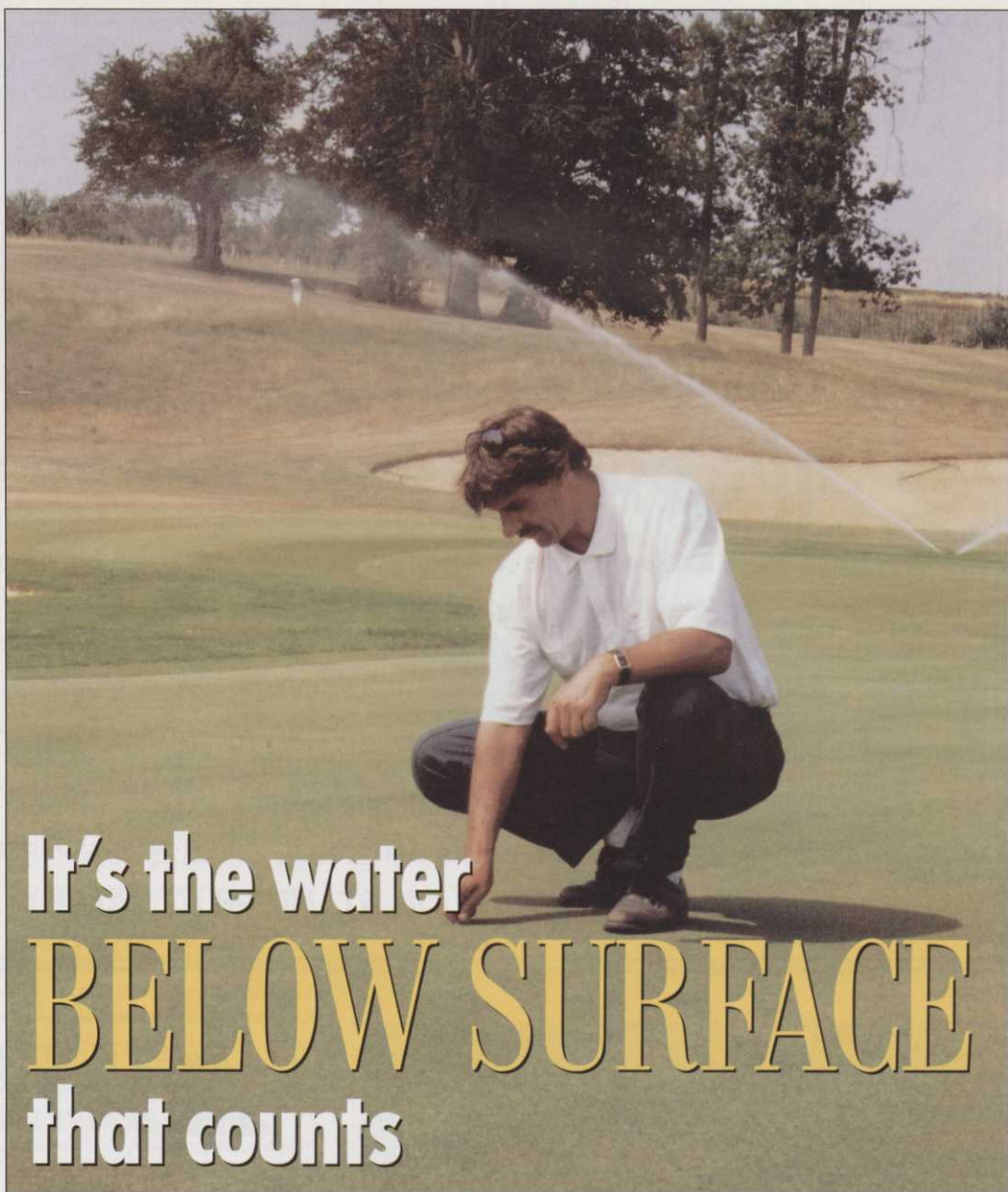


Gordon Jaaback compares the use of water for the purposes of turf maintenance at two different golf clubs.

The wise management of water use becomes vital in the extended heat wave conditions we have been experiencing. Understandably water applied is most productive if it is sufficient only to meet the turfgrass needs and is applied to a depth where it can be utilised with minimum loss to evaporation and drainage. Applying only enough water to meet the demand implies that it is essential to monitor the use of the water applied and consequently gauge when the next applications should be made.

Continuous daily applications involve greater evaporation losses and also lead to shallow root growth that is quick to die back at the time of water restrictions or irrigation failure. Thatch accumulation is encouraged. Grass cover can be unhealthily succulent; anaerobic conditions develop easily and grass is more prone to disease attack. The increasing costs of water too are of concern and it must be expected that in the future supplies of potable water will not be as readily available for maintaining turfgrass areas.

Looking to those in Britain that share a concern for wiser water use, the following case studies give personal accounts that are worthy of consideration. The two Course Managers have taken a closer look at irrigating and beyond into water conservation and self sufficiency in water supplies. One, confined to main line water supply, soil greens and a restricted irrigation installation, has striven to find the actual water needs of his greens; the other, with enormous needs to sustain growth on large sand greens and tees as well as sand carpet fairways, has sought to contain and control water flow



It's the water BELOW SURFACE that counts

Mike Smith has the task of controlling and monitoring the movement of water cost effectively over an expansive course

on the course. Both consider water as a priceless resource in golf course maintenance and not the everyday commodity that is taken for granted by so many.



Peter Negus at Willingdon Golf Club in Eastbourne, West Sussex

Peter, pictured, has been severely restricted in water use – the course being dependent on main line water supply and a limited irrigation installation. With the

rapid increase in costs over recent years to a gross price of £1.00 per cubic metre (which is discounted in his circumstance), he has always sought ways to reduce his need.

Actual need

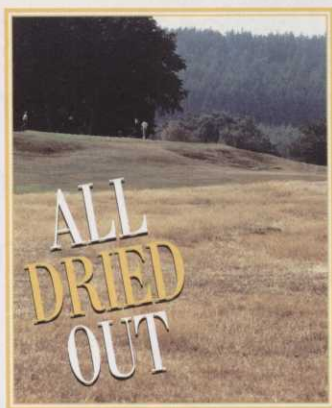
In 1993, Peter's club sought the professional services of A & P Hill Irrigation Monitoring Services to assess accurately the actual daily water losses from his greens. Using the Neutron probe, they concluded that the average daily loss in the summer was in the region of 2mm rising to a maximum of 3mm on the hottest days. Peter, in turn, proceeded in 1994 to apply a regular daily application of 2.5mm in dry conditions. He assessed this measurement by installing measurement cups and relating to actual metered flow rates to irrigated greens installed with part circle sprinklers. He did find, however, that with this approach dry areas still developed in the heat of summer and

wetting was not thorough.

In 1995, he was encouraged into applying water to penetrate at least to the depth of root growth and observing the water use with a soil probe. With his concern for healthy turfgrass and particularly the degree of turgidity (succulency) he was able to gauge when the next application was necessary establishing an irrigation interval in keeping with the heat and resultant water demand. (A more positive means of gauging the irrigation interval is based on measured water losses from an evaporation tank which bare a constant relationship with total water losses from grassed cover.) Peter has, however, installed a simple evapotranspiration gauge which measures evaporation and makes the adjustment – and this will serve the same purpose.

Programming

With the limitation of operating only two sprinklers around a



green at one time and the plan to complete three repeat cycles, each of 5-7 minutes, in one night, Peter is only able to irrigate nine greens. Separating nine drier greens from the total, he has been able to stagger the irrigation of the two sets of greens with no noticeable difference in putting performance. During May, which was very dry but cool, he found he was able to restrict watering to five day intervals without the quality of the putting surface suffering. Applying a total of 71h to 10mm in repeat cycles each of 2'hmm he found he got deeper penetration of water to the depths he desired.

Furthermore, he found that now in the hottest part of the prolonged drought period he has not found it necessary to apply 7.5mm more than twice a week – believing that his maximum need will not exceed 15-17mm per week. Small night applications are, however, applied to follow up liquid tonic applications and light sand dressings.

For example, recent recorded applications were:

- 27 Jul applied 10mm
- 31 Jul applied 5mm
- 01 Aug applied 2mm to follow liquid tonic
- 04 Aug applied 3mm to follow sand dressing
- 06 Aug applied 8mm.

Peter's real significant finding is the lack of dry areas and the reduced need for hand watering. Also, by drying out the surface he has a less succulent but more healthy grass cover – and at significant less cost.

Mike Smith at Moatlands Golf Club in Paddock Wood, Kent

Mike has the challenging task of controlling and monitoring the movement of water cost effectively over his expansive course. With full circle sprinklers, irrigating greens, tees and surrounds, together with 20 ha of fairways, demands a considerable storage supply. His reservoir capacity is 40,000 cub. metres and in both 1993 and 1994 he was able to

meet his watering requirements and replenish the reservoir by the beginning of the next spring, mainly due to his efforts in recovering drainage water.

Sprinkler coverage

With greater emphasis on green irrigation using full circle sprinklers, applications of water are not uniform. Sprinklers are individually controlled in accordance with conditions throughout the green – high dry areas receiving more than low wet areas. Furthermore, a schedule allowing for the troublesome east wind operates with adjustment to sprinklers assisted by the wind and to those hindered. Seldom is the application to a green a set precipitation and yet with negligible variation in evapotranspiration losses throughout the course the targeted amount of water to be made available is the same on all greens. Still, whatever allowances are made to secure the same precipitation at any point on a green the effects of wind and run-off within the thatch layer still make it difficult to obtain even wetting and there remains the need to hand water parts of individual greens.

Generally under the dry conditions experienced in July, Mike's approach has been to operate 2-3 soak times (repeat cycles) in a night of irrigation applying a total of 7-10mm per night. With generally three full days before irrigating again (two on exceptionally hot days) his application rate is 15-21mm per week.

Effect on putting

He finds the repeat soak times necessary to secure adequate penetration to reach the 'water front'. Allowing the surface to dry out to a degree, Mike finds the best putting surface occurs just before the following irrigation at the point of 'turn' when the turgid leaves losing water become 'hardened'. This is before the point at which temporary wilting is reached and is generally an indication that irrigation

Contact!

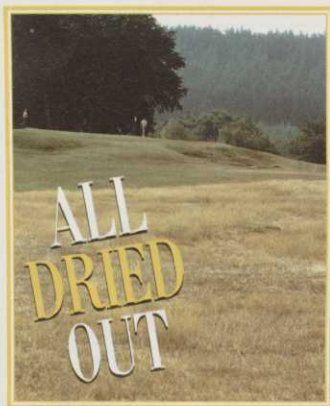


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'Soil greens hold more water than sand greens to the same depth and different grass species vary in their water use rate... this is more noticeable in conditions of limited supply'

should be commenced soon. At this point, it is interesting to note the stimpmeter reading goes from 9 to 10.5 due to the reduced resistance of the more hardened grass leaves.

Water recovery

The most significant aspect of water management undertaken at Moatlands is the recovery of drainage water from greens and gully drains on fairways. In 1993, only 20 ha was subject to recovery with the necessary pump installation. The amount collected and pumped up to the reservoir was 16,147 cub. metres. In 1994, the recovery area was increased to 45 ha and the amount pumped to storage was 48,867 cub. metres. With annual rainfall of 691mm and 839mm in

the respective years the collection represented 11.6% and 12.9% respectively of the potential rainfall for the two years.

With increasing water costs it must be of increasing economic importance to seek self sufficiency in water supplies on a golf course – and it is encouraging to learn that off barely 20 ha sufficient water (16,147 cub. metres) was collected to be able to irrigate greens and tees on the average golf course in the period of a year. (10,000 cub. metres supplies sufficient water to irrigate 2 ha of greens and tees using part circle sprinklers).

Concluding thoughts

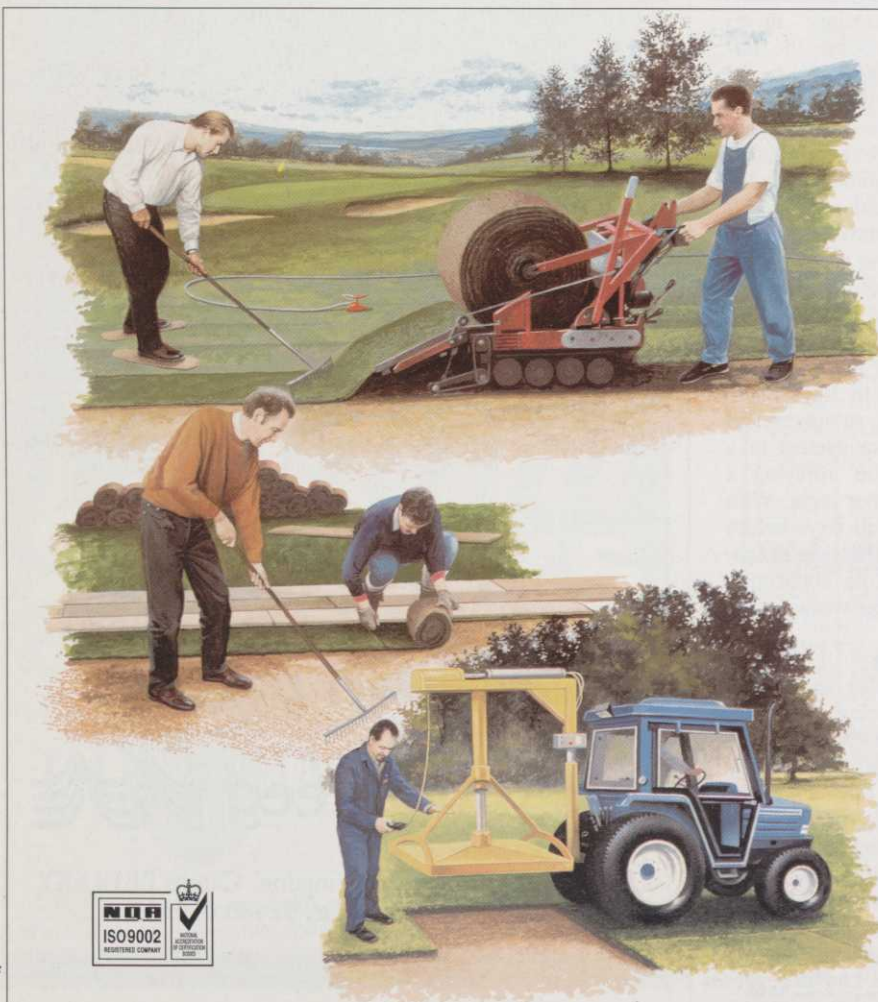
It is interesting to relate Mike's experiences with creeping bent on sand greens to those of Peter

Negus with bent/meadowgrass on soil greens. Both have approximately the same water need, rely on repeat soak times and allow the surface to partially dry out. This also underscores the fact that provided there is adequate water supply to the root system and no water is lost to drainage there is no difference in the water demand when comparing soil to sand greens – this must not be confused with the fact that soil greens hold more water than sand greens to the same depth and that different grass species vary in their water use rate though this is more noticeable in conditions of limited supply.

Surely the over-riding need in times of drought is the continual monitoring of moisture in the rootzone with a soil probe. Water

in the surface layers, so vulnerable to evaporation loss, is of little value compared to that well within the depth of the root system. Thought should be given to attaining deeper penetration of water below the thatch layer, allowing the surface to dry out – and to managing irrigation of turfgrass into a more 'hardened' state than the present consistent unhealthy succulency that results from daily watering.

■ Gordon Jaaback is an agronomist with practical experience in a wide range of conditions. He has long advocated a wiser approach to irrigation and the need to conserve water. Having made a special study in soil:water:plant inter-relationships, he advises on cost-effective benefits in turfgrass maintenance.



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