

# How Low Can You Go?



Stella Rixon, STRI Turfgrass Agronomist for the South East, gets her ruler out and explores the changes in grass growth and cutting heights over the past two years.

With an ever increasing demand for Augusta quick greens all year round, the STRI has been carrying out a countrywide survey to record present day cutting heights on golf courses around the British Isles. Height of cut information on greens, tees, collars, fairways and rough was collected by STRI agronomists visiting over 850 courses, distributed throughout Scotland, Ireland, North and Southern England. The courses varied in type from links, heathland to parkland and from pay-and-play to The Open venues. The survey ran from June 2002 to June 2004 so that we have two complete years of data, enabling a comparison to be made from year to year.

**TABLE 1: MAXIMUM, MINIMUM AND AVERAGE CUTTING HEIGHTS FOR 850+ COURSES AROUND THE BRITISH ISLES.**

Area	Summer (Apr-Sept)			Winter (Oct-Mar)		
	Min	Max	Average	Min	Max	Average
Greens	2	8	4.62	3	8	5.67
Tees	4	13	11.34	6	20	12.26
Collars	5	27	11.24	7	18	11.59
Fairways	6	30	15.16	10	25	15.89
1st rough	20	100	40.54	19	100	42.42
2nd rough	25	125	60.71	25	125	66.93

## A GOOD DEAL OF VARIATION

The range of mowing heights for each area of a course varied quite widely. The maximum and minimum cutting heights found in each turf area, and the calculated average over all courses is shown in Table 1. As you can see variations were quite extreme for some parts of the course.

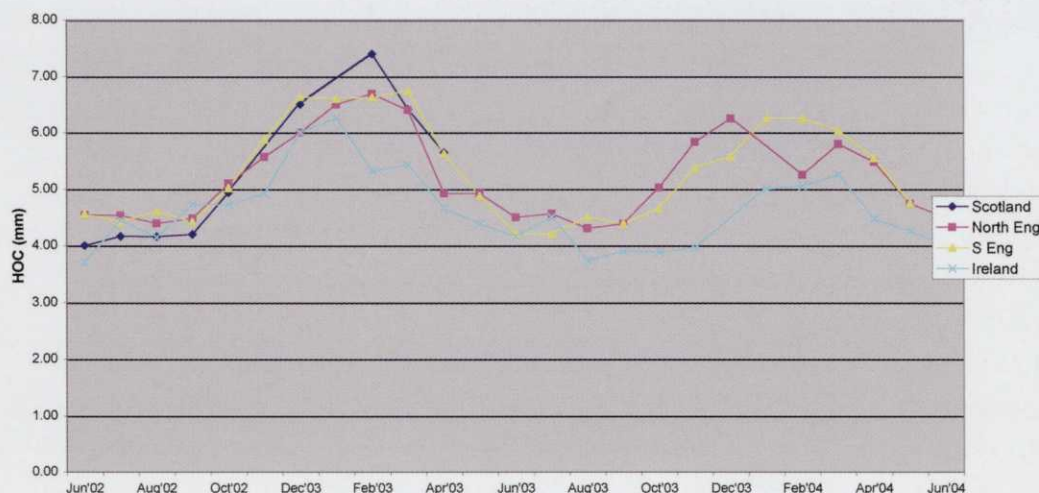
It was interesting to compare data from different areas of the country - a summary table (Table 2) is given. The one trend clearly shown was that Ireland had consistently lower mowing heights on greens, as demonstrated more clearly in Graph 1. This is due to a prevalence of USGA specification, close-mown, creeping bent greens.

With the exception of Ireland, all other areas had a similar average greens height of cut, i.e. winter and summer combined. However, perhaps not surprisingly, Scotland showed the greatest drop between winter and summer heights. The data collected suggested that slightly longer cutting heights were maintained through the colder Scottish winters but shorter greens heights were found during the summer - perhaps due to less heat stress compared to more southerly climates?

Ireland and Scotland also tended to have shorter mown fairways than courses throughout England, both through the summer and winter. This is likely to be due to the predominance of bent grass on Scottish fairways and the high number of tight mown, USGA style courses in Ireland. This grass species can withstand shorter mowing heights without suffering from drought stress. Finally, Scotland also appeared to maintain shorter grass heights on tees, both in summer and winter and, once again, Scottish tees tend to have a high percentage of bent grass.

As well as location, I also looked at whether there were any differences in heights of cut on different course types - i.e. comparing data for parkland, heathland, links/seaside and moorland/upland courses. This analysis showed that lowest summer greens heights were found on links/seaside courses and the highest found on parkland courses, although there was only an average difference of ~0.2mm. In winter, this observation was reversed with parkland and heathland recording the lowest greens heights and links/seaside and moorland/upland retaining cutting heights up to 0.5mm higher. However, we cannot be certain that this depicts an accurate picture as the data collected was predominantly from parkland courses and some of the other types e.g. moorland/upland were poorly represented.

**GRAPH 1 Comparison of Average Greens Height around the British Isles**



**GENERAL DOWNWARDS TREND?**

Perhaps most significantly, the data collected showed that the average height of cut for greens, tees and fairways reduced over the period of time from June '02-'03 to June '03-'04. Granted that we have only two years of data but this does seem to confirm the perception that there is a general trend to lowering cutting heights, particularly with respect to greens.

However, before we draw any premature conclusions we should look at how the weather in each year affected mowing heights.

**THE WEATHER EFFECT**

We might expect that cutting heights are adapted according to weather conditions such as cold, drought, rainfall, etc. Therefore, I analysed the data to see which of these factors had the greatest effect on the mowing heights recorded.

**DROUGHT**

June to Sept '02 was a good growing summer, whereas June to Sept '03 was very hot and dry, therefore you might have expected more generous cutting heights in the latter to compensate for the drought conditions. This was true for the tees and fairways but greens were actually cut lower. Obviously, greenkeepers would have been relying heavily on their irrigation systems for maintaining the greens turf, whereas tees and fairways could not be irrigated to the same extent, if at all.

According to the Meteorological Office records over the last 30 years, average UK temperatures usually peak in the month of July. However, over the last four years we have experienced equal or greater temperatures in August. Despite this, our survey shows that greens were being mown at their shortest in August of both years, '02 and '03, when temperatures reached their highest.

For instance, in the hottest month through the survey, August '03, when temps hit 16.5°C, we recorded the lowest average greens cutting height of only 4.19mm. No doubt the warm temperatures combined with summer fertiliser and irrigation were promoting rapid growth at this time but the sudden and severe heat stress took many greenkeepers unawares.

**TABLE 2: SUMMARY OF AVERAGE CUTTING HEIGHTS FOR DIFFERENT AREAS (\*ONLY SMALL DATA SET FOR SCOTLAND).**

	Scotland		North England		South England		Ireland	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Greens	4.43	6.31	4.64	5.99	4.67	6.07	4.22	5.07
Tees	9.76	11.51	11.16	12.32	12.17	13.12	11.16	12.71
Fairways	13.72	14.11	15.43	16.48	16.35	16.40	13.59	15.23

Perhaps the sunshine was also bringing out more golfers and therefore pressures to maintain fast greens were greater?

**WINTER WEATHER**

Winter of '02/'03, November to January, was fairly wet, with an average rainfall over the UK of 397mm (111%) over the three months and a mean temp of 5.3°C. The same period in '03/'04 was similarly wet with 375.7mm (110%) over the three months and the same mean temperature. Despite this, the average greens, tees and fairways height all came down in height slightly in winter '03/'04 compared to the previous one.

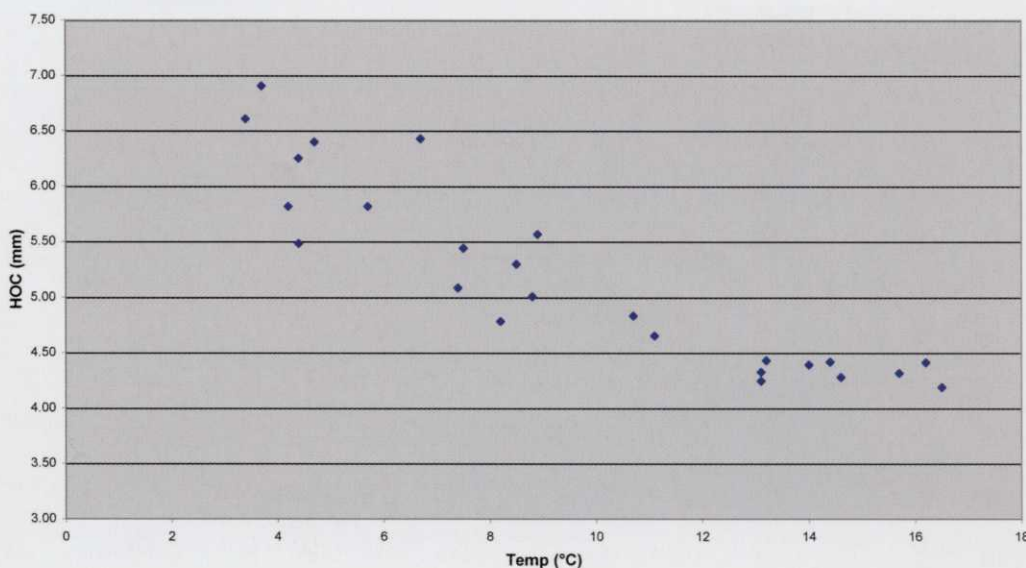
**CHANGEABLE SPRING WEATHER**

January to May '03 was a generally dry spring. The year started cold before becoming unseasonably warm and dry - many eastern and southern parts received less than 50% of their average rainfall in February and March and the UK average for April was down to only 75% of the 30 year average for this month. In contrast, January to May '04 was wetter, in particular the best growing month, April, which received an average of 138% of its usual precipitation. Therefore, the slightly lower cutting heights recorded on greens and tees in spring '04 might be expected, as growth was more vigorous.

In contrast, fairways in spring '04 were slightly higher than in '03. These areas tended to be hit hard by 2003's drought and in many areas the soil was still notably dry below the surface, despite winter rains. As a consequence, numerous courses were still struggling with notably thinned fairways and moss invasion as a legacy of the drought and therefore this increase in height was likely in response to this.

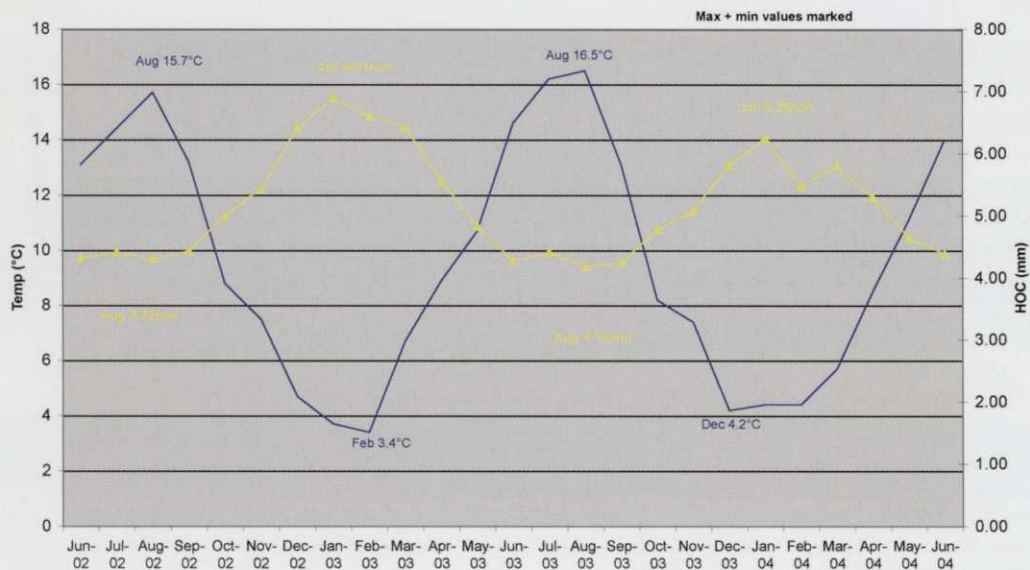
**GRAPH 2**

**Relationship between Temperature + Greens Height of Cut**



**GRAPH 3**

**Average UK Temperatures and Cutting Height of Greens**



Looking at the reduction in greens height of cut through February to June '03 compared to the same period in '04 we can see that for 2003, cutting heights were steadily reduced over this time. However for 2004, greens heights actually increased from February to March before steadily coming down again.

**SUMMARY OF WEATHER EFFECT**

It seems temperature governs greens cutting heights more than any other factor. Whereas there was no obvious relationship between rainfall and greens cutting heights, there is a good negative correlation with temperature. This trend is strongest in warm temperatures, i.e. everyone is cutting at their lowest in the summer months but mowing heights vary more widely in colder periods.

Analysis of the data shows that above 13°C, greens are reaching their lowest mowing heights, which vary very little around an average of 4.33 mm (S.D. 0.93). However, at temps less than 10°C, HOC tends to vary much more, around an average of 5.61mm (S.D. 1.78). For instance, in the coldest month through the survey, February '03, when the mean UK temp was only 3.4°C, green cutting heights ranged from five and eight.

There is not the same clear relationship between temperature and cutting heights for tees and fairways; frequently these areas tend to be mown at a relatively similar height year round with little difference between summer and winter.

**FOOD FOR THOUGHT**

The skill of greenkeeping is to adapt constantly to the weather and changing environmental conditions and alter management accordingly. As

the survey indicates, this is happening up to a point. Greenkeepers are responding to changeable spring conditions and cold temperatures. This is probably an easier call to make as clubs tend to accept less than perfect conditions through the winter months. Come the summer the golfers want excellence and this is reflected in the sustained short mowing heights, particularly on greens.

A quick lesson in physiology: As we all know, the green leaves of a plant are its powerhouse. It is here that the magic of photosynthesis occurs. The sun's energy is harnessed and combined with carbon dioxide and water to produce food in the form of sugars. These sugars are then transported around the plant and used for energy and as building blocks for growth. Of course, the roots are important for taking in water and nutrients to add to these sugars to form complex molecules such as proteins, etc but ultimately, it is the shoots which feed the plant.

This is why plants die without sufficient light - irrelevant of how much fertiliser/water they were given. Furthermore, the roots can only grow with the shoots feeding them; therefore the length of the roots is directly linked to the amount of leaf matter on the surface.

So you can see it is very easy to get into a vicious downwards spiral - the shorter the cutting height = less green matter = less growth = less roots + weaker plant = less drought, disease and wear resistance.

This was clearly shown in the drought of 2003 when many courses lost grass cover on surfaces, but most commonly on irrigated greens, as opposed to non-irrigated fairways. This should be a warning. Just

because turf is growing vigorously, does not mean it can withstand shorter heights. Most importantly, let Mother Nature be your guide as opposed to the golfing calendar.

