TOPDRESSING 101: What Lies Beneath

Photos courtesy Turfco Manufacturing

By Pam Charbonneau

Every golf superintendent knows it should be done. Every golfer protests when it is done. Topdressing is a universal maintenance practice on golf greens in Canada. The practice of sand topdressing is said to have originated over a century ago on the Old Course at St. Andrews, Scotland. With the increase in traffic on golf courses causing soil compaction, coupled with a never-ending demand for lightening-fast greens, the practice of topdressing becomes even more important.

Topdressing programs fall into two basic categories—light and frequent or heavy and infrequent. The heavy and infrequent method is used in conjunction with core aeration. The type and quality of topdressing materials available varies. The specifics of a topdressing program are dictated by the condition of the greens, the amount of thatch, the results that are trying to be achieved, available resources, budgets and the expectations of golfers, members, etc.

What are you trying to achieve?

There are many reasons why superintendents should topdress. It:

- helps prevent the build up of thatch;
- can be used to modify the surface layer of a rootzone;
- smooths the putting surface and increases green speed; and
- can be used to help prevent greens from desiccation during the winter.

Light, frequent applications of a straight sand or a sand/organic mixture is an essential practice for controlling thatch build up. The principle behind this practice is that sand simply dilutes the thatch, which is essentially 100 per cent organic matter. This is particularly important with sand-based golf greens and it should begin during grow in. Studies at the Guelph Turfgrass Institute (GTI) in Ontario by Dr. Jack Eggens have shown topdressing alone was more effective at controlling thatch than either vertical mowing or core aeration. A significant thatch layer can hold water and restrict root growth. Thatch, especially with the very low mowing heights that are utilized today, can also lead to scalping.

The aim of a topdressing program is to match the amount and frequency of topdressing to the rate of growth of the turf. If this is successfully accomplished there will be a mat layer only with no serious accumulation of thatch. Topdressing is especially important on greens that are seeded to the new aggressive bentgrass cultivars.

If a significant thatch layer has developed, one solution is to use heavy topdressing in combination with core aeration to get thatch under control. If done twice a year with cores removed and holes filled with sand, over time this method will also modify the upper layer of the soil rootzone and improve surface drainage and provide a more compaction resistant putting surface. This method is also the one employed to modify the surface layer of a rootzone over time.

Frequent topdressing also helps to maintain a smooth, consistent putting surface and can be used to increase green speed.

The affect on green speed, however, is short-lived. In addition, it is beneficial for providing a more uniform putting surface from green to green on golf courses that have greens constructed from different parent materials. Heavy topdressing applications are also used to smooth out greens during grow in.

Topdressing is used in parts of Canada where snow cover is lost over the winter and where high winds may prevail. A layer of topdressing, applied after the winter preventative fungicide and before snowfall, can protect the crowns of the grass plants from dessication.

The tale that lies beneath

One of the drawbacks of topdressing is that you can never go back. A topdressing program should be relatively consistent over the years as should the material being used. If not done consistently, the result could be soil layering, which could spell disaster. One only has to examine the soil profile in the greens to know if there is a layering problem. Some greens' profiles look more like a layer cake than a uniform rootzone. Each layer usually corresponds to a new superintendent. It has been said that one can tell how long a superintendent was at the course by the thickness of the layer. Superintendents often take the practices that worked for them at their previous course and implement them at their new golf course without examining what was previously done. This is often not the wisest thing to do.

What is the impact of soil layering on the performance of greens? A layer in the soil rootzone will affect the way water moves through the soil profile, which will inevitably affect the turf roots. Layering restricts root growth. Roots will grow through the layer at the top and will not penetrate the layer below. There are different problems depending on which layer is on top and which is on the bottom.

If the original rootzone is heavy in texture (clay, silt or loam), continuous topdressing with sand over time will create a layer that will become saturated. The water will move freely through the sand layer and it will be very slow to penetrate the clay. It is similar to filling up a bowl with water. This results in soft greens. Another problem associated with a layer of sand is the tendency toward droughty greens and localized dry spots, especially on the high areas of a green. Conversely, if a sand/soil mixture with silt in the sand is applied on top of a sand-based green, the fine particles in the silt will plug up the macropores in the sand below. This will eventually impede drainage of the sand profile rootzone.

Another problem linked to alternating layers of sand and organic matter in golf greens is black layer. This develops during wet weather or when a green is over irrigated. Other disadvantages include cost and the extra time and labour necessary to topdress. It has also been suggested topdressing encourages antracnose basal rot, and there can be temporary wounding of the turf if topdressing is applied during a stressful period. This allows the fungal organism an entry point into the crown of the plant. In addition, frequent topdressing plays havoc with mowing equipment and is particularly hard on bedknives.

Love them or hate them, topdressing programs are a universal maintenance practice on golf greens in Canada. They can be divided into two basic categories—light and frequent or heavy and infrequent.

What, when and how much?

There has been a continual debate about whether the best topdressing mix is comprised of straight sand or of a sand/peat mixture. On a USGA specified rootzone, it is best to use an 80/20 sand/peat ratio for topdressing for several years after construction. These greens have a very low cation exchange capacity and this makes it more difficult to manage their fertility. If these greens are topdressed with straight sand this problem is exacerbated. Research conducted at the University of Rhode Island found the quality of turf was better with a sand/peat mixture compared to straight sand.

The type of sand that is used in topdressing is very important. When choosing a sand, a medium to coarse sand is best. Roughly 80-95 per cent of the sand particles should be in the 0.15-0.75 mm (0.006-0.03 in.) range. If the particle size distribution is too narrow, the sands lack stability. One of the drawbacks with a sand/peat mixture is that it is often more difficult to have a constant supply of a consistent mixture. From that point of view, straight sand is often chosen. A straight sand would be adequate to use on older, fine textured soils. High pH sands are preferred over calcareous sands because of their high calcium carbonate content.

If the objective is thatch control on a sand or sand/organic based golf green, the goal of the topdressing program is then to match the topdressing frequency and rate to the rate of growth of the turf. In this type of a program the frequency is usually every two-three weeks throughout the period of the growing season where turf growth is rapid, and every three to four weeks during the slower periods of growth. The rate of topdressing ranges from 0.01cu.m to 0.11cu.m per 93 sq m (0.5 ft^3 to 4.0 ft^3 per 1000 $ft^{2)}$ The rate depends on the rate of growth of the turf, which in turn is affected by nitrogen rates, turf cultivar, the amount of irrigation, etc.

If the goal is rootzone modification and/or the prevention of the build up of organic material in a sand-based golf green, then a twice-yearly core aeration (spring and fall), followed by topdressing will help achieve this goal. The amount of sand required will depend on the core aeration depth, the hollow tine diameter and the tine spacing.

Some recent research

Some very recent work done by Dr. Bob Carrow at the University of Georgia has addressed the observation that the soil physical properties of USGA specified rootzones change over time. There is often reduced infiltration rates as the greens mature. This occurs in the upper 4-6 cm (1.6-2.4 in.) of the rootzone. This has been found to be caused by an accumulation of organic matter in the rootzone from the death of turf roots over time. The situation is worst in cool

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climates where soil microbial activity is not enough to break down the dying roots. This organic matter clogs up the macropores, which restricts drainage and leads to restricted root growth.

In this study they were able to ascertain that the ideal amount of organic matter in the upper 4-6 cm (1.6-2.4 in.) of the rootzone is between three and four per cent. Once above the four per cent range, there is a probability the soil hydraulic conductivity will decline, resulting in low oxygen in the rootzone and excessive water retention. In his research, Carrow found hollow-tine core aeration followed by filling the holes with sand topdressing improved the saturated hydraulic conductivity for a duration of five-eight weeks. This research supports the notion of the need for core aeration and topdressing to have optimum performance from a sand/peat rootzone.

Starting a new topdressing program

If one is constructing a new golf course, the answer to what type of topdressing to use and when, is an easy one. The cardinal rule is to match the topdressing to the rootzone below. If there are 18 USGA greens, then frequent, light topdressing with a USGA specified sand/peat mix is recommended. This should be combined with core aeration to prevent the build up of organic matter over time from the death of turf roots.

For a new superintendent at an old course or an old superintendent at an old course, the approach to topdressing first requires some investigation. It is good practice to take intact soil cores from several greens and have the physical characteristics of each layer checked by a soil testing laboratory. In addition, the topdressing material currently being used or being considered should be tested. It is also good practice to test the topdressing material every few years to make sure the product that is being received is consistent. After all that is done, it is necessary to keep an eye on what the results of the topdressing program are so that slight modifications in amount and timing can be made.

Superintendents should not be afraid to take a look and look often. It can be as simple as looking at a cup changer plug to determine if the topdressing program is having the desired results.

The practice of topdressing is here to stay. If it is done correctly it is an excellent tool for controlling thatch and rootzone modification. If done consistently, with high quality materials, the results will be favourable.

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