Winter activity of perennial ryegrass cultivars

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It might seem that turf-type perennial ryegrasses are all much the same, and that it doesn’t matter which cultivar you choose for a sportsground, fairway, tee, lawn or park. But the species *Lolium perenne* covers a wide range of genetic variation and includes diploid or tetraploid types, transitional or persistent types, high or low endophyte types, dark green or bright green types, and Continental or Mediterranean types. There are real differences between ryegrass cultivars that affect their appearance, their performance and their suitability for a particular use. For professional Turf Managers, selecting the most suitable cultivar is every bit as important with perennial ryegrass as it is with bent or bermudagrass.

Perennial ryegrass originated in Europe and adapted itself over time to a wide range of climates, from northern continental Europe through to the Mediterranean region, including northern Africa. Northern continental Europe has extremely cold winters, often with snow cover and frozen ground. The growing season in this climate is in the summer. So the Continental perennial ryegrass genotypes grow with peak activity from spring through summer and autumn. They close down dramatically in winter, giving them a greater ability to survive snow and ice, hence the term ‘winter hardy’.

The Mediterranean zone, on the other hand, has hot dry summers and the main rainfall is over winter. So the Mediterranean perennial ryegrass genotypes grow with peak activity through the autumn-winter-spring period, and they close down a little over summer, giving them a greater drought resistance.
These genetic traits are hard-wired into their lifecycle and when you move them to new locations, such as the temperate zones of New Zealand or Australia, they still follow their original growth pattern. So the winter hardy Continental cultivars grow very slowly over our winter, and grow more strongly in the summer. The Mediterranean cultivars, on the other hand, have better winter activity and also better summer drought resistance than the Continental types.

This fact has been known and exploited in the grazing industries for generations. The pasture-type perennial ryegrasses used in southern Australian and New Zealand are locally bred cultivars based on Mediterranean genetics to provide better feed yield over the cooler months and better drought resistance over the summer compared to the Continental cultivars (Silsbury, 1960).

When the breeding of turf-type perennial ryegrasses took off in the US in the 1960s, the parent material incorporated the genetics of winter-hardy plants from old stands on the east coast of the US and north-west Continental Europe (Funk & Clarke, 1989). The basis of varieties such as ‘Manhattan’ and ‘Pennant’ 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. Naturally the breeders will want to produce varieties that handle their very cold winters, perhaps with snow cover and frozen soil. The breeders also selected for a very dark green colour to suit the US market. Due to their dark colour (and also to clever marketing) these Continental types have been widely sold into the turf industries of Australia and New Zealand, despite the experience from the grazing industries that Mediterranean varieties would be better suited to our climate and needs (Stewart & Aberdeen, 1997).

This edition of Turf Talk points out two, or three, big advantages of Mediterranean cultivars compared to the dark green Continental cultivars for turf in our part of the world. The first advantage is that the Mediterranean cultivars will germinate and establish more rapidly when sown later in the autumn, in colder conditions. The second is that Mediterranean cultivars produce more growth over winter. And the third possible advantage, for those losing the battle against Poa or just not worried about it, is that Poa annua blends very nicely into the mid-green foliage of the Mediterranean cultivars, but sticks out like the proverbial in the dark green Continental cultivars.
Advantage 1: Better establishment in cold conditions

A sowing trial was conducted at the PGWrightson turf research facility at Kimihia, near Christchurch. Field plots of a Mediterranean cultivar (Colosseum) were established alongside a Continental cultivar, with new plots sown at regular intervals from early April until June. There was very little difference in establishment rate between the cultivars when sown in April, but in the plots sown in May and June the emergence and establishment of the Mediterranean cultivar Colosseum was dramatically better than the Continental cultivar, as seen in the following photos.
Only the Mediterranean cultivar was able to successfully establish when sown in May or June. This result was corroborated by a germination study conducted at 5°C, which is really cold. Colosseum achieved 89% germination in 30 days, whereas Nine-o-One achieved 36% germination, and Citation 3 only achieved 11% germination.

This is particularly important for those planning a winter oversow of bermudagrass fields. Competition between the perennial ryegrass and the bermudagrass over the winter is much reduced if the ryegrass can be sown late, simply because the ryegrass plants are younger when it comes time to remove them in the spring. Sowing late and reducing competition between the two grasses will result in a more successful transition back to bermudagrass in the spring. The most difficult transitions involving loss of bermudagrass are usually seen when the ryegrass has been sown in February – April, and has simply been in too long.

**Advantage 2: Higher winter growth rate**

Another advantage of the Mediterranean cultivars is the higher winter growth rate when compared to Continental varieties. The question is, how much higher is that growth rate? A clipping rate trial was conducted on mature turf plots during winter 2011 at the PGGWrightson Australian turf research facility at Leigh Creek, near Ballarat. As Table 1
shows, the growth rate during May, June and August was dramatically higher with the Mediterranean cultivars, especially the Sports Oval blend (Colosseum, Tambour and Arena 1) which had clipping yields around three times higher than Fiesta 4 during the winter months.

Table 1: Fresh clipping weights (g/100m²/day) of perennial ryegrass varieties or blends at Leigh Creek, Ballarat, winter 2011.

<table>
<thead>
<tr>
<th>Cultivar/blend</th>
<th>Type</th>
<th>31st May</th>
<th>28th June</th>
<th>14th Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiesta 4</td>
<td>Continental</td>
<td>34 a</td>
<td>21 a</td>
<td>23 a</td>
</tr>
<tr>
<td>Trio Pro</td>
<td>Continental</td>
<td>112 b,c</td>
<td>32 a</td>
<td>31 a,b</td>
</tr>
<tr>
<td>Colosseum</td>
<td>Mediterranean</td>
<td>133 c,d</td>
<td>68 c</td>
<td>41 a,b</td>
</tr>
<tr>
<td>Sports Oval</td>
<td>Mediterranean</td>
<td>147 d</td>
<td>74 c</td>
<td>61 c</td>
</tr>
<tr>
<td>LSD (P=0.05)</td>
<td></td>
<td>34</td>
<td>20</td>
<td>19</td>
</tr>
</tbody>
</table>

By September the growth in all the ryegrass cultivars took off and the differences weren’t so dramatic. But it’s the mid-winter growth that is of prime importance for most Turf Managers, especially on football fields. Some Turf Managers on venues hosting televised night games have complained that the mid-green Mediterranean types don’t show up well on television under lights, but that can be managed with fertilizers, especially iron.

In more passive turf situations such as lawns or parklands, low winter growth might be an advantage. The cultivar Fiesta 4 or the blend TrioPro offers this, as well as an attractive dark green colour.

**Advantage 3: Blending with Poa annua**

The current group of Mediterranean cultivars are all a bright, mid-green colour, rather than the dark green of the Continental cultivars. It can be seen in the following photo that Poa annua doesn’t stand out so much in the Mediterranean cultivar Colosseum compared to the Continental cultivar Fiesta 4, which could be a benefit in some situations.
A final point that should not be forgotten in the debate about Continental vs Mediterranean cultivars concerns endophytes. New Zealand bred Mediterranean cultivars such as Colosseum contain new endophyte technology (AR95) that provides excellent pest resistance, whereas most Continental types don’t. If you can use endophytes, why wouldn’t you?

So, not all perennial ryegrasses are the same. As mentioned at the start, professional Turf Managers should devote as much care to selecting a perennial ryegrass cultivar as they would if selecting a bent or bermudagrass cultivar.

References:

