

AERATION...

what's on offer?

TORO Count on it.

*Continue
to learn*

Roland Taylor takes an extensive look at the various methods of aeration currently at a Course Manager's disposal

Out of all the turf maintenance operations that are carried out aeration is one of the most important. To substantiate this we need to look at the number of beneficial effects that aeration has to offer to the well being of the turf. A well aerated soil promotes strong healthy growth which in turn deters the development of fibre and thatch. Surface water is quickly absorbed into the rootzone. There is less likelihood of areas of stunted growth and bare patches occurring in which unwanted weeds and grasses can invade and become established. Soil micro-organisms beneficial to the breakdown of organic material thrive. Diseases and fungal attacks are less likely to occur on strong healthy growth.

In an ideal world the soil under the turf should always be friable and open. The roots then have the freedom to move and develop and there is always a plentiful supply of water, air and nutrients. Unfortunately, this is rarely the case and the chances of it lasting long are fairly slim. There are a number of contributory factors. The first major drawback is the increased level of players using the course and the fact that golf is now generally played all year round. Soil profile is another possibility; this is often the case where a course was built many years ago and as a consequence suffered from a lack of modern know how.

The key to good aeration is the size and consistence of the air pockets within the soil structure. Getting this right is the challenge. If a soil (sandy) is too open then any nutrients, water and air do not stay in it long enough to benefit the grass. With a heavy soil (clay) the air pockets are very small or non-existent. In either case the roots cannot develop and the plants are weak.

The aim is always to produce a good playing surface, but this is not just for the benefit of the golfers but also for the long term well being of the course. A strong sward acts like a cushion when it comes to compaction. Without this cover compaction and subsequent problems rapidly develop. This is often seen on areas of grass which have a considerable amount of foot traffic. Once the grass cover has been worn away the underlying soil quickly forms a hard crust as it becomes compacted. Eventually, virtually nothing can penetrate this crust and certainly very little can grow in it. If a similar situation was occurring under a sparse layer of turf then it would not be long before the effects become evident.

RUBBER CRUMB

To help overcome this problem a number of clubs now use rubber crumb as a top dressing. This is worked into the turf and onto the soil surface - soil where it is said to protect the crowns, rhizomes and stolons. Firstly, any existing compaction problem should be dealt with. An initial dressing of no more than 6mm of crumb is worked into the turf making sure it reaches the soil surface and the crowns. After three weeks another application can be made followed by further ones at intervals until a depth of between 15mm and 19mm is reached. Like all top dressing little and often is recommended. The turf needs to fully recover before foot traffic is allowed over the area. Clubs that have used rubber crumb are reporting satisfactory results. A further extension of the use of this material has taken place during 2003 with a number of companies offering turf grown with it in the root zone.

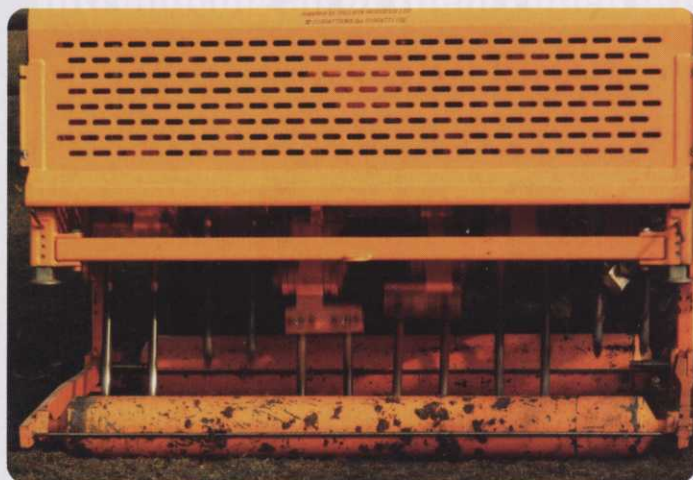


MECHANICAL AERATION

There is little evidence that any form of aeration was practised until the 1930s. If any was carried out it was probably done using a fork. One of the first pioneers of the practice of aerating the soil to improve the quality of playing surfaces was William Hargreaves. He founded the Cheshire based company of Sisis and worked closely with RB Dawson, of the STRI, in developing machines capable of opening up the soil. These early models were either a hand fork or an aerator mounted on a wheeled hand frame. They were suitable for small areas but it became obvious that a much larger unit was required. Sisis' answer, the first horse drawn aerator, was sold to Doncaster Racecourse. The Royal Liverpool Golf Club was later to buy the first tractor towed unit.

AERATION...

what's on offer?



Like the development of the mechanical mower, golf clubs were reluctant to fund new innovative products. It was not until 1964 when Sisis launched a motorised version of the pushed aerator.

One question that does arise from those early days was that were the tines actually penetrating enough to have any beneficial effect? The answer is probably no, although breaking up any surface crust must have helped.

Today, a wide range of machinery and systems are available to provide all round aeration for most types of soil.

TINES

The early machines were fitted with a solid tine but in 1950 Sisis introduced a flat tine which produced a larger hole giving a greater area of soil exposure for the intake of moisture, air and water. This type of tine was said to have another benefit. Its action prunes the roots and thus encourages new growth.

The hollow tine is the third type that is now available and whilst this helps relieve compaction its main purpose is as a method of soil exchange. Because soil is removed in the form of cores they have to be cleared up. Machines are now available specifically designed to carry out this task plus some leaf sweeping units are also capable of collecting cores. There is the possibility that if hollow tining is carried out too frequently a soft and not very resilient sward is produced. Another problem that has been known to occur is that the holes created can become breeding grounds for weeds and unwanted grass species.

Tines have their place in aeration but one aspect that tends to be overlooked is that by their action of punching a hole in the soil they do in fact cause a certain amount of compaction. However, the benefits of frequent tine aeration far outweigh the side affects.

Over the years designers have perfected ways of getting the tines into the soil. The simplest system uses some form of rotor to which a number of tines are attached at given intervals. The more sophisticated machines punch the tines into the ground using a form of cam drive. With the wide tractor operated units it is now possible to aerate large areas of turf in a relatively short period of time.

There are now over 36 companies offering various forms of aerators here in the UK.



SAREL OR SORREL ROLLER

In the early days back at the beginning of the last century some greenkeepers used a roller with spikes as a simple form of aeration. In fact this type of unit which became known as the sarel/sorrel roller has a very beneficial advantage. Used on a regular bases it breaks up any crust that tends to form on the soil's surface and allows the air, nutrient and especially water to start its journey down to the roots. One of these units is ideal to complement irrigation as it allows water access and minimises run off. A number of these units are now available including attachment cassettes for certain makes of mower.

VERTIDRAINING

The biggest change in aeration occurred with the introduction of the vertidrain in the early 1980's. Up to this point you could say aerators had been barely penetrating the rootzone layer and deep compaction was still a problem. The vertidrain principle is relatively simple. The tines are driven deep into the soil structure and a heave or levering action, similar to that of a fork when digging, is applied. The amount of lift can be adjusted to ensure any surface disturbance is minimal. Below the surface the compacted layers are broken up leaving pockets into which the plant's essential elements can percolate.

Another advantage of this type of deep aeration is that top dressing can be introduced into the holes providing extra drainage. Conditions need to be right. If the soil is wet there is a much greater chance of smearing the holes and where the soil is dry penetration is impaired. The machine also has to be operated at the correct speed otherwise surface damage can easily occur. There is a skill to good vertidrain and when the operation is carried out is important to its success. For this reason a lot of golf courses have invested in a vertidrain rather than waiting in a queue for a contractor.

Fortunately, vertidrainers are now more competitively priced, which brings their purchase within most golf course budgets.

Vertidrain is not always the answer and for very deep compaction an alternative solution for breaking it up needs to be sought.



Terrain Aeration

COMPRESSED AIR PROBES

A method of deep aeration that has been used by a number of clubs over recent months uses a hollow probe which is hydraulically driven into the soil to a depth of one metre. The process is then repeated at two metre intervals in a grid pattern. Once the probe is at the correct depth compressed air is introduced. This creates a network of lateral fissures in the soil structure. Slow release nutrients can also be injected by the same method.

The suppliers of this equipment say there is very little surface disturbance and that drainage is improved by filling the holes with an aggregate.

WATER AERATION

When a droplet of water is virtually fired into the soil its velocity makes it behave similar to a bullet, shattering virtually anything in its path. This is another method of aeration that has become popular in recent years. One of the benefits is said to be that there is virtually no surface disturbance and therefore no hold up in play.

SUB AIR

This system was the brainchild of a Marsh Benson, a Golf Course Superintendent. It uses the green's drainage system. A blower creates an airflow which permeates the gravel layer, passes into the rootzone and is then finally released into the atmosphere via the turf. The airflow provides oxygen to the roots and transfers moisture vapour from the water table to where it is going to be of most benefit. The gravel layer is said to be at a constant temperature and as the air passes through it travelling upwards it adjusts the levels in the rootzone and turf above. This process is claimed to be highly beneficial when the air temperature over the greens is high. Likewise when the rootzone cools down in winter it can be warmed from the gravel layer.

Change the sub air unit to suction and the airflow draws excessive water down from the surface. Trapped gases and any build up of salts in the soil can also be removed.

Because the soil is constantly aerated, it has been found that this system controls the build-up of black layer, which forms as a result of low oxygen levels, the presence of organic material and anaerobic microbes.

The greens need to be USGA specification and have a suitable drainage system in place.

As was stated, early aeration is a very important part of the turf management programme and there is equipment available for virtually every situation.

In a month's time SALTEX will be held at Windsor. It is also the time of the year when most aeration is carried out. This exhibition provides an ideal opportunity to talk to companies, who supply the type of equipment mentioned in this feature, about your specific requirements and problems.

Getting aeration right is a major factor in growing strong, healthy, hard wearing turf.

See the Buyers Guide on page 64 for more aeration companies.



Sisis Equipment Ltd