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# A VERY

How to win the battle against compaction:  
a Greenkeeper International special report

One of the major battles every greenkeeper must win if he is to gain the respect of his employers and Club members is the battle against compaction. We hear so much these days about compaction and its associated problems that it is important for our members to understand precisely what is meant by compaction, how it affects our courses, and what can be done to alleviate it.

First, let us identify the problem. Plants have basic requirements if they are to thrive: food, water, warmth and light are all obvious and readily spring to mind. In addition to this they require the right growing medium. This usually means soil. Soil should be open and contain a high proportion of air as healthy plants require oxygen within the root zones. These air gaps and pockets provide the passageways through which water can easily move and be stored. This aids both drainage and irrigation. It is also through these gaps that the plant pushes its root systems.

Compaction exists within the soil when it has been pressed together, causing these air gaps and pockets to close. As soon as compaction starts, the micro-environment within the soil moves in a downward spiral. Having closed the air gaps, oxygen can no longer keep the soil sweet. Decaying organic matter gives off methane, which will now remain locked in the soil, making it sour. Water can no longer drain through the soil, which adds to this problem as it becomes stagnant.

Neither can the water be drawn up through the soil by capillary action to supply the plants' requirements. The grass roots are now in a hostile environment and start to retreat towards the surface. The plant can no longer thrive and will begin to lose its healthy green colour. The technical term for this is chlorotic.

If nothing is done to correct the basic problem it becomes tempting for Clubs to treat the symptoms. More water is required to keep shallow rooted grasses alive. Since shallow roots find it difficult to obtain food, fertiliser is also applied, and as every greenkeeper will tell you, we now have the classic situation for a build-up of thatch. If allowed to continue, the thatch will cause the soil to dry out even more.

The root zones will become even more shallow until they almost only exist within their own layer of thatch. This causes a root break, where the turf on the greens is often not attached to the soil layer at all. More water and more fertiliser is required to keep the grass alive, and so the spiral continues.

By now the ideal environment has been created for the build up of various bugs and diseases which tend to survive in the sour damp micro-climate of thatch. The most obvious of these is fusarium, although there are several others which can be just as devastating. At this point many a strong man has been known to go weak at the knees, but let us not despair. Rather let us ask ourselves a few questions which may help us to avoid getting to this point, or if we are already there, help us to reverse the cycle.

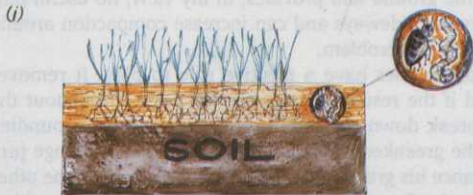
The first question is: 'What causes compaction?' The answer is traffic. Traffic through construction, traffic through maintenance and traffic through play. While there is little that may be done about traffic in construction, there is a great deal which can be done by greenkeepers and the Club to reduce unnecessary maintenance and play traffic. It seems obvious to us that players and maintenance vehicles should be kept to the proper paths and walk-ways. However, greenkeepers often complain that golfers ignore barriers and signs, but I wonder how often they are set a bad example by green staff sometimes riding unneces-



# PRESSING PROBLEM



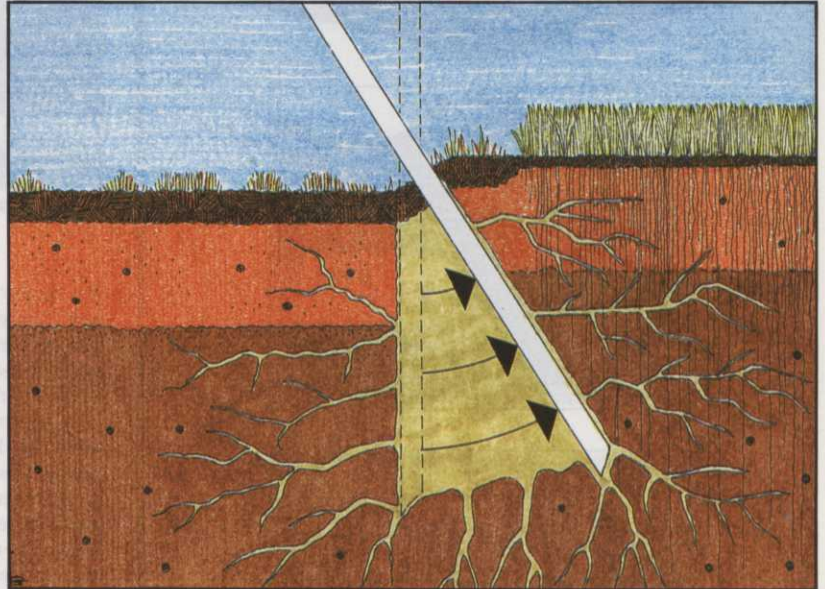
Air channels are closed; the air is forced out and water can no longer move freely in the soil



A micro climate is created within the thatch layer where pests and diseases thrive

sarily over the grass on tractors and turf maintenance vehicles? Good communications are important, and it may be that greenkeepers need to explain just how much damage can be done if selfish players do not obey the course rules.

Having said all this, it has to be acknowledged that most



The action of a Verti-Drain

courses are being subjected to an amount of play which is far in excess of anything imagined even ten years ago, let alone when many courses were built, possibly over a hundred years ago.

Having identified compaction and its causes, what can be done to alleviate the problem? The answer is a great deal.

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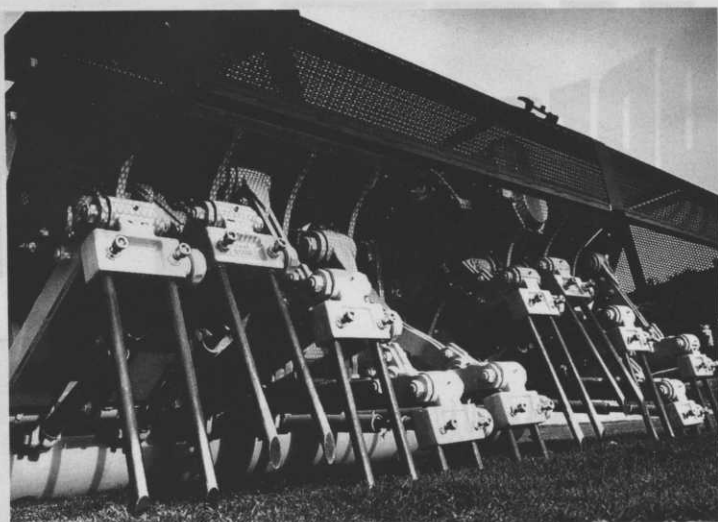
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The Verti-Drain – a powerful tool

In the past many different systems of cultivation have been devised and used. These include solid, hollow, and slit tining. Solid tining is simply driving a spiked shape tine into the ground and provides, in my view, no useful purpose whatsoever. It forces soil sideways and can increase compaction around the hole rather than alleviate the problem.

By contrast, hollow coring does have a positive role to play. It removes some thatch and soil and if the resultant holes are left open throughout the winter, frost again can break down the hole sides, helping the surrounding soil to open up. Should the greenkeeper wish to conduct a soil exchange programme, because for instance his greens have been built on clay or some other unsuitable matter, he can simply remove the cones and replace them with a suitable top dressing. The depth of hollow tining is of paramount importance when carrying out such an operation, and a machine capable of penetrating the soil up to eight inches or more should be used.

Slit tining also has its benefits. Deep slitting in the autumn connects the surface of the soil to the drainage layers. This helps to take away any heavy winter rain and, in the same way, fine slitting in the spring and summer ensures that rain and irrigation soaks through the turf rather than being shed sideways by the thatch. Slitting is also a useful means of root pruning rhizomes and stolons.

In recent years the appearance of the Verti-Drain has transformed compaction relief by using its unique shatter tining action. This machine penetrates the ground up to 16 inches deep, piercing any pan which may exist. The tines then heave the soil, cracking up the compaction before they are withdrawn. This heaving action lifts the soil in a uniform manner, the lift representing the amount of air that has been incorporated into the ground. Like most machines, the Verti-Drain has to be used conscientiously, and soil conditions need to be taken into account. The operation should be undertaken at an intensity of hole spacings and to a depth which is consistent with the greenkeeper's maintenance programme. It may be that the greenkeeper would wish to start at, say, four inch centres going down to a six inch depth and progressively increase the depth as well as decrease the distance between centres. Such a programme may well be necessary if the greens have a root break. In such circumstances the surface of the soil needs to be opened up so that the grass carpet can anchor itself to the soil before a more vigorous treatment is attempted.

Whichever method of compaction relief is used, it is important for greenkeepers and Clubs alike to realise that the benefit is not indefinite, and that it will be necessary for them to continue with their compaction relief programme as long as their courses are extensively played.

Finally, let us consider our objective, which is to have a healthy grass cover despite the excessive wear and possible drought conditions which we are experiencing. Open friable soil should enable the right grasses to put down deep rooting systems which can obtain moisture in all but the worst drought conditions. These deep rooting grasses should be able to sustain heavy wear and regenerate growth after intensive play. Using the right machinery at the right time can assist every greenkeeper in achieving this objective.

**'Whichever method of compaction relief is used, it is important for greenkeepers and Clubs alike to realise that the benefit is not indefinite, and that it will be necessary to continue with their compaction relief programme as long as their courses are extensively played'**