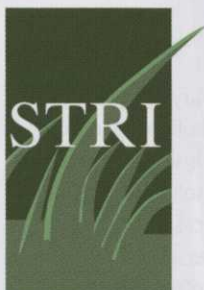


# Too Wet, Too Dry

## - Soil Moisture and Your Greens



Peter Winter, STRI Agronomist for the South West and South Wales, highlights the importance of total soil moisture management in the preparation of excellent putting surfaces

The demands of golf and periods of extreme weather together make management of soil moisture an underestimated element in producing a dominance of bentgrass and/or fescue grasses in greens that will then support the consistency and quality required in putting surfaces.



### THE IDEAL

Much could be written on the theory of soil moisture relations. The often stated ideal is the 50:50 balance of air : water in the soil pore space. In controlled glasshouse conditions it can be difficult to achieve consistently over a crop, even with sophisticated environmental controls. Small wonder it is difficult to achieve within an undulating green in the open, let alone across 18 greens in different environments, possibly with differing rooting environments.

I would suggest the effort needed to achieve this uniform condition is more often than not underestimated and the demands of it are unlikely to be understood by many golfers. Of course, not only is the soil moisture important for optimal growth but it is also critical in producing the desired putting surface characteristics.

### CLIMATE CHANGE?

Whether this is occurring or not seems to remain under debate. Various elements of the weather records continue to be broken and most greenkeepers comment on 'un-seasonal' weather in recent years. This is supported by national weather records, but we would recommend all clubs keep their own weather records to be able to make comparisons. Importantly, it is then possible to identify how often and under what rainfall conditions a green may become inundated and out of play but in addition it is possible to monitor irrigation needs.

I believe a change seems to be occurring and the periods of wet or dry are more severe. This places greater demands on the quality of the turf and the rootzone apart from the expertise of the greenkeeper. This change in weather pattern and demands from golfers for consistent conditions over the full 12 months makes it worthwhile to look at each green from a soil moisture perspective - many older greens were constructed for a spring to autumn golfing season.

### INFILTRATION RATES

These will probably vary across individual green surfaces as well as between individual greens, as a result of variation in rootzone depth, compaction and thatch accumulation as examples. The amount of moisture that penetrates the surface will depend on elevation within the green and the gradient or slope of the surface. Thus in heavy or persistent rainfall, surface moisture, which does not readily penetrate the surface, will gather, migrate and collect into the lowest area. If sub-surface drainage is inadequate this water may persist for a long time. In some circumstances evaporation alone will remove it and dry the surface, hence the importance of good air movement across the green and freedom from shading.





**DRYING OUT**

Water falling on the surface will accumulate in the soil/rootzone to the point of 'field capacity', after which excess moisture should be lost into the subsoil or drainage. The microclimate of the green will affect how much moisture can be lost by evaporation from the grass surface and transpiration from the plant. Thus, aspect, slope, exposure, shading and elevation are the types of factors that will influence the loss of moisture and possibly the amount of water which naturally lands on the surface.

The effect is invariably different in winter and summer. Factors such as exposure and a south or southwest facing slope would be advantageous on a poorly drained site with high rainfall, whereas such attributes might present problems of excessive drying in summer on a well-drained site. Thus the features which can be helpful in winter may lead to a reduced tolerance to lower soil moisture in summer and a greater need for irrigation water.

**SOIL MOISTURE DEFICIT**

As a measure of the 'dryness' of the soil, this will vary at a particular time of year according to soil type and pore size distribution, apart from locality and elevation. We can expect differing soil moisture conditions across individual greens, and between greens, as the soil dries within the rooting depth as well as at the surface. These differences potentially become exaggerated as the growing season progresses unless skillfully corrected. Depending on the locality and the soil or rootzone, this soil deficit may start to develop as early as April and persist until late summer if the losses of moisture through evapo-transpiration exceed that which falls as rain or from irrigation.

**WATERING**

Over the last couple of years, and especially this year, according to the locality, dry soil moisture deficit has appeared earlier in terms of its effect on the surface and early growth. In preparing a good surface this cannot be ignored. Two points become paramount if problems are not to develop in the summer when higher soil temperatures are expected:

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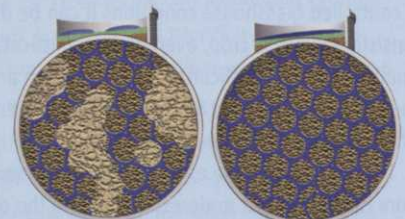
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1. Elevated and sloping areas, especially on south facing or exposed areas need to be watered as soon as the turf layer, i.e. the top 30-50mm, loses its moisture or the grass shows the first signs of stress. A dry soil will not be cooled by evapo-transpiration and on a hot day the grass can be damaged through heat stress.
2. The soil moisture needs to be monitored regularly throughout the growing season to ensure moisture is maintained to a depth of 100-150mm minimum. Check the moisture on elevated or sloping areas with a soil auger.

Selective and thoughtful watering allows the pop-up irrigation input to be kept to the minimum. This in turn allows for the overall preparation of more consistent putting surfaces, especially after summer rainfall. Such practice will support better root development and allow the greenkeeper to present drier surfaces over the growing season. Hand watering is time consuming but essential in achieving these aims, even more so if the pop-up irrigation is inefficient or affected adversely by wind.

#### SOIL MOISTURE UNIFORMITY

This in essence is another way of looking at the soil moisture in the greens, in that the aim is to balance this out by aeration and drainage techniques in low-lying parts of the green in the autumn and winter to remove excess moisture; and through selective watering of elevated and sloping areas in spring and summer. Take account of day length and average temperatures, holding back on overall irrigation in late summer,

i.e. from August, to leave some soil moisture deficit to 'mop up' increased rainfall in the autumn.

Keeping a soil moisture surplus and deficit chart for each green, backed up by observations noted as to when stress symptoms in relation to deficit occurs, is a useful, simple start point when considering soil moisture levels and their repercussions. Your soil moisture surplus/deficit chart will record precise 'moisture inputs' from rainfall and irrigation and the 'moisture outputs' from evapo-transpiration - the latter can be obtained from local agricultural centres.

#### KILL OR CURE

Horticulturists and gardeners recognise the problems of over or under use of water, as must golfers and greenkeepers. It has been said before, but it will not hurt to repeat the sequence, that poor surface drainage and over irrigation will lead to thatch ridden turf, dominated by annual meadow grass, and this turf will present a poor, slow putting surface but also will demand more irrigation due to poor root development. This starts the greens on a slippery slope to major problems.

Given the extremes of weather and demands of the golfer, balancing moisture levels near to the ideal across each green, over the 18 greens and through the year will place a large demand on expertise in maintenance on all courses, a need to improve drainage where this is inadequate, and to achieve critically effective watering practice - it is total 'soil moisture management' which has the greatest potential to facilitate the preparation of the best putting surfaces.