Clipping Rates of turf-type Perennial Ryegrasses over winter.

Phillip Ford (University of Ballarat) and Andrew Brooker (PGGWrightson Australia)

Introduction

Perennial Ryegrass (*Lolium perenne*) originated in Europe, and adapted and diversified itself over a wide land mass from northern continental Europe through to the Mediterranean, including northern Africa. Northern continental Europe has extremely cold winters, often with snow cover. The growing season in this climate is in the summer. So the Perennial Ryegrasses from this zone (which we'll call 'Continental' types) grow with peak activity from late spring through summer and autumn. They close down their activity in winter, giving them a greater ability to survive, hence the term 'winter hardy'.

The Mediterranean climate, on the other hand, has hot dry summers, and the main rainfall is over the winter. So the Perennial Ryegrasses from this southern zone (the 'Mediterranean' ryegrasses) grow with peak activity through the autumn-winter-spring period, and they close down somewhat over summer, giving them a greater drought resistance. If well irrigated, however, they maintain good activity through summer as well.

These traits are genetic and hard-wired into their lifecycle, and when you move them to a new location, such as southern Australia, they still follow their original growth pattern. So the winter hardy Continental types will have very slow growth over the winter, and look to grow more strongly in the summer. This extra activity in the summer makes their drought resistance poor unless generous irrigation is applied. The Mediterranean types, on the other hand, have better winter activity, but are also more drought resistant than the Continental types.

This fact has been known and exploited in the grazing industries for many years. The pasture-type Perennial Ryegrasses used in southern Australian and New Zealand are locally developed cultivars based on imported Mediterranean genetic material, which provides better feed yield over the cooler months, and better drought resistance over the summer (Silsbury, 1960).

When the breeding of 'turf-type' Perennial Ryegrasses took off in the US in the 1960s, the parent material consisted of winter-hardy plants from old stands on the east coast of the US, and genetic types from Continental Europe (Funk & Clarke, 1989). The basis of varieties such as 'Manhattan' and 'Pennant', then, was largely of the Continental genetic type, and most of the modern turf-type cultivars bred in the US or Europe continue to use Continental genetics. Due to their exceptional density and colour (and also to clever marketing) these Continental-based cultivars have been widely adopted in the turf industries of Australia and New Zealand, despite the evidence from the pastoral industries that Mediterranean varieties would be better suited to our climate and needs (Stewart & Aberdeen, 1997). One obvious advantage of the Mediterranean types for football fields is the higher winter growth rate. The question is, how much higher is that growth rate?

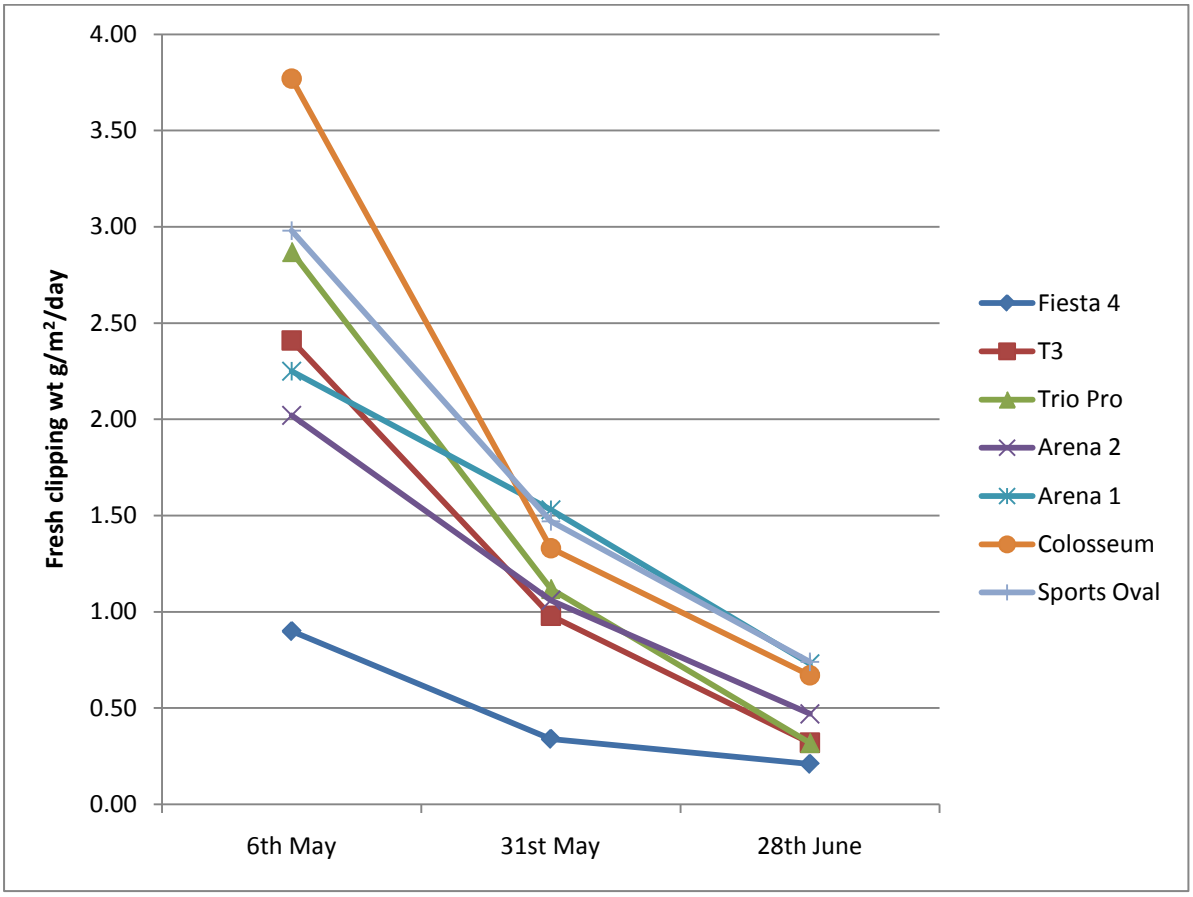
The aim of this trial is simply to quantify the clipping yield over winter of two Mediterranean turf-type Perennial Ryegrasses, Colosseum and Arena 1, with two Continental varieties, Fiesta 4 and Arena 2 (note that Arena 1 and Arena 2 are completely different genetic types, despite the similarity in name). A transitional ryegrass (T3), and two commercial Perennial Ryegrass mixes were also included. The TrioPro mix contains three Continental cultivars (Fiesta IV, Arena 2, Centurion), whereas the Sports Oval mix contains three Mediterranean cultivars (Colosseum, Tambour, Arena 1).

Method and Results

Field plots of each variety or mix were established at the PGGWrightson field station at Leigh Creek, near Ballarat, in April 2010. Starting in May 2011, fresh clipping weights of three replicate 8m^2 plots were measured, and the results converted to grams of clipping fresh weight per square metre per day since their last mowing. Analysis of variance was used to determine the least significant difference values. The mean maximum temperature for June was 11.6^{o}C.

Cultivar or Mix	Type	6th May	31st May	28th June
Fiesta 4	Continental	0.90 ^{a}	0.34 ^{a}	0.21 ^{a}
T3	Transitional	2.41 $^{b.c}$	0.98 ^{b}	0.32 ^{a,b}
Trio Pro	Continental	2.87 ^{c}	1.12 ^{b,c}	0.32 ^{a,b}
Arena 2	Continental	2.02 ^{b}	1.06 ^{b,c}	0.47 ^{b,c}
Arena 1	Mediterranean	2.25 ^{b}	1.53 ^{d}	0.73 ^{d}
Colosseum	Mediterranean	3.77 ^{d}	1.33 ^{c,d}	0.67 ^{c,d}
Sports Oval	Mediterranean	2.98 ^{e}	1.47 ^{d}	0.74 ^{d}
LSD (P=0.05)		0.59	0.34	0.20

Table 1: Fresh clipping wts (g/m^2/day) of Perennial Ryegrass varieties or mixes at Leigh Creek, winter 2011. Values followed by the same superscript letter are not statistically different.



Graph 1: Mean fresh clipping wts (g/m^2/day) of Perennial Ryegrass cultivars at Leigh Creek, 2011.

Discussion

The Mediterranean cultivars Colosseum and Arena 1, and the mix 'Sports Oval' (containing Mediterranean varieties), grew approximately three times faster through June than the cultivars Fiesta IV and Arena 2, and the 'Trio Pro' mix, which are based on Continental genetic material.

Winter performance of a turf variety on a football field depends on its initial wear tolerance, and after wear, on its recovery rate. Leaf growth is an essential element of this recovery. The Mediterranean types demonstrated higher winter growth rates, and have an important role in maintaining a grass surface through the winter season. The trial will continue until early summer.

References

Funk, C.R. and Clarke, B.B. (1989): Turfgrass breeding – with special reference to turf-type perennial ryegrass, tall fescue and endophytes. 6th International Turfgrass Society Research Journal (Tokyo), p3.

Silsbury, J.H. (1960): A study of dormancy, survival and other characteristics in *Lolium perenne* L. at Adelaide, South Australia. CSIRO publishing: www.publish.csiro.au/?act=view_file&file_id=AR9610001.pdf

Stewart, A.V. and Aberdeen, I. (1997): The use of winter-active germplasm in breeding turf ryegrass for winter sports fields. International Turfgrass Society Research Journal (Sydney), Vol 8, p 377.