View of the wear damage incurred to the turf plots at Redlands Research Station 4 June 2010. DEEDI is working together with Redland Touch Association on testing and evaluating a series of warm-season turfgrasses under simulated and actual wear conditions on community sporting fields

Turf wearability and recovery of community sportsgrounds

In ATM Volume 12.2 DEEDI senior research scientist Matt Roche outlined a new research project being carried out to help provide community sporting clubs and local councils with additional information in choosing a suitable turfgrass for their sporting facilities. Here he outlines results from the first phase of the trial.

To assist those involved in the development, funding and management of community playing surfaces, including end users, the Queensland Department of Employment, Education, Development and Innovation (DEEDI) is involved in a community sports field study together with the Redlands City Council. The aim of the two-year Horticulture Australia Limited-funded study (Project TU08018) is to document the ongoing effects of turfgrass wear and soil compaction in a simulated environment and under actual playing conditions.

Trial sites were established during Phase One (Year 1) of the project at Redlands Research Station (RRS) and the Redlands Touch Association (RTA) between 7-12 January 2009 with a total of 10 warm-season turfgrass cultivars are being trialled, which includes three genus (Table 1). This is the first time such a study has been undertaken to compare the two methods of implementing and assessing turf wearability and recovery in Australia.

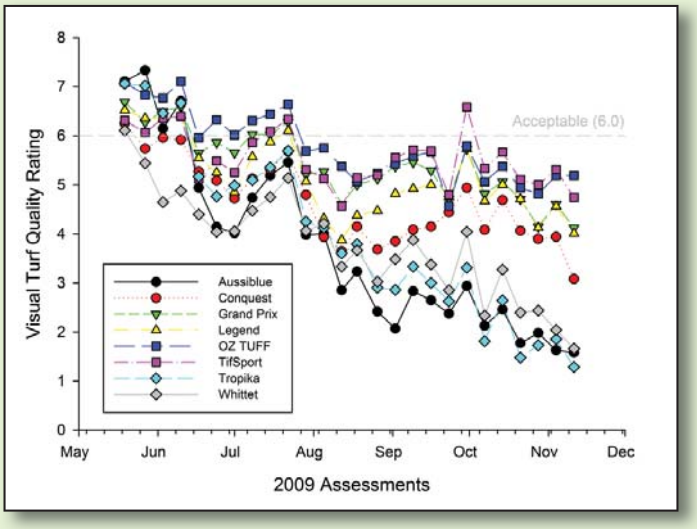
PHASE ONE RESULTS

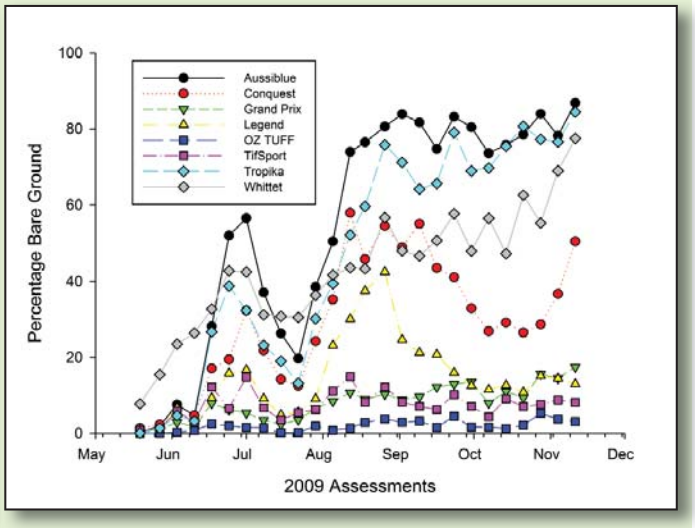
Comparison of turfgrass quality and percentage bare ground between the two sites (fields 3 and 4 of the RTA site and RRS) shows a higher level of damage to the turf plots located at RRS. This is likely to be a result of the initial higher level of wear imposed by the DEEDI wear machine (which is based on

TABLE 1. WARM-SEASON TURFGRASS CULTIVARS BEING TRIALLED IN PHASE ONE AND TWO OF THE COMMUNITY WEAR PROJECT (TU08018)

Scientific name (common name)	Cultivar	RRS	RTA
Cynodon dactylon (green couch)	TifSport	X[1,2]	X[2]
	Oz-Tuff Green	X[1,2]	X
	Wintergreen		X[1,2]
	Hatfield		X[1,2]
	Conquest	X[1,2]	X[1,2]
	Legend	X[1,2]	X[2]
	Grand Prix	X[1,2]	X[1,2]
Digitaria didactyla (blue couch)	Tropika	X[1,2]	
	Aussiblue	X[1,2]	
Pennisetum clandestinum (kikuyu)	Whittet	X[1,2]	

Key: RRS (Redlands Research Station site); RTA (Redlands Touch Association site); [1] cultivars trialled in Phase One; [2] cultivars trialled in Phase Two; TifSport has been planted on the remainder of the RTA field, surrounding the trial areas.





the design of the GA-SCW Simulator, Carrow et al., 2001) at 20 passes. It is expected that the lower level of passes – 10 – which will be continued in Phase Two of the study will ameliorate the level of variation of turfgrass quality and percentage bare ground between the two sites.

The RRS site between the period of 19 May and 11 November 2009 shows turfgrass quality of worn treatments – no decompaction (D0), decompaction once per year (D1) and decompaction at six-week intervals (D6) – being less than acceptable (a visual rating of ≤ 6.0) following two to three months implementation of wear (Figure 1). The turf cultivars were largely grouped into two categories:

- Green couch cultivars (better performing);
- Kikuyu and blue couch cultivars (poorer performing).

Turfgrass quality in comparison was much higher at the RTA trial site (fields 3 and 4) where quality ratings were predominantly 6 or greater for five months of the trial period (Figure 3).

Percentage bare ground at the RRS site showed under higher levels of wear that Aussiblue, Tropika, Whittet and to a lesser extent Conquest did not handle that which was imposed (Figure 2). Legend performed poorly during August, however, recovered strongly to compete against top cultivars OZ TUFF, TifSport and Grand Prix.

Under the recommended guidelines produced by the HAL-funded project Best Use Modelling for Sustainable Australian Sports Field Surface (Project TU06019), ground cover should be greater than 85 per cent (mid-season) or less than 15 per cent bare ground (McAuliffe and Roche, 2009). If the guideline was to be followed, the conditions experienced at RRS would mean that there would be up to 96 per cent (25/26 assessment dates for kikuyu) of the time field closures would be required for the period between 19 May and 11 November 2009. In comparison, two cultivars – OZ TUFF and TifSport – produced less than 2 per cent bare ground.

With the exception of the Legend, percentage bare ground like that of turfgrass quality was on the majority less noticeable at the RTA site (Figure 4). Legend was the worst performer of the six cultivars trialled. Seven times it exceeded having more than

Left: Figure 1. Subjective quality assessments (0 = worst to 9 = best; 6 = acceptable) undertaken of turfgrass cultivars undergoing simulated wear at Redlands Research Station between 19 May and 11 November 2009. Data shown is the mean value for D0, D1 and D6 treatments

Above: Figure 2. Bare ground assessments (0 = full turf cover, 100 = completely bare ground) undertaken of turfgrass cultivars undergoing simulated wear at Redlands Research Station between 19 May and 11 November 2009. Data shown is the mean value for D0, D1 and D6 treatments

The DEEDI Wear Simulator in operation at Redlands Research Station

15 per cent bare ground with a maximum value of 49.97 per cent. The only other cultivar to exceed the guidelines was that of Conquest with 29.97 per cent bare ground recorded on 10 November 2009.

However, the latter date saw on average, percentage bare ground rise by a staggering 6,511 per cent from 27 October 2009. The damage incurred has been linked to the timing of inclement weather when touch fixtures must not have been cancelled. Such a vast increase in turf damage highlights the importance of having a field closure strategy in place to ward off long-term damage to the playing surface.

SURFACE HARDNESS

As part of a study undertaken by DEEDI researchers for AFL Queensland, Henderson et al. (2007) reported that a surface hardness (Clegg Impact Value or CIV) value of 7-8 is ideal, ≥ 12 is concerning and ≥ 20 is dangerous while also being the upper limit where 'head injury risks are doubled'. As part of their recommendations to reduce surface hardness, Henderson et al. (2007) reported that regular decompaction work be undertaken and moisture levels be maintained between 15 per cent and 30 per cent depending on the soil type, field usage etc.

There is a moderate to strong correlation (R^2= 0.64 and 0.78) between hardness and moisture levels from the results collected since testing started 26 May 2009. Decompaction treatments – D0, D1, decompaction twice per year (D2) and D6 – have been applied as close to their scheduled dates as possible at both the RRS and RTA sites.

RRS treatments D0 and D1 show increasing surface hardness values above 12 CIV (Figure 5). Only where decompaction is undertaken more frequently (D6) is surface hardness considered acceptable. However, the RRS site is somewhat compromised due to the fact that the DEEDI wear machine is a heavy item which inevitably places considerable weight on the soil profile.

Surface hardness values collected from the RTA site are between 10 and 14 CIV (Figure 6). Once again the D6 treatment of routine decompaction work is the only treatment where surface hardness values are considered acceptable. It will be interesting to monitor the performance of surface hardness at both sites over the next few months.

ONGOING ASSESSMENTS

Phase Two (Year 2) experiments have been set up at both the RRS and RTA sites. Minimal turf installation was undertaken at RRS, with only the kikuyu plots failing to recover from the simulated wear testing undertaken between 13 May and 9 December 2009.

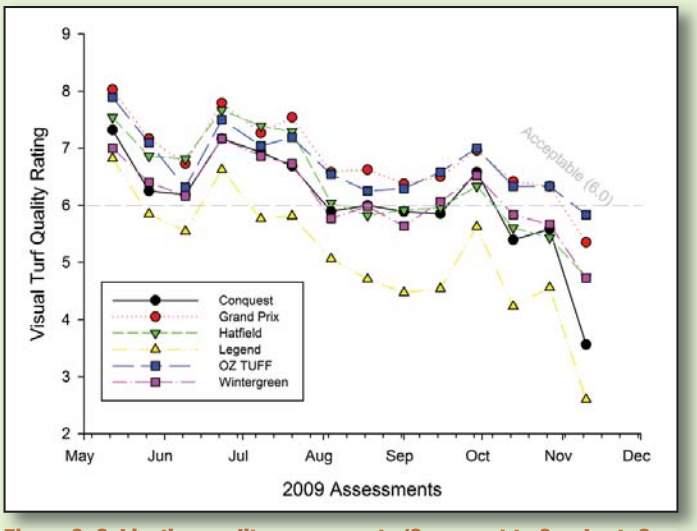


Figure 3. Subjective quality assessments (0 = worst to 9 = best; 6 = acceptable) undertaken of turfgrass cultivars at the Redlands Touch Association between 12 May and 10 November 2009. Data shown is the mean value for D1, D2 and D6 treatments

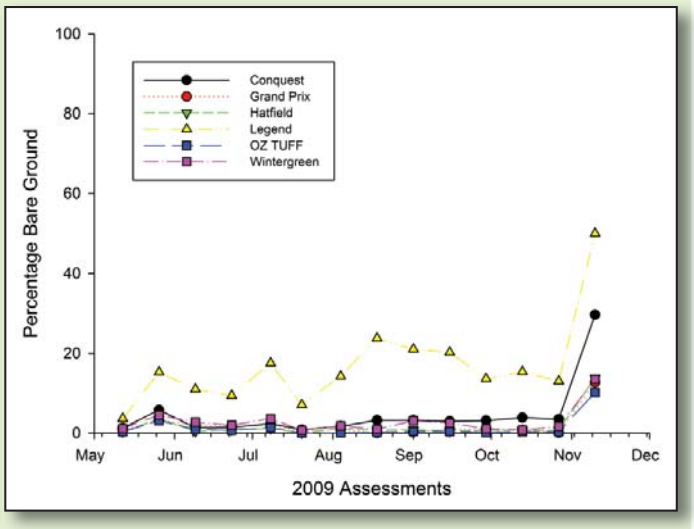
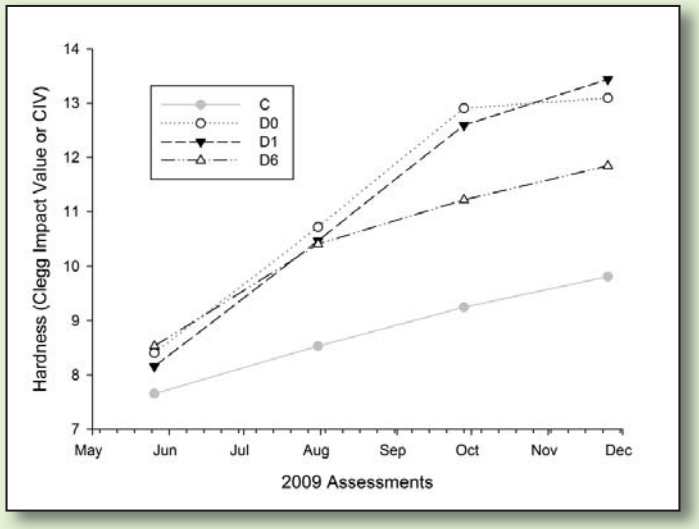
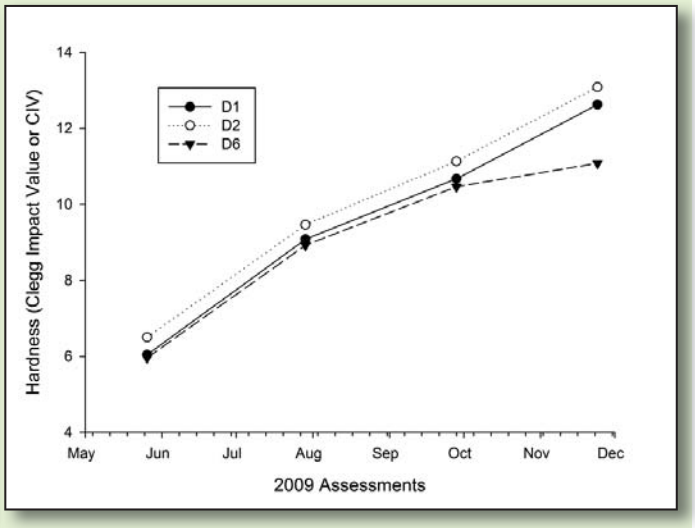


Figure 4. Bare ground assessments (0 = full turf cover, 100 = completely bare ground) undertaken of turfgrass cultivars at the Redlands Touch Association between 12 May and 10 November 2009. Data shown is the mean value for D1, D2 and D6 treatments





Trial plots on fields 5 and 6 of the RTA site (identified as Phase Two) were planted over four days following construction activities (e.g. turf removal, levelling) starting on 30 November 2009. A total of six *Cynodon* spp. were planted (Table 1).

The cultivars were similar to that used during Phase One, with the exception of Legend which was excluded and TifSport which replaced the latter cultivar within the formal experiment. The RTA turf plots located on fields 5 and 6 were fast to establish and stabilise given the warm weather and plentiful rainfall.

The 2010 Redlands Touch Football competition kicked off on 12 February and the fields were immediately introduced into the playing schedule. Testing including subjective quality and wear ratings, hardness, soil moisture, rooting depth and water infiltration started in March 2010 at the RTA and RRS sites.

To date interesting results have been obtained from both trial sites. It would be pertinent to undertake two full years of testing of both Phase One and Phase Two of the trials to obtain sufficient replicated data. Doing so will provide community sporting groups who rely on the performance, including safety, of natural turf surfaces with unequivocal information to assist with their future turf installations.

AUTHOR'S NOTE

The current project (TU08018) is due to end in November 2010 and DEEDI is investigating possible extension opportunities. Touch football groups, councils and turf producers have commented on the importance of the study and have expressed interest to investigate various management techniques.

If you are interested in collaborating as a voluntary contributor in the extended study email Matt.Roche@deedi.qld.gov.au.

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Left: Figure 5. Surface hardness (CIV of 7-8 is ideal, ≥ 12 is concerning) of turf treatments (C, D0, D1 and D6) at Redlands Research Station between 26 May and 25 November 2009. The control (C) treatment is included; however it should not be compared with the decompaction treatments (D0, D1 and D6) because it is not undergoing simulated wear (compaction of the DEEDI wear machine)

Above: Figure 6. Surface hardness (CIV of 7-8 is ideal, ≥ 12 is concerning) of turf treatments (D1, D2 and D6) at the Redlands Touch Association between 26 May and 24 November 2009