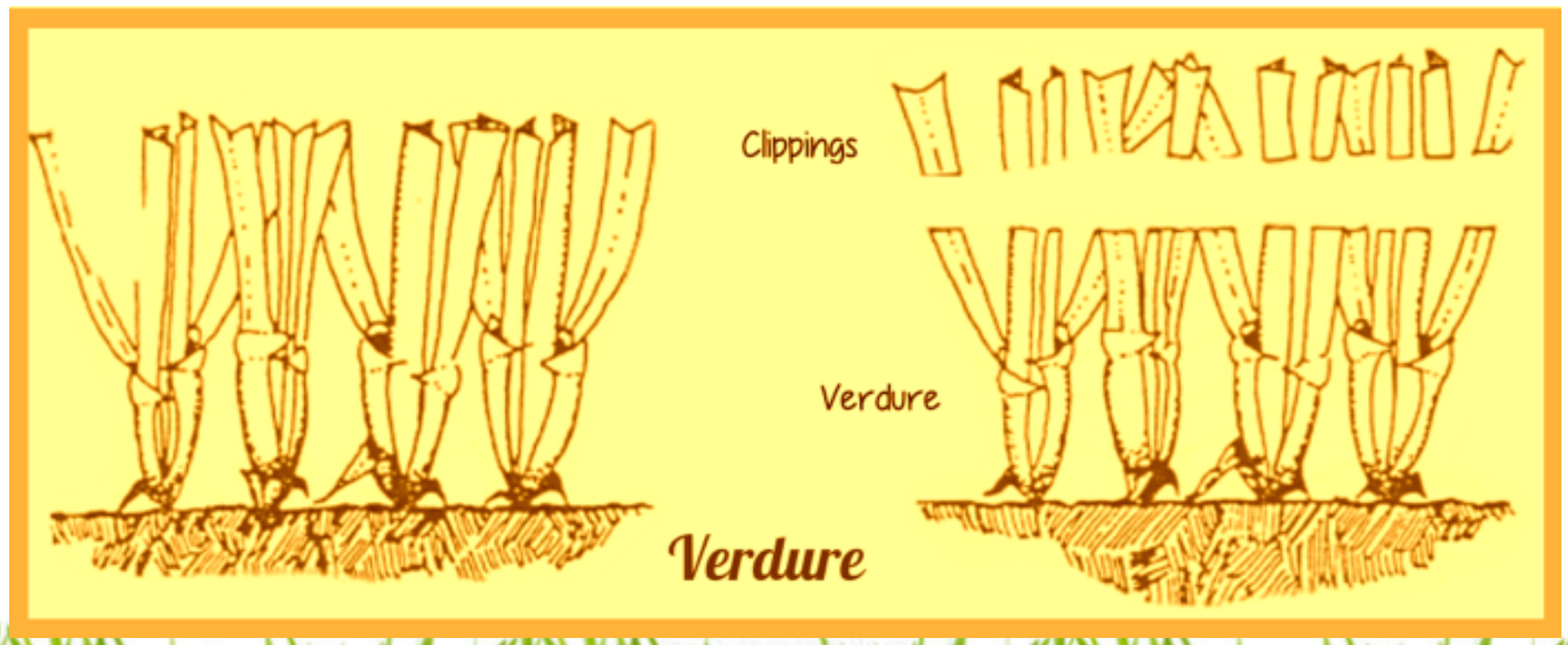


Resiliency

- Resiliency is a measure of the combined effect of grass plants and the medium they are growing in or what we call the turf.
- Turf resiliency is a measure of a turf's capacity to retain it's surface character during and after shock or stress. In this case the shocks and stresses we are mainly concerned with are those from play such as bowling or golf, including the downward pressure from bowls, balls feet and maintenance traffic.

Verdure

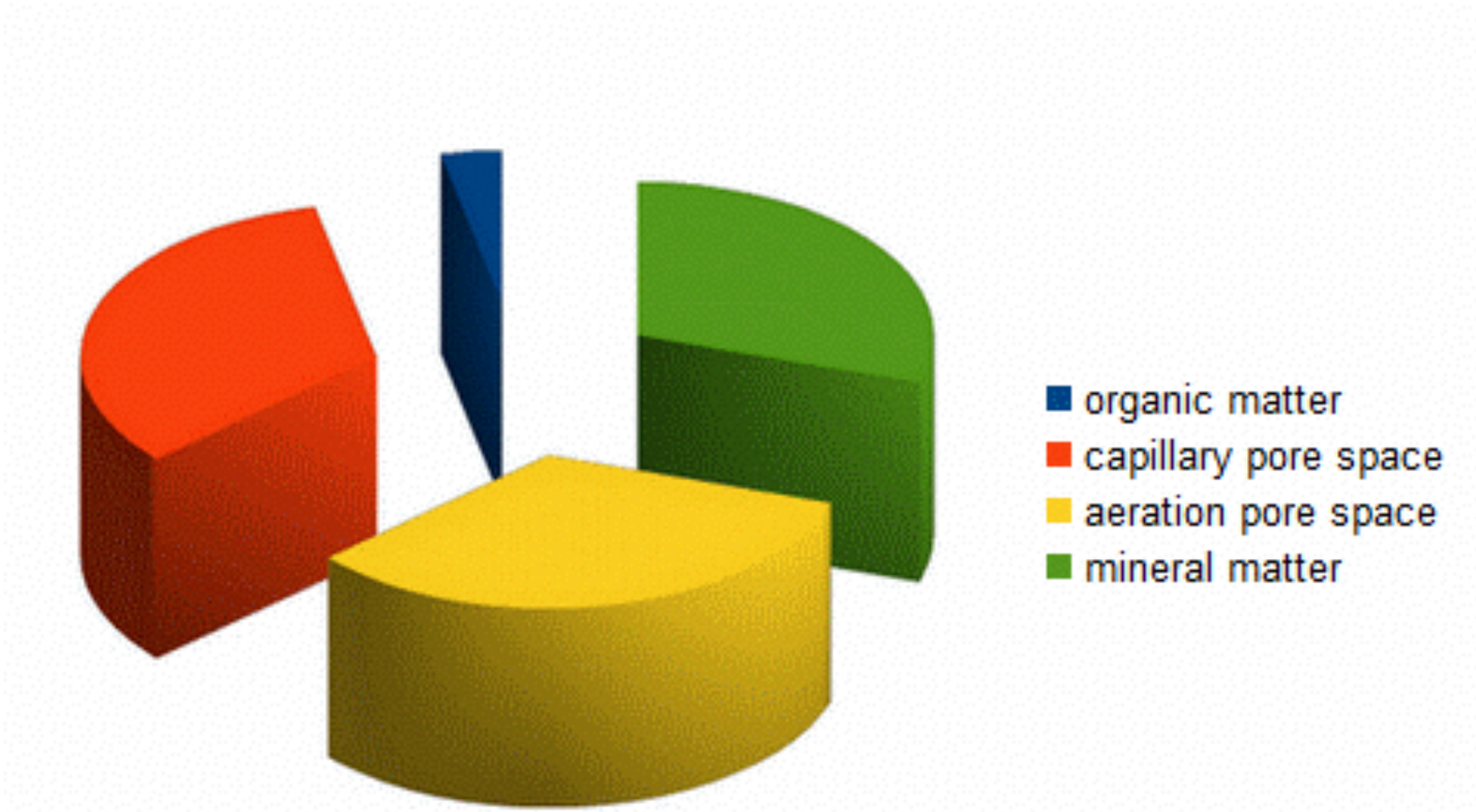
- Verdure is a measure of the green plant material that is left after mowing.
- Root mass is directly proportionate to leaf tissue mass.
- Grass will generally be healthier and more robust at higher mowing heights.
- Raising the height during drought conditions and in winter helps to protect against stress.



What lies beneath?

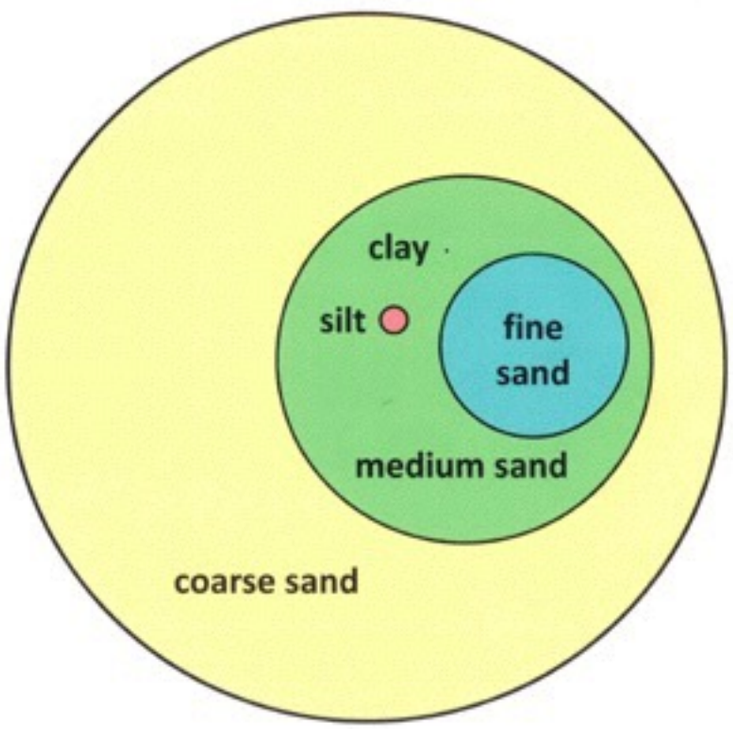
Up until now we've discovered how to evaluate performance by simply looking for visual indicators on the turf and by gauging some of the functional attributes of grass plant communities when they form turf, but no appraisal of this kind would be complete and certainly wouldn’t make any sense in ecological terms without examining the growing medium in more detail.

The Ideal Soil



Mineral Component of Rootzones

45% of the ideal topsoil (rootzone) is made of Mineral material. The mineral component of soil is made up of a mixture of 3 main groups and these are Sands, Silts and Clays. A suitable mixture of these is important to the soil's performance as they dictate the soil's ability to provide nutrition and moisture to the grass plants and to support suitable drainage properties. The mix of sand, silt and clay defines the soil's texture.



Organic Matter (OM)

The organic component will ideally make up around 5% of the soil's volume and consists of living organisms, micro-organisms and dead, decomposing and already decomposed plant tissue (humus). The organic material is added to by the plants themselves as they produce thatch and the soil organisms break this down to release plant nutrients.

50% Nothing?

Then there's the remaining 50% of the soil to look for, but if you do, it might cause you some confusion, because in the ideal soil the remaining 50% of its volume will equate to nothing at all. In fact it is 50% space, or soil porosity to give it the correct name.

Ideally half of this space will be made up of small spaces between soil particles called micro pores and large spaces called macro pores. The micro pores hold the soil solution which is a mix of water and plant available nutrient ions and the macro pores provide air space and this is where all of the drainage occurs after heavy rain. This air space keeps the soil well oxygenated so that it can sustain a huge population of soil microbes; around 1 billion in a teaspoon of soil.

Objective Measurement

- Green Speed
- Green Trueness
- Green Smoothness

Green Speed

- Stimp Meter method, gives a reading in feet. Range between 8 and 12 feet. Higher reading equals faster green.

- Stopwatch method, gives a reading in seconds. Longer time equals fast green.

- Both methods have a human error and subjectivity problems, but Stimpmeter more reliable than stopwatch.

- New, objective equipment becoming accepted such as Greentester in Golf and Bowls Central Speed Ramp in Bowls.

Green Trueness

- A tight, dense, sward with good rigidity, elasticity and smoothness encourages greater green trueness.
- Trueness is a measure of how much side to side movement the wood or ball encounters on its journey over the green.
- Deviation from the straight line is called snaking and this is caused by discrepancies in the surface ranging from Annual Meadowgrass (Poa annua) seedheads to disease scars and thatch related dips and bumps.
- Objective measurement via STRI Trueness, Parry Meter etc.

Green Smoothness

- Green smoothness is simply a measure of how much vertical disturbance the wood or ball encounters on its travel over the green, or bumpiness to you and me!
- This movement is referred to as bobbling and is influenced by many factors, but thatch management is the greatest of these.
- Thatch is by far the biggest contributor to bumpy greens and the unevenness caused by excessive thatch and the constantly mobile nature of this makes top-dressing as a cure for bad levels ineffective.
- Measurement via STRI Trueness meter, Parry Meter etc.

Tyre Lever and Golf Ball

- Stimp Meter Adaptations such as Greentester and Bowls Speed Ramp can be used to good effect for Performance Measurement of playing surfaces.

- Speed, Trueness, Smoothness and Surface Reliability can all be appraised.

- A Tyre Lever and a Golf Ball can be used to good effect for clubs on a tight budget…(only partly tongue in cheek).

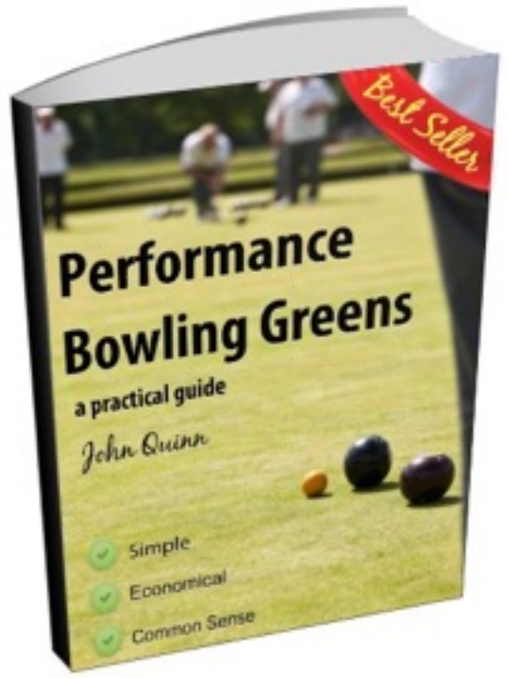
Final Points

- This presentation is a bullet point version of a more comprehensive article first published on Bowls Central. There is also a free eBook version.
- You are also free to embed the presentation on your club website if you so desire. If you need any technical help with this, please don't hesitate to get in touch.
- As detailed in the full article, this subject area can be compared to the traditional Russian doll, when one layer is exposed to the light it becomes apparent that a deeper, more complex layer exists below.
- In this case it is the practical aspect of Objectively Measuring Turf Performance that is exposed as requiring further explanation. With this in mind I've written another article to delve a bit deeper into current best practice for measuring turf surface playing performance. You can read it here.

Further Reading

Performance Bowling Greens eBook

In our best selling eBook, Master Greenkeeper John Quinn explains a program for the recovery and transformation of any bowling green into a high performance green. This eBook will change your mind on how bowling greens should be maintained for ever. Includes annual maintenance schedules. More Details



John Quinn's Turfgrass Academy

more from John Quinn at:
Bowls Central
Hole18

Acknowledgements

- Line drawings adapted from those by AJ Turgeon
- Stimpmeter image credit: BMS Products