The reclamation of indigenous turf

Eddie Park turns his attention to the vexed subject of how and when our golf courses are watered.

I SUPPOSE that for most people of my age scientific instruction began with a broad bean. This had to be put in wet blotting paper for a few days to sprout, then we had to draw it and label the different parts. Indeed, botany was a bit of a bore but, already, some were seeing a much more interesting side to the plant world. Simple and interesting text books explained the environmental factors that determined which plants would come to dominate any particular habitat.

Unhappily, the knowledge and theories have almost become too extensive and many recent text books have lost sight of the basic principles and become bogged down in detail. As the subject distanced itself from everyday problems, practical men tended to lose interest. But now, because several groups have found that they must understand these principles if they are to dig themselves out of the pits they have got into, there has been a resurgence of interest. Those interested in conservation were among the first. The neglect of woodland, wasteland, verges, hedgerows, etc, needs a very clear knowledge of, for instance, natural succession if any recovery is to be made.

Forty years, in which any and every method of increasing agricultural productivity has been used, have given farmers enormous problems, which can only be solved with basic knowledge.

And what of golf courses?

If we think back to the primary environmental factors—climatic, edaphic (soil) and biotic (other organisms and man himself)—we know perfectly well that we have tried to bend conditions to suit our whims. The downhill slide in standards, especially to Poa annua domination and thatch, should tell us we have gone up some blind alleys.

I am going to take a close look at just one factor we have chosen to tinker with—moisture—not that I will pretend to know all the answers, but simply to point out what has happened. It may seem strange, in view of the enormous expenditure by clubs on irrigation equipment, that the requirements for watering golf courses in the British climate have never been scientifically established.

Water has been applied to golf greens for well over a century now, but for most of that time many have expressed doubts. Garden Smith was editor of *Golf Illustrated* and the author of *The World Of Golf*, published in 1898. He wrote: 'Many greens are now well supplied with water, which has been done by the sinking of artesian wells. This is a very costly arrangement and the results of artificial watering are doubtful.'

In fact, doubts were frequently expressed for the next 60 years, during which time many clubs with sufficient money installed some form of watering. It was usually of a pretty primitive nature, not more than a tap to which a hose could be attached.

Liming disasters

The considerable drought of 1921 gave events a push forward and the liming disasters of the 1920s, which converted many courses to Poa annua (this died off in a short drought), produced an even bigger incentive. But still many of the older and skilful greenkeepers remained doubtful.

A.J. McSelf in *Lawns And Sports Greens*, first published in 1930, said: 'Avoid watering—some warnings will be disregarded, no matter how frequently they are reiterated. Two such are: don't water and don't roll.'

By 1930, Bingley had been established and its prime aim was to undo the havoc of the previous decade by frequent top-dressing with sulphates of iron and ammonia. Excellent stuff, but dangerous, especially on links courses when a drought supervened. In fact, that is just what happened and, in his first book published in 1938, R.B. Dawson was recommending as much as four gallons per square yard two or three times a week.

The other great guru of that era Martin A.F. Sutton concurred, saying: 'Where intensive fertiliser treatment is practised, watering in dry weather is an absolute necessity.' Yet, I can remember in the early 1950s a greenkeeper/pro, who was over 70 and had marvellous fescue greens cut by hand-propelled mowers, telling me that it was necessary to dry out his greens every summer to kill off shallow-rooting meadow grass. The greens turned slick and brown, but came quickly back to colour with the first rains of autumn.

To be fair to R.B. Dawson, who was a scientist, he, too, retained his doubts. In his Penguin handbook *Lawns*, published in 1960, he said: 'Watering should be regarded as a mixed blessing, for while it may keep the lawn green and flourishing in dry weather, it is apt to encourage certain types of weed and it undoubtedly keeps alive such grasses as annual meadow grass, which on the best lawns could be allowed to die out with advantage.'

We could sum up the first half of this century by saying that practical men were, on the whole, quite good at botanical analysis and that they had no doubts about the effect of watering on the composition of vegetation. Most of them recognised that festuca/agrostis turf was the only option for golf greens and after the fiasco of the '20s they were keen not to destroy it again.

The scientists had gone even further. In Leach's *Plant Ecology*, first published in 1933, it says: 'The experimental modification of existing edaphic conditions often produces striking corresponding changes in vegetation. For example, Farrow (1925) found that on grass heath with Festuca Ovina and Agrostis Tenuis as co-dominants, artificial increase in the soil water by irrigation caused the Agrostis to become completely dominant with the result that Festuca was crowded out.' Presumably, the converse happened if the soil was kept dry.

Let us break off from this historical survey and wonder how and why we have gone from the situation I have described to wall-to-wall green, lush, soft carpets.

Sandy Tatum is a highly respected ex-president of the United States Golf Association and in 1980 he said: "Maintenance, generally, is deteriorating. The problem, simply put, is one of too much water! This has been endemic to this country for a long time. As the game here came more and more to be played in the air with bounce and roll negligible factors, heavily watered golf courses became easily justified. As a related factor, we seem to care more about how a golf course looks than about how it plays. The lush green look has

become more than the norm, it has become the standard. It is, moreover, much easier to maintain a lush green look."

I couldn't have put it better myself!

It was the combination of golfers demanding soft green greens and the fact that irrigation companies were in a position to meet that demand that pushed events along. Few realised there might be unfortunate side effects. Bobby Locke, an arch proponent of watering, wrote in 1953 of his ideal golf course: "that I would want facilities for the greens and some of the approaches to be well watered. I would also want British turf for all fairways and greens."

I am sure he would never have dreamed that the one might destroy the other. Again, to be fair, neither did anyone else or, at least, they didn't make themselves heard. We all plunged into an orgy of bigger and bigger sprinkler heads and, if possible, automatic watering systems.

I am not out to pursue a witch-hunt against the irrigation companies—they were good salesmen, but that isn't a crime.I am surprised they only sold the implements, fitting and maintenance and missed out on the much fuller service that was needed.

However, returning to the history of automatic watering, it derived from agricultural irrigation, which had been developed in the States during the '30s to combat the needs of hot, dry regions. At first, it was received with suspicion here but, sold with the main advantage of saving expensive labour, it appealed to the richer clubs and, eventually, the great majority.

It is surprising how quickly the whole saga has been enacted. The first proper rotary sprinklers appeared in the USA in 1935, but were not really in use until the 1950s. The first automatic pop-up sprinklers came to this country in 1961 at a cost of about £5,000.

By 1984, it was estimated that something like 70 per cent of clubs had automatic systems. Today, they are costing in the region of £40,000 to install. The machinery has increased in sophistication and convenience, but most of it still originates in California or Florida.

So the watering of greens has become accepted in this country as an absolute necessity in summer and golfers now demand it, not for the health of the grass, but to make the game easier in the drier months.

They justify these demands with some extraordinary reasoning. One man said to me last summer: "Eddie, let's go back to basics, you don't get grass in the Sahara." I won't bother to explain the double fallacy contained in that gem. Instead, as always, let's go back to first principles—back to my broad bean in wet blotting paper, in fact.

Every plant requires water in every stage of its life cycle. Soil conditions and structures affect the availability of water. Water applied to the soil, either as rainfall or artificially, will either run off the surface, be retained in the pores, or be lost by evapo-transpiration to the atmosphere or by percolation down through the soil.

If we want to know the amount of water available to the plant, we must study all these factors. I would suggest that present practice is to study none of them, but simply to concentrate on installing enough machinery to pump and spray out indeterminate (but considerable) amounts on the surface.

Indeed, with many installations there isn't even a suggestion that we measure the quantity we apply. Greenkeepers speak not of so many gallons per green, but of so many minutes per green. Can you imagine a doctor giving medicine and not saying: "drink two teaspoons every twelve hours," but saying: "have a good drink at the bottle for three minutes every twelve hours"?

Automatic watering

The next quotation appears in the leaflets of one company and also in an article about automatic watering. 'When installation is completed and the system is made operational, the soil is quickly brought to field capacity—i.e. moist from the surface down to sub-soil. Thereafter, the system is programmed to apply only enough water to make good daily moisture losses. This topping-up procedure only requires a short application of water at a slow rate every night. It is this type of irrigation which is of maximum benefit to growing turf.'

It sounds more like a car radiator than anything else and pretty crude at that.

Some agronomists—particularly our American friends—seem to be in a bit of a muddle about the situation as well. I recall a comment from the EIGGA conference at Cambridge last year: "At field capacity, plants will grow to their maximum." Which plants? Take the example of a sandy links green. The mind boggles at how much artificial water would be necessary to maintain this at field capacity (though, perhaps, many pop-up systems could manage it).

Even if that was achieved, I'll wager the 'plant' growing there in the long term would be Poa annua, not festuca rubra. In fact, given sufficient fertility, doubtless you could grow crops of potatoes just as easily.

We know that water availability is a powerful management tool. Plant ecology tells us that different plants are adapted to exist on vastly different degrees of moisture and, by controlling these levels, we can greatly influence the botanical composition of the sward.

As I have said many times, botanical analysis is the only objective guide. If we are not getting at least agrostis turf (with, in many cases, fescue as well), our mix of the environmental factors is faulty. The commonest faults seem to be, first, too high fertility, second, poor soil structure from compaction and, finally, more moisture than is required by the grasses we want. The latter may be due to water retention by thatch or an impervious layer, but I suspect that the commonest cause is simply too much water being applied.

I am quite sure I will be accused of over simplification and I plead guilty. Of course, there is a multiplicity of other factors, but I want to focus attention on just this one that has not, I feel, received enough attention. I have listened to hours of theories about artificial watering, but I have yet to hear anyone tell me about the ecological effects. In the complete absence of definitive research in this field in British climatic conditions, I would offer a few simple observations from my own course.

For many years, we had to keep records of water abstracted from a bore hole and the monthly figures, set side by side with local monthly rainfall figures, make interesting reading.

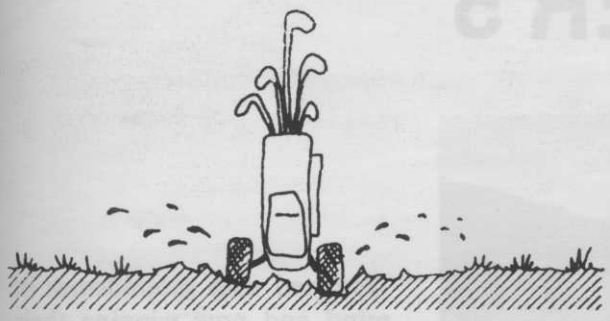
If we actually know the amount of water used on the course, we can soon translate it into something meaningful. The equation is not difficult to work out. Take the figure for total gallonage used and divide it by total greens area (in sq yds) multiplied by a factor of 4.7—this gives the equivalent in inches of rain.

We do not possess pop-ups, but in the 1970s, to allow greens to be watered at night, we turned to large Perrott sprinklers with a time clock on the pump. We could then apply large quantities of water, almost without knowing it. From average figures of well over a million gallons per annum ten years ago, there has been a drop to less than 20 per cent of that figure under our present regime. We *had* been adding perhaps 25in to 30in of

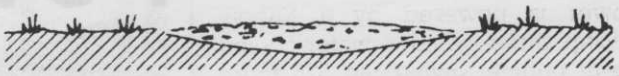
Continued on page 27...

Get On The Right Track

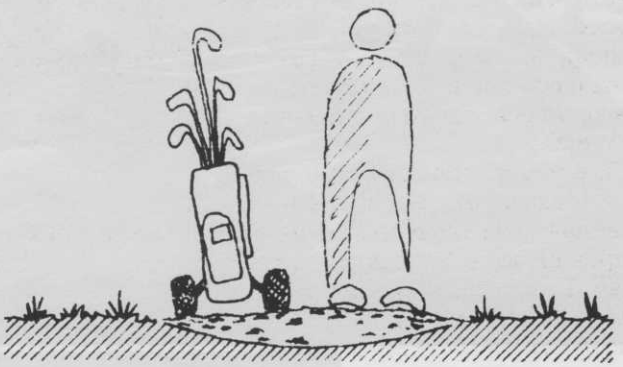
The problem of how to stabilise and keep clean muddy pathways in a cost-effective way has been tackled by Woodland Riding Surfaces, Warren Camp, Crowborough, East Sussex TN6 1UB. ✆ 034282 4612. On test, what was previously a bog remained a clean and walkable pathway throughout the winter thanks to a 3in-6in layer of the company's Woodland Pathway Surfacing. The only preparation required is the removal of excess mud and, as the material is delivered in bulk, it can be wheelbarrowed straight on to the path and takes spiked shoes and trolley wheels immediately. Decay resistant, the material will last for up to five years before topping up is necessary.



'Muddy paths, dirty shoes, bogged wheels,' the members complain... Prepare a clean, hard sub-base by clearing the mud and draining puddles down to the firm subsoil.



Delivery of the mixed hardwood chip/bark and twigs takes up to ten days. Rake until level a layer of Woodland Pathway Surfacing. The clean, light-coloured, natural, non-splashing, long-lasting and economical surface pleases golfers!



EDDIE PARK—CONTINUED FROM PAGE 11...

water to our natural rainfall. We *now* only add about 5in.

When you realise that the average rainfall for the area totals only 25in, you can see how easy it was to go over the top. We have now realised just what a skilful job watering should be. Hand watering, the use of small local sprinklers, wetting agents and moisture meters enable the skilled operative to apply just enough water to different areas of permeability at different rates and to achieve a positive effect in change of grasses. There are no more wet middles with lush meadow grass and no more dry peripheries or hard and bare slopes. As fescue and agrostis have reappeared, we can allow the top few inches to become drier and concentrate on the root growth, perhaps 6in down. Local weather forecasts and a rain gauge are other helpful aids.

I can illustrate the variations that exist in different parts of the green with some further simple observations.

Many greens on old courses were constructed to retain water for periods of drought. An impervious layer was built in, sometimes in a saucer shape. Many of our greens had to be built up to clear the underlying rock and local clay was used. As most of the greens have returned to agrostis with fescue, we have seen two interesting features. One is the initial change back to agrostis followed by a further change in many areas to fescue. The second is the fact that we are left with a few small local areas that are different from the rest in that they have some Poa annua patches.

Fusarium

These are the only areas to be susceptible to fusarium. They are not really extensive enough to be significant, but they are irritating. There had to be some reason lying under the surface and so we tried the 'comparative cans' test. Tin cans minus tops and bottoms were inserted into a shallow slit in the turf and filled with water, with controls on the better areas. The soil should be generally moist, but not saturated. The control cans emptied at a vastly greater rate than those in poor areas. Percolation in these difficult areas was clearly blocked. And, in fact, deep holes revealed a dense layer of impervious material.

I may have drawn the wrong conclusions from these observations. I hope someone is going to think it worth doing the research to prove me right or wrong. I would like to see irrigation companies thinking out what we require for our climate. It could be high volume, but well diffused, hand-watering devices, equipped with a flow meter so that if hand watering is required, it can be done in the shortest possible time. Quick coupling hoses are available.

There must be a commercial need for a full watering advisory service able to keep a check on our swards to tell us how much water is required, to test the permeability, compaction, moisture holding capacity and, no doubt, many other things. For some courses, its arrival cannot come soon enough.