

Over the last three years, **KATE YORK**, research officer at the **STRI**, has been researching the biology and control of dry patch as it affects golf greens in the UK, supported by funding from the Royal and Ancient Golf Club of St Andrews. Dry patch is a term used to describe a turf condition which is characterised by the presence of underlying water-repellent soil. This article is the first of two showing how our knowledge of dry patch in the UK has increased, with reference to results obtained from an extensive questionnaire survey and provides a practical guide for the greenkeeper on how best to manage dry patch on the greens.

DO OR DRY

Symptoms of dry patch first become apparent during the spring, but usually develop to a maximum through the summer months when it is generally most severe.

The localised circular to irregular shaped areas of the golf green affected by dry patch range in size from small, isolated patches to a general effect, as can be seen in the photograph. The turf present in affected areas generally shows signs similar to those of drought stress, i.e. the turf wilts and is unable to return to an upright position following compression by, for example, foot traffic. The botanical composition of the sward and its appearance is one way of determining areas of the golf green affected by dry patch. Due to the low moisture content of soil in affected areas, the relatively shallow rooting annual meadow grass (*Poa annua*) tends to die out, leaving the deeper-rooting, darker green *Agrostis* spp. and *Festuca* spp. to dominate affected areas. Under extreme conditions of high summer temperatures and low water availability, the grass in affected areas will eventually die out resulting in unsightly bare patches.

The photographs overleaf show the condition of the soil in both unaffected areas and those affected by dry patch on the same green. In the first photograph, the soil appears dark due to its high moisture content, which 'holds' the soil together following the removal of the soil core. In areas affected by dry patch the soil moisture content is severely reduced and the soil takes on an almost dust-dry appearance, which causes the soil profile to crumble when a soil core is removed (second picture).

An extensive questionnaire survey has enabled us to determine the extent and severity of dry patch on UK golf courses. The questionnaire was divided into several subject areas including presence/severity of dry patch, greens maintenance and the use of wetting agents. Eighty-five percent of courses included in the survey indicated a problem with dry patch. Due to the total number of parkland courses within the UK, it is not surprising that over 60% of affected courses included in this survey were parkland. However, although a fewer number of heathland and links courses were surveyed, the percentage of these courses with dry patch was 82% and 100% respectively. The results obtained from the survey indicated dry patch had only been a problem on the majority of courses for 2-5 years (up to 1991), although we know that dry patch has been recognised on certain courses for over 20 years. It is possible that the symptoms have only recently become apparent due to changes in maintenance practices, eg. reduced irrigation, even though in fact the soil may have been water-repellent for many years.

Eighty-seven percent of completed surveys confirm the common belief that dry patch generally affects older, more mature greens. However, the results showed that just over 10% of courses surveyed indicated the presence of dry patch on greens which were less than ten years old. Severity of dry patch on individual greens was recorded as the percentage area exhibiting symptoms. On the majority of courses included in the survey, between 5-25% of the green's surface was affected by dry patch, but in extreme cases up to 75% of the surface showed dry patch symptoms. The results of the survey indicated that in the majority of cases, once dry patch had been identified, there appeared to be no annual increase in the extent of the symptoms, i.e. dry patch does not appear to 'spread' like fungal diseases are known to do.

Applications of high sand content top dressings have frequently been suggested as a likely cause of dry patch development. Many courses do use these top dressings, but if they were causing this condition it might be expected to occur as a blanket effect across the entire greens' surface, rather than as the patchy distribution which is actually observed. However, it is true that if by some means a water-repellent material is being deposited in the soil, sand grains will be 'covered' more readily than smaller soil particles, due to their lower surface area:volume ratio and express the symptoms of water-repellence more rapidly.

Both thatch and root breaks have also been suggested as causing dry patch, however, neither appears to be a significant problem on affected greens included in the survey. Thatch if allowed to dry out is known to be highly water-repellent and is capable of forming a barrier to water penetration. It is possible therefore, that thatch may enhance the severity of the symptoms but it is not a primary causal factor in dry patch development. Root breaks can appear on any green, irrespective of its construction type or its age and occur as a result of a change in the physical state of the soil. Most commonly, this is a result of a change in top dressing material, which eventually leads to shallow rooting, poor turf composition and frequently an increase in its tendency to dry out.

From the results of the survey, we have found no evidence that dry patch is caused by compacted soils – another common misconception. Over 60% of the affected courses surveyed indicated no association between areas of dry patch and the normal traffic routes/pin position. Compaction may itself cause reduced water infiltration and subsequent deterioration of the sward, but it is not directly associated

**How to
manage
dry
patch on
the golf
course**



Core holes taken from adjacent unaffected (left) and dry patch (right) areas

DO OR DRY

11 → with dry patch development.

Finally, as expected, non-ionic wetting agents are used on 93% of courses affected by dry patch, in an attempt to control the symptoms. Currently, a wide range of wetting agents are in frequent use as a tool to combat the problem. However, it appears that although wetting agents solve the short-term problem of getting water into the soil profile and sustaining plant growth, the symptoms of dry patch recur shortly after treatment stops. Various methods of aerating the soil such as spiking are frequently used, particularly on severely affected areas prior to wetting agent application. If certain areas on particular greens are known to have a severe problem with dry patch, it is perhaps advisable to complete the first application of the wetting agent in the early spring before the symptoms begin to show.

It is well known that whilst wetting agents have a role to play in turf management, they will never be able to solve the problem of dry patch completely, but currently they are an effective means available to greenkeepers to reduce the symptoms.

Laboratory analysis of soil has identified a significant

reduction in the moisture content of soil from areas affected by dry patch when compared with adjacent, unaffected areas. However, soil analysis has also shown that there are no significant differences between soil from dry patch and unaffected areas with regard to levels of pH, phosphate, potassium or nitrogen, nor are there any significant differences with depth with regard to soil particle distribution or soil organic matter content. These results tend to imply that dry patch is more likely to be a biological problem rather than a purely chemical or physical one.

In conclusion, we are now aware of the distribution and severity of dry patch on UK golf courses, its associated maintenance factors and how the problem is currently being alleviated with wetting agents. In addition, the physical and chemical characteristics of soils from areas affected by dry patch have now been well defined. This information is crucial for the development of techniques to remove the deleterious effects of dry patch on UK golf greens.

■ In April's Greenkeeper International, the results of research at the STRI on the influence of turf irrigation practices on dry patch formation and the possible biological causes.

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