

# Aeration on the Golf Course

by

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The general need for aeration of one type or another is now accepted as a necessary part of the efficient management of all turf used for sport. The problems may vary from a deep state of severe compaction to a hidebound skin over the top surface. A somewhat similar undesirable effect is often brought about by a mass of mat, fibre and trailing grasses on the top surface of the ground: this condition effectively restricts the free entry of air, moisture and dressings and thus produces a state where, at best, the roots of the turf are largely in the very top of the soil, or, at worst, do not reach the soil to any worthwhile degree and are, to a large extent, existing in this thick nap. The result is a weak and shallow rooted turf, subject to rapid deterioration in a dry spell and prone to suffer from the many diseases to which particularly the finer and more valuable grasses may be subjected.

It will be appreciated, then, that the solution of the problem of aeration falls into two categories. Firstly, providing a clean surface, free to absorb air and moisture, and allow the free entry of nourishment fed to the grasses to reach the roots where it is needed. Work in this category will produce other benefits, such as standing up trailing weeds or grasses so that the mower can make a much cleaner cut; this operation may thus be regarded as complementary to mowing and regular attention to scarifying, in one form or another, will materially assist in producing an upright clean sward of healthy turf.

Secondly, breaking down compaction below the surface, in which the need may vary from a light spiking in the top inch to deep penetration. Each step has its right place in a programme of good management and regular application is the key to successful results.

On a golf course, we have the fine turf of the greens and the coarser turf of the fairways and these different areas obviously need different tools and machines although the treatment needed is basically the same. On the greens composed of fine grasses we often find an excess of the nap or mat referred to; since it is in the nature of these grasses to create such a mat of fibre it follows that regular and efficient scarifying of the greens is of special importance.

## Surface Aeration

Surface aeration consists of scarifying and shallow spiking. Scarifying can be carried out in various ways. On the greens by means of an ordinary Springbok rake—a long, laborious and backaching job, wasteful in man hours and therefore not too practical nowadays. The second and much less laborious method is to use one of the mechanical types of rake scarifier; these implements, developed from the basic principle of the Springbok, use specially developed Spring Tines which are designed to give maximum efficiency on fine turf. There is a range of mechanised hand-operated scarifiers which, by means of the wheeled frames on which they operate, offer immense improvement on the old Springbok, removing much of the backache and greatly speeding up the operation and, at the same time, enabling the work to be done much more effectively.

During the last few years, however, we have seen the introduction of machines which give an entirely new approach to this problem of scarifying. I refer in particular to the 'SISIS' Auto-Rotorake which has been described by experienced and knowledgeable users as the greatest single development in turf management since the war. The greatest advantage of these machines is the removal of all hard work from the hitherto laborious task. The Auto-Rotorake is merely driven across the turf and not only is the backache removed but scarifying can be done in a mere fraction of the time formerly needed; one man can do the work of a great number using earlier methods.

The principle of the Auto-Rotorake is to use vertical tines or cutting blades which

revolve at tremendous speed in the opposite direction to that of the traverse of the machine. These tines may be set in a chosen positive position so that the operator has the choice of whether he wishes merely to flick the surface of the soil or to penetrate half-an-inch into the ground and thus it is possible to achieve only the cutting of horizontal growth above the surface or to carry out a considerable measure of root pruning and surface aeration.

In addition, an interchangeable reel of spring wire tines gives lighter surface scarification in dry conditions and raises the grasses before mowing for a better cut. The operator can be as gentle or as drastic as he wishes by setting the machine in an appropriate position.

A point of great importance is that, with the Auto-Rotorake, the unwanted material is cut out cleanly and only the rubbish is removed; whereas, with raking, some good growth is inevitably dragged out. A natural result of the regular use of the Auto-Rotorake will be to produce firm, fast and true greens as opposed to the spongy slow surfaces often seen on greens where an excess of nap or mat is present.

When cost of equipment is of paramount importance, a less expensive version of the 'SISIS' Auto-Rotorake Mk. 2 is available known as the 'SISIS' Duo-Rotorake. This machine has enjoyed tremendous popularity since its inception some years ago. Surface piercing of greens can be effectively performed by means of the spiker slitters which put tremendous numbers of slits into the surface of the turf to a depth of about 1½ in., aiding air/moisture absorption and assisting in the ready entry of fertiliser and dressings. The spiker slitter is valuable especially for summer use; in dry conditions this surface aeration can be carried out when it would not be possible, or perhaps even desirable, to do deeper spiking. The spiker slitters are designed for attachment and operation by mechanical hand frames and implement controls referred to under scarifiers.

Scarifiers for the fairways of a much more robust construction are designed to be operated by various tractor units. The most attractive to the greenkeeper will undoubtedly be the mounted variety, 8ft. wide, for use on the hydraulic lift of the tractor. With this width and ease of operation many acres can be treated in a very short time.



*Sisis Auto-Rotorake Mk. II*



*Sisis Heavy Duty Aerator*

## **Deep Piercing**

For the greens, the oldest method is to use a piercing fork but it is extremely difficult in these days to envisage sufficient manpower available to tackle the enormous task of treating 18 greens in this way. The answer is to use a machine and to carry out the operation as a frequent maintenance step; this phasing of piercing in as a part of a regular maintenance programme is the key to the problem. It is necessary to avoid any undue surface disturbance on the green and with the range of tines available, plus choice of favourable ground conditions, this can easily be done. Some tearing of the surface may occur as a result of shallow rooted turf. This must be faced up to and accepted, if the condition is to be cured. In any case, the position can be quickly reinstated by brushing, scarifying or running the mower over the turf.

Modern equipment offers a choice of tines to meet all needs and judicious use will enable dressings to get where they are required, and bring air and moisture to the lower regions of the root areas, as well as promoting rigorous root development. As the nourishment sought by roots and the cultivated conditions they require are deeper, the roots will themselves go deeper to find the conditions they prefer and the plant food they seek.

There is a range of equipment of various types available for mechanical piercing of the greens. With the acute shortage of skilled greenkeepers in this country at the moment, a fully powered machine is a must. The piercing drums of these ranges can be fitted with a varied choice of tines which will enable the greenkeeper to select a tine suitable for any circumstances.

In general, the hollow tine is for occasional use when it is desired to effect a soil exchange operation or for relief of very severe compaction. The time for using hollow tines has to be chosen very carefully, having regard to soil condition if the plugs are to leave the tine freely. A most useful tine is the chisel tine which is extremely effective, gains penetration well and is very clean in action. There are still a number of users who have a preference for a round pointed tine for the greens and, of course, on these fine areas they can be very useful and so they are still available.

A machine which incorporates all the points listed above, coupled with power traverse, is the 'SISIS' Auto-Turfman. This tool will penetrate up to a maximum of 4 in. even when fitted with hollow tines, which of course demand more driving into the turf than any other type of tine. It is possible for the greenkeeper to travel quickly and efficiently, the machine moving between the greens under its own power.

## **Deep Piercing on the Fairway**

Here the need will be for tractor-operated machines with a capacity to deal with large acreages and able to provide the more drastic treatment one must adopt on these tougher areas. Machines are available for towing by tractors which are not equipped with hydraulic lift but for tractors such as the Leyland 154 or Leyland 253 which are equipped with hydraulic lifts, machines will be chosen to be operated on the lift, thus taking advantage of lower initial capital expenditure and deriving the benefit of time saving, ease of operation and increased efficiency.

Care should be exercised when choosing a machine to ensure that the type selected is one which is designed in a flexible manner to allow the piercing heads to follow closely the contours of the ground in order that high and low spots receive equal treatment.

Modern equipment can be obtained to accommodate flat section tines of sufficient thickness to leave an open top to the hole and of a design to ensure a thorough shattering coupled with movement of the soil underground. This is most important as the objective is not merely to make a hole but to create as much underground movement as possible with the minimum of surface disturbance.

Flat tines expose greater areas of soil surface to air and moisture and the walls of the slit made by a flat tine appear to be less compacted than walls of holes made with round tines. Flat section tines meeting this requirement are available in two basic types; a

pointed tine which achieves maximum penetration in hard conditions, pierces to the greatest depth and produces a maximum shattering effect, and a root pruning or taper slitting tine which achieves rather less penetration but produces a wide uncompacted slit and leaves a completely clean surface.

On areas of poor root growth and where there is a sparse growth of grass, some surface disturbance must be expected when effective deep piercing is commenced but this disturbance can quickly be reinstated by harrowing, scarifying or even thorough brushing with the Whalebone Brushes which are available to be interchanged with the Scarifier Heads on the tractor-mounted, 8 ft. implement referred to above and after these operations little disturbance will remain.

Assuming it is acknowledged that spiking is necessary, it follows that greenkeepers and green committees will accept that it should be drastic enough to cure the condition existing and therefore some initial surface disturbance is inevitable, but it must be emphasised that if this is faced up to at the onset, and the treatment pursued and performed regularly, then in an amazingly short time the turf will develop the necessary root action to permit the operation to be carried out without disturbance.

When the ground is in a suitable moist condition less disturbance will occur to the surface as the moisture in the soil will act as a lubricant for the tines. It should be remembered that, to be successful, piercing must not be regarded as a treatment for once or twice a year but a maintenance operation to be carried out as frequently as possible. It is fair to say that it cannot be overdone; one has only to think that a progressive farmer ploughs his grassland every four or five years as a recognised system of good husbandry.

We cannot plough up our fairways but we can do a maximum of effective spiking. While piercing should be kept going throughout the year *whenever ground conditions permit*, it should be intensified during autumn, early winter and spring.

Spiking on the fairways will serve to assist greatly in producing drier surface conditions by permitting surface water to drain to the lower regions and thus find its way to the drainage system, where drainage is installed, or, as applies in a number of cases, permit the water to get down to lower soil strata where we often find natural drainage through a gravel or chalk subsoil structure. Thus thorough attention to efficient aeration will do much to cure wet and muddy surface conditions both by producing a dense sward of healthy turf and getting the water off the turf surface.

For the treatment of fairways a choice will have to be made whether a general purpose machine designed to give penetration of, say, 4½ in. will be sufficient to achieve the desired results, or whether to instal a heavy duty machine with the added advantage that it can carry out ordinary maintenance work but offer the facility of being able to pierce to a depth of 9 in. when conditions are suitable and the extra penetration is desirable.

This is a matter for considerable thought as it is being shown, to an ever increasing extent, that more often than not the wise choice will be the heavy duty machine with its capacity to shatter really deep compaction and get the water as far away from the surface of the ground as possible.

There are a few fortunate people with courses where they have a soil which, by its nature, drains freely and in addition has a good deep rooted turf formation on the fairways. On these courses the greenkeeper will only need to consider the appropriate attention to greens. Such natural blessings are few and far between and the conditions I have referred to will be found on widely different soils. It is not only the heavy soils which suffer, indeed some of the worst conditions can be found on sandy soils with a heavy content of silt. This silty type of soil seems to pack down in such a manner as to completely exclude air and the need for attention can become extremely urgent.

The conclusion to be drawn from these observations is that efficient aeration in all its phases can, on the one hand, prevent bad conditions developing and, on the other hand, offer a positive policy of relief when such conditions exist.