

Improved wear tolerance through breeding, higher seeding rates and iSeed® fertilisation

Keywords: sport pitches

Introduction

During the past decades wear tolerance of sport pitches has been improved considerably. Important factors in this have been breeding (Van der Schoot, pers.comm.), increased sowing rates (Van der Schoot 2009) and improved fertilisation (Gibcus 2009). This paper quantifies the contributions made by each of these.

Materials and methods

The 'Grasgids', the list of recommended varieties in the Netherlands (Anonymous 2009), was used for evaluating the progress in wear tolerance of perennial ryegrass (*Lolium perenne*) by plant breeding. Because of the introduction of new and better varieties in the trials, the relative scores (1-10) of a listed variety are gradually decreasing. This decrease is a measure for the improvement through breeding.

The effect of seeding rate on wear tolerance was evaluated by overseeding a heavily worn perennial ryegrass sward with a perennial ryegrass seed mixture. The trial was established at six different seeding rates (0, 12.5, 25, 50, 75, 100 g m⁻²), and was seeded on May 20 2004 in a randomised block design with five replicates per treatment. Fertiliser (8:12:8) at a rate of 35 g m⁻² was incorporated into the soil prior to seeding. All plots were seeded by hand and top-dressing added at a rate of 4 kg m⁻². Mowing height was gradually reduced to reach the final mowing height of 20 mm on July 16 2004. Further fertiliser applications were made on June 22 and August 13 using 12:6:6 fertiliser at a rate of 35 g m⁻².

The combined effect of seeding rate and iSeed® was tested in a field experiment on a sandy soil in the Netherlands. A 75/25 mixture of perennial ryegrass and smooth-stalked meadow grass (*Poa pratensis*) was hand-seeded at seeding rates of 20 and 35 g m⁻² on May 22, 2008. The iSeed-plots received 4 g N m⁻² + 0.8 g P m⁻² and 7 g N m⁻² + 1.4 g P m⁻² by means of the seed coating. Starter fertiliser 11.6 g N m⁻², 1.4 g P₂O₅ m⁻², 2.8 g K₂O m⁻² was applied to all plots after seeding. Further fertilisers were applied in weeks 30, 39 and 41, totaling 9.4 g N m⁻², 4.0 g P₂O₅ m⁻² and 21.8 g K₂O m⁻². The experiment was mowed at 20 mm, twice a week during the growing season.

Results and discussion

Figure 1 shows the average decrease in scores/year for wear tolerance of varieties in the Dutch Grasgids from 1975 until 2009. This decrease appears to be constant over the years. Based on this decrease per year, which reflects the increase in quality because of the introduction of new varieties, it can be calculated that varieties first listed in 1979 would now score between 5 and 6.

Expressed as a percentage of the scores, wear tolerance improved by 1.1% per year. Assuming a standard 300 playing hours per field per year in 1975, this results in 417 hours per year in 2009. This is in accordance with the estimate of 400 hours per year made by ESA (Anonymous 2006).

Seeding rates had two effects on the playability of a pitch. First it decreases the number of days between seeding and the moment the field was fit for play. When taking the time to 80% live ground

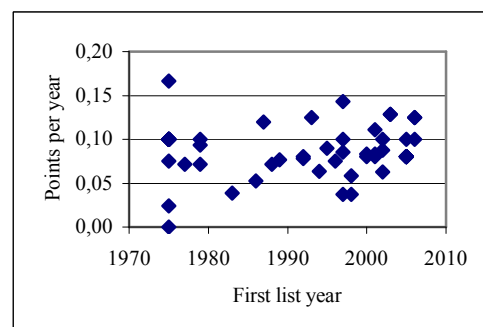


Figure 1. Decrease in points per year of *Lolium perenne* varieties for wear tolerance score.

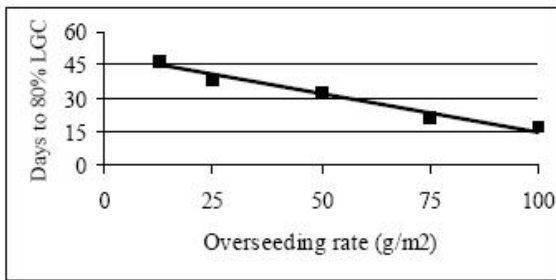


Figure 2. Time to 80% live ground cover (LGC).

November; thereafter difference were not statistically significant anymore (Table 1). These results are in line with Minner et al. (2008), who also found positive effects of increasing seeding rate on wear tolerance. By increasing the seed rate from 25 to 75 g m⁻², the overall mean score for wear tolerance increased from 5.5 to 6.3, or by 15%. Based on the 400 hours standard in 2006, this would mean a further increase by 60 hours/year.

Table 1. Turf quality scores (1=poor, 10=very good) as a result of applied wear.

Overseeding rate (g/m ²)	Month/year										
	8/04	9/04	10/04	11/04	12/04	1/05	2/05	3/05	4/05	5/05	Mean
100	7.7	6.0	6.6	5.8	5.6	5.8	5.4	5.0	5.0	5.2	5.7
75	7.7	6.2	6.6	6.4	6.4	7.0	6.0	6.2	5.4	5.4	6.3
50	7.0	6.0	6.6	6.0	6.0	7.2	6.2	6.2	4.8	5.8	6.1
25	5.7	4.2	6.0	5.2	5.6	6.6	5.8	5.6	5.0	5.4	5.5
12.5	3.8	4.0	4.8	5.2	5.4	6.4	6.8	5.6	5.4	5.4	5.3
0	1.2	1.2	1.4	1.4	2.0	2.6	2.0	1.6	1.8	1.8	1.7
LSD (p<0.05)	0.9	1.1	1.0	1.1	1.3	1.6	2.3	1.6	2.0	1.4	1.0

Table 2. Turf quality scores after fall wear (1=poor, 10=very good).

seed rate (g m ⁻²)	Control iSeed	
	20	6.3
35	7.2	8.2

estimated that iSeed® adds 30-50 hours per year. It is well known that wear tolerance increases with nitrogen nutrition, until a critical point where additional nitrogen provides no further increase (Shearman 1989). In our trial we obviously did not reach this point.

Crossley and Newell (2007) showed the improved establishment of iSeed® treated grass seeds when overseeding a heavily worn pitch.

In existing football pitches, the iSeed® treatment resulted in fields that were fit for play earlier and showed an increased wear tolerance thereafter (Gibcus 2009). In our experiment, the iSeed® effect was similar at both 20 and 35 g m⁻² seeding rates.

Based on these results it is

Conclusions

Breeding, sowing rates and fertiliser-coated seed all increase wear tolerance of sports pitches. The effects of seeding rate and iSeed are additive at least up to seeding rates of 35 g m⁻². Translated in the number of hours/year that a pitch can take, this is an increase of approximately 250-300 hours per year since the mid 1970s.

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