

**Ryegrasses for Racetracks**  
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There are several different types of ryegrass (*Lolium* species). This report will provide information that should help Racetrack Managers choose which type is best for their situation.

Ryegrass is a tillering plant, with only a very limited ability to move laterally. Some cultivars are promoted as creeping, but their lateral spread is minimal, not at all like the creeping behaviour you would see with Kentucky bluegrass, couch or kikuyu. Tillering is where the original plant that germinates from a seed starts to develop a crown, with multiple shoots (tillers) growing from that central crown, as shown below.



Photos: a newly established ryegrass plant, above, developing its first few tillers. An older plant, below, that has developed hundreds of tillers, all from the central crown.



If given enough space, a single plant can develop hundreds of tillers. But this leads to clumpy turf, unsatisfactory for racing. It is important that a high enough sowing rate is used to limit the tillering of ryegrass by crowding. Follow-up oversowing is also required if ryegrass density is reduced through wear and tear or disease. Pasture sowing rates might be 25kg/ha, but clumpiness isn't an issue in pasture. On racetracks, ryegrass sowing rates should be at least 150kg/ha.

### **Annual ryegrass**

Each individual tiller has the ability to form a seedhead. However, once a tiller has switched from producing leaves to producing a seedhead, there is no going back; that tiller will produce its seed, and then die. If all or nearly all of the tillers on a particular plant switch to producing seedheads at the one time, the plant itself must die. This, then, is an annual type (*Lolium rigidum*, Wimmera ryegrass, or Italian ryegrass, *Lolium multiflorum*). These species are well adapted to an unirrigated, Mediterranean climate. They establish in autumn, grow extremely well through the winter, then in spring they react to vernalisation signals in the environment (increasing soil temperature and longer daylength) and switch all the tillers over to seedhead production. This is a one-way ticket to death; their annual cycle is done. Naturally, heading also causes a problem with turf quality, as the sward becomes very stalky and open, with limited or zero ability to regenerate new foliage.

Annual ryegrasses have a place in couch or kikuyu racetracks that are oversown for winter. They produce considerably more growth in winter compared to perennial ryegrasses, and their seed yield is also higher, making them cheaper to buy.

Winter oversowing of kikuyu or couch tracks provides many benefits, some you may not have considered. Obviously, ryegrass in the sward over winter will provide green colour. And ryegrass produces a striking mowing pattern, which is very attractive. More importantly, the winter activity of ryegrass provides recovery from wear and tear. Highly winter-active ryegrasses (such as PGG Wrightson's 'Bolter' blend) can germinate right through the winter in our climate, either in follow-up oversowings into the track, or when mixed with divoting sand. Because ryegrass is actively growing over the winter, its roots will be extracting water and pumping it out through the leaves, resulting in a reduction in moisture level in the soil. The presence of ryegrass actually protects the underlying couch or kikuyu from damage, which means the warm season grass will be in better shape coming out of winter, going into spring regrowth.

### **Perennial ryegrasses**

Some ryegrass cultivars don't respond as strongly to vernalisation, and not all their tillers switch to seedheads. This leaves enough tillers to carry on producing foliage, so they can survive for more than one year. Some survive just a few years, others can survive indefinitely. The cultivars that only survive a few years are known as short-rotation ryegrasses. Usually they are an Italian ryegrass, or a hybrid between an Italian and a perennial type. These are given the botanical name *Lolium hybridum* or *Lolium boucheanum*. Short rotation ryegrasses have a role in agriculture, but it is hard to see their place in racetracks.

The true perennial ryegrasses (*Lolium perenne*) can live for many years. Only a limited number of their tillers switch to seedheads each spring, leaving the majority of tillers still in the vegetative state, able to continue producing foliage. Obviously, to continue their perennial growth they will need summer irrigation in our climate. They can survive drought to some extent by going into a summer dormancy, where they stop growing and lose colour. So they can be grown without irrigation in temperate areas with good rainfall and short, moderate summers. But keeping them completely green and active over summer requires irrigation.

### **Heading date**

Heading date and aftermath heading are two factors that have major implications for racetrack quality. Heading date relates to how early in the springtime a particular cultivar will start producing seedheads. It is a genetic feature of a cultivar. Some cultivars are early heading, others are late. Early heading varieties are suited to a dry, harsh climate with no irrigation, a climate where it can switch very quickly from cool winter conditions to hot, dry conditions. In a climate like that an early heading variety is a safe bet, as it produces its seedheads and seeds well before droughting can kill the mother plant. A late heading variety

can get caught out, being killed by drought before it has a chance to produce seed. But that has little relevance to an irrigated racetrack. Early heading means a substantial part of the spring is wasted. The plant is producing seedheads (to the detriment of turf quality) when it could be producing foliage and maintaining turf density and quality right through the spring.



Photo: the early heading cultivar Tetila (left), compared to Winter Star II, in October. Tetila's quality, density and productivity has been reduced by switching to seedhead production.

Some Racetrack Managers have preferred an early heading annual cultivar like Tetila for winter oversowing into couch or kikuyu, as the ryegrass heads early and can then naturally transition itself out of the sward through mid-spring. However, this is a fairly ugly and drawn out process, especially if the spring is mild and the ryegrass hangs on a long time.

We recommend a different, more modern approach to oversowing and transition, using Bolta for oversowing, and the herbicide Destiny® (iodosulfuron) to kill the ryegrass out whenever you are ready, at a precise date of your choosing. WinterStar II, the main elite cultivar in Bolta, is late heading and will provide excellent growth and quality right through spring (see photograph above). And Destiny will ensure a complete and rapid kill of the ryegrass at the precise date you want, to fit in with your racing program.

Whether for oversowing or for permanent ryegrass swards, there is substantial benefit in using a late heading variety. A comparison of heading dates is shown below. The old cultivar, Nui, is used as the standard, and all varieties are compared to it:

<b>Cultivar</b>	<b>Type</b>	<b>Heading date</b>
<b>Skippy</b>	diploid	24 days earlier
<b>Victorian</b>	diploid	10 days earlier
<b>Kingston</b>	diploid	3 days earlier
<b>Nui</b>	diploid	0
<b>Extreme</b>	diploid	0
<b>Banquet II</b>	tetraploid	18 days later
<b>One50</b>	diploid	21 days later
<b>Base</b>	tetraploid	23 days later
<b>Halo</b>	tetraploid	25 days later
<b>Quartet II</b>	tetraploid	28 days later

Note that Victorian perennial ryegrass, another old standard, is very early heading compared to a modern cultivar like Halo. In the field, the difference is very visible, as shown below:



Photos: early heading Victorian perennial on the left, the late heading cultivar Halo on the right, seen in October. The Vic perennial is very stalky with low biomass compared to Halo.

Another factor that has ramifications for turfgrass quality is aftermath heading, which is how long the heading process drags on. Some cultivars have a prolonged heading period, whereas other cultivars get it over and done with quite quickly. This is a relatively new factor to look at, but it makes sense that a drawn out heading process means the turf quality is compromised

for a long period of time. A short, sharp heading with low aftermath heading will mean the perennial ryegrass gets back to vegetative production quickly, restoring turf quality and density. The improved perennials in PGG Wrightson's new range, such as Halo, One50 and Base, all have much lower aftermath compared to the old cultivar Victorian Perennial. The combination of late heading and lower aftermath heading means these modern perennial ryegrasses have great advantages over the older cultivars, especially for turf density and productivity through spring and into early summer.

### **Diploids vs Tetraploids**

Another feature of ryegrasses that is noted in the previous table is whether they are diploids or tetraploids. Diploids have the 'normal' number of chromosomes (14 for ryegrass), tetraploids have double that number (28 chromosomes). Doubling the chromosome number can be done in the laboratory, although it can also occur in nature. If inputs such as water, sunshine, nitrogen and other nutrients are high, then the double set of chromosomes allows more rapid growth and higher productivity. Many plant species bred for modern, high-input agriculture exploit polyploidy, extra sets of chromosomes, to maximise yield.

In the field, tetraploid perennial ryegrasses are darker in colour, usually broader in leaf, but have lower density than diploids. Tetraploids are more palatable to livestock, so their lower density in a pasture can be partly attributable to overgrazing. This suits a pasture, as it allows more room for clover. On a racetrack we're not worried about palatability or compatibility with clover, but we are interested in colour and density. The tetraploids provide darker colour, the diploids provide greater density. So a common practice has evolved of using a blend of diploids and tetraploids for a racetrack. It seems sensible to continue that practice, so PGG's perennial ryegrass blend ('Furlong') contains an elite diploid cultivar and an elite tetraploid cultivar.

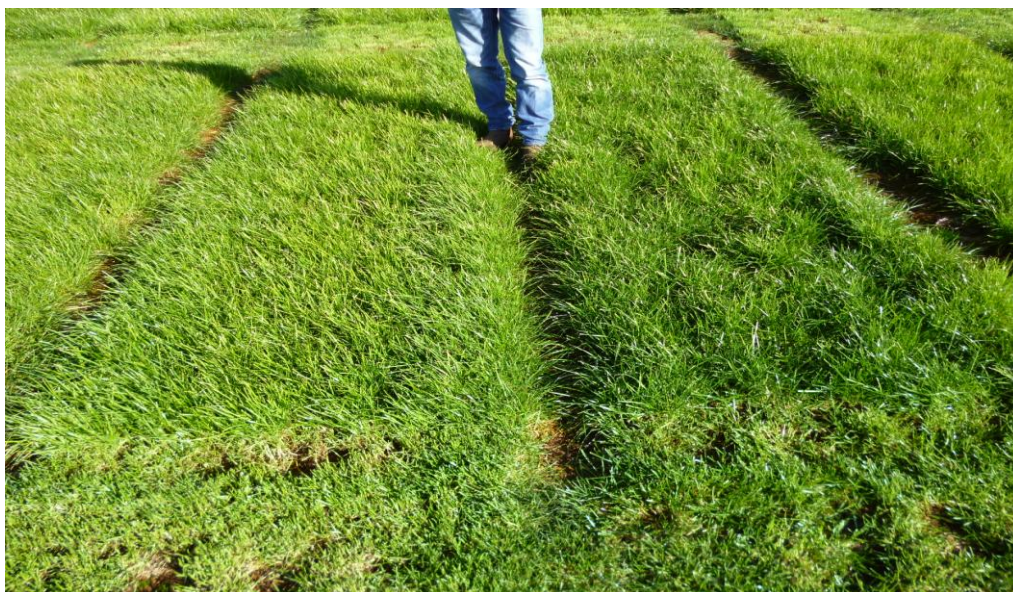
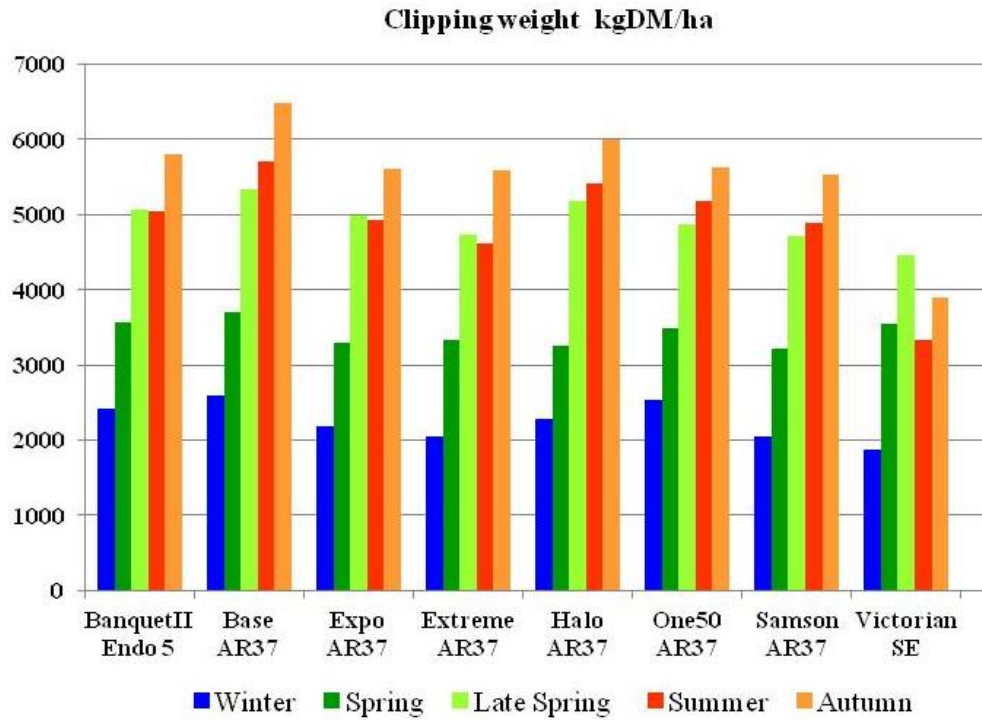


Photo: a diploid perennial ryegrass (left) compared to a tetraploid. The stand is over two years old, so the tetraploid is showing the typical lower density compared to the diploid.

The next point to talk about with ryegrasses is their growth and productivity. Great advances have been made in the breeding of ryegrass cultivars to provide high biomass production. In pasture, as well as on racetracks, winter productivity is a key issue, but modern cultivars provide higher growth and biomass yield right through the year, as shown on the following graph. The clipping yield is in kilograms of dry matter per hectare.



It is unlikely that any Racetrack Manager will knock back the opportunity to grow more grass, especially during winter. The following photos show what this actually looks like:



Photo: Vic perennial rye (left) with a yield of 1880 kgDM/ha in July, compared to Base, with a winter yield of 2587 kgDM/ha, 38% higher.



Photo: On the left, Base (4634 kgDM/ha) compared to Vic perennial on the right (2,886 kgDM/ha) in October. The swards look similar, but Base has 60% higher biomass compared to Vic.

Cultivar	Ploidy	Winter production	Summer production
<b>Banquet II Endo 5</b>	Tetraploid	2422	5038
<b>Base AR37</b>	Tetraploid	2587	5708
<b>Expo AR37</b>	Diploid	2187	4927
<b>Extreme AR37</b>	Diploid	2040	4612
<b>Halo AR37</b>	Tetraploid	2288	5420
<b>One50 AR37</b>	Diploid	2541	5188
<b>Samson AR37</b>	Diploid	2046	4885
<b>Victorian SE</b>	Diploid	1880	3324

Table 1: yield of perennial ryegrass cultivars, in kilograms of dry matter per ha.

Note that there isn't a great deal of difference in productivity between the diploids and tetraploids. The elite diploid cultivar One50 has similar yield, summer and winter, to the elite tetraploids such as Base and Halo. All three of those modern cultivars are considerably more productive than the older cultivar Victorian perennial.

Another difference between ryegrasses is whether their genetic background is from northern Europe (known as Continental types) or from southern Europe (Mediterranean types). Continental types go dormant in winter in order to survive the snow and frozen soil of inland



Continental Europe. Their peak growth season is through the summer. Mediterranean genotypes stay active through the winter, to suit the Mediterranean climate (wet winters, dry summers) like we have here. All PGGWrightson racetrack ryegrasses are Mediterranean types, in fact nearly all pasture ryegrasses used in Australia and New Zealand for the last 50 years are Mediterranean types. However, other seed companies might be selling Continental types, probably bred in the US. These will be dormant over winter, and not much good for our racetracks.

## Endophytes

Many of the cultivars listed in these tables have ‘AR37’ after their name. This refers to a special type of endophyte. The presence or absence and type of endophyte in a ryegrass is of great importance. Endophytes are fungi that are symbiotic partners in many plant species, including ryegrasses. Symbiotic means they confer a benefit to the ryegrass because they produce toxic alkaloids that deter anything that tries to eat the grass, such as insect pests or grazing animals. Endophytes cause problems in pasture; they cause a deadly disease in sheep called ryegrass staggers, and they can reduce meat or milk yield of cattle. You can choose ryegrass cultivars with either nil-endophyte, or a wild-type (standard) endophyte, or cultivars that have been inoculated with a specially selected endophyte. That’s what AR37 is, an endophyte selected for forage-type ryegrasses that is effective against insect pests such as Argentine Stem Weevil, Root Mealybug, Root Aphid and grass grubs, but doesn’t unduly affect livestock health. The photo below shows a ryegrass with AR37 endophyte on the left, and a nil-endophyte ryegrass on the right. Eliminating insect pests, especially the root-sucking pests, goes a long way to improving the root health and resilience of perennial ryegrass. On the table above, most of the elite ryegrasses carry the AR37 endophyte. Banquet II carries a different endophyte, Endo5, and Vic perennial ryegrass carries a standard endophyte, or wild-type endophyte, the one nature provided it with.



Research on the safety of AR37 in livestock has only been done on sheep and cattle, where it is relatively easy to measure weight gain or meat or wool yield. This research has not been done on horses, so PGG Wrightson makes no claim on its safety as a pasture species for grazing horses. That doesn't mean it can't be used on racetracks, however. An animal would need to graze ryegrass heavily down to the crown over quite a period of time to accumulate enough toxin to cause harm. Racehorses having a nibble on the racetrack are highly unlikely to suffer any effects. Also consider that most ryegrasses used on racetracks in the past, especially Vic perennial, carry wild-type endophytes with who knows what toxicity. At least with cultivars carrying AR37, it is known the effects on sheep and cattle are minimal.



Photo: Vic perennial ryegrass nil endophyte (left) vs standard endophyte (right). The endophyte in Vic perennial is obviously potent, yet Vic perennial has been used on racetracks for decades.

Another endophyte, AR95, is being used in some turf-type ryegrass, such as Colosseum Avanex. AR95 is a 'hot' endophyte with excellent protection against insect pests, grazing birds such as geese, seed eating birds such as pigeons, and even mammals such as rabbits. The fact that turf-type ryegrasses aren't grazed by livestock opens the door to using the most toxic endophytes that can be found. It would definitely be unwise to use these endophytes on a racetrack.

### **Turf-type ryegrasses**

Do any turf-type ryegrasses have a role on racetracks? Turf types are dense and dwarfy, and don't reach the mower blades at heights above 50-60mm. But they have been used as an oversow into forage ryegrasses to improve turf quality even when the mowing height is above

100mm. Although the turf-type rye won't reach the mower blades, it can still improve density and appearance in key areas. Turf-type ryegrasses are also used to oversow couch tracks in winter. Couch is usually mown at 30-50mm on a racetrack, so the turf-types work well.



Photo: a turf-type perennial ryegrass used as a border between forage ryegrass plots

### **Winter oversowing of couch or kikuyu racetracks**

Our experience with ryegrass winter oversowing into couch or kikuyu football grounds has led us to develop a ten point sportsground oversowing plan. We have seen excellent, consistent results with this plan when all ten points have been followed. This plan is also applicable to couch or kikuyu racetracks, slightly modified to an 8 point plan, as listed below:

1. Consider the schedule for the field for upcoming season, and lock in all necessary dates. Lock in an autumn oversowing date which will be followed by at least two weeks without traffic. And lock in a date in spring or early summer for herbicide removal of the ryegrass. Ensure that all parties are on board with the program and have agreed to lock in those dates. And ensure that the ryegrass isn't in for longer than 7 months, so that the couch or kikuyu is on its own over summer for at least 5 months.

2. One week before oversowing, apply trinexepac at one of the higher label rates (e.g. 0.25 l/ha active ingredient) to the couch or kikuyu. This will retard the activity of the warm-season grass and promote a better ryegrass strike.
3. Sow the selected PGG Wrightson ryegrass cultivar (we recommend 'Bolter' for winter oversowing), using a turf dimple seeder or disc drill. Use a ryegrass sowing rate of 200 kg/ha. Don't go lower than 150kg/ha, even if you plan to use top-up sowings later in the season. Keep some seed for top-up sowings through the winter on high-wear areas.
4. Immediately after seeding, take the track completely out of action for at least two weeks. You won't need to mow or fertilize for those two weeks, just stay off it.
5. You'll probably need to irrigate, however. Apply irrigation as required to maintain a moist seedbed. One of the main causes of poor ryegrass establishment is insufficient irrigation if the autumn is warm and dry.
6. Once the track is back in action, apply fertilizers through the winter period, appropriate to the activity of the ryegrass. Bolter has high winter activity, and will require diligent fertilizing at an N rate of around 0.15kg N/100m<sup>2</sup>/month through winter.
7. In spring or into early summer, transition the ryegrass out using a suitable herbicide. There are several herbicide options in couch, but in kikuyu there's only one product labelled for that job, Destiny®. It will remove Poa, clover and several other weeds species as well as the ryegrass.
8. Don't dethatch heavily at this time of year (spring and early summer). Couch or kikuyu will be undergoing a major root replacement in preparation for summer, and any shocks such as suddenly lowering the mowing height, dethatching or drought stress can retard the development of those new roots. Coring or spiking is okay as the irrigation season starts, but leave dethatching until later, into the new year if possible.

### **Conclusions and recommendations:**

PGG Wrightson have recently revamped their racetrack grasses to incorporate the new, elite ryegrass genetics. These have a much higher productivity than the old cultivars, right through the year, but especially during winter.

For winter oversowing of kikuyu tracks, we offer Bolter, a blend of two elite annual tetraploid ryegrass with rapid germination in autumn, excellent winter productivity, and late heading to allow excellent spring verdure as well.

For permanent ryegrass stands, we offer Furlong, a blend of two Mediterranean perennial ryegrasses, an elite diploid and an elite tetraploid, to provide high density as well as dark

colour. These elite cultivars provide much greater biomass than older cultivars, right through the year, but especially during winter. The constituents of Furlong might change in different years, as we upgrade cultivars, but the name will stay the same. For new sowings we recommend a sowing rate of 200kg/ha, for oversowings (e.g. at renovation), rates should be between 100-150kg/ha, depending on the density of the existing track.

If you would like to discuss your own situation and have questions regarding our ryegrass cultivars, please contact us.