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RACECOURSE UNCERTAINTIES-THE PLANTS THAT COVER RACETRACKS

T. R. 0. Field, J. W. Murphy and A. J. Hamlin
Grasslands Division, DSIR, Palmerston North

Abstract

Vegetation surveys were carded out on 10 Central Districts and two northern racetracks. Tracks could be allotted to three groups according to the type of turf cover. classified mainly on the relative importance of ryegrass (*Lolium* species), Poa (*Poa trivialis*), browntop (*Agrostis capillaris*) and white clover (*Trifolium repens*): Type 1 (3 tracks) had swards consisting of about half Poa, one quarter ryegrass and 20% white clover; Type 2 (2 tracks) had about 30% ryegrass and Poa with substantial browntop, and Type 3 (7 tracks) had higher ryegrass contents (44-75%), intermediate Poa and little browntop.

Unlike ryegrass, Poa is very intolerant of heavy wear, and therefore should be unwelcome on racetracks. Data gathered here indicate Poa presence is encouraged by high phosphate applications while ryegrass is stimulated by potassium applications and lower cutting heights. Appropriate fertiliser applications and lower cutting heights should move the botanical composition towards higher ryegrass contents.

Keywords: ryegrass, *Poa trivialis*, browntop, white clover, fertilisers, mowing.

INTRODUCTION

Turf is the medium on which thoroughbred horses are raced in New Zealand. Racetracks carrying this turf vary widely in the frequency and seasonality of racing which determines the damage suffered by the turf sward and the underlying soil. Racetrack maintenance procedures, such as fertiliser application, weed control and subsurface treatments, also vary widely. Marked differences in plant species growing in turf should be expected to arise from the disparate combinations of racing use and maintenance inputs. Such a result would contrast with the objective of racecourse managers who aim to produce a high quality turf restricted to a few wear-tolerant species.

This paper reports the results of an initial botanical survey of 12 racetracks in the North Island. The study was designed to quantitatively describe the vegetation growing on the racetracks and to relate these results to management procedures that might affect species distribution.

METHODS

Ten racetracks in the southern area and two in the northern part of the North Island were sampled in this survey (Fig. 1). Quantitative estimates of plant cover were obtained from samples taken at 100m intervals round each track. At each sampling location a measurement was taken on the main racing surface (quadrats located at distances varying between 1 and 5m from the permanent location of the inside running rail) and another from the central section of the track (7 to 10 m away from the first sampling). A soil sample was taken from the centre of each quadrat (25 mm diameter core to a depth of 75 mm),, bulked then later analysed for plant available phosphorus (Olsen P) and potassium.

Visual estimates of plant cover of all species within a quadrat 20 cm square were assigned among a six-point cover scale.

cover%:	O-5	6-10	11-25	26-50	51-75	76-100
cover score:	1	2	3	4	5	6

Cover of species in layers was not assessed separately so that where, for example, grasses overtopped clover and broad-leaved species, the sum of cover values could total greater than 100 percent.

Data from each track were analysed using the polythetic classification technique embodied in the Cornell Ecology Program TWINSPAN (Hill 1979) to classify quadrats and so assess whether there were significant differences between areas within tracks. Representative profiles of species for each track were then obtained from individual quadrat data using mid-point values for each cover class. Both tracks and species were then classified simultaneously using TWINSPAN.

Relationships between the cover values for Poa and ryegrass, and soil analyses, were tested using Spearman's rank correlation coefficient.

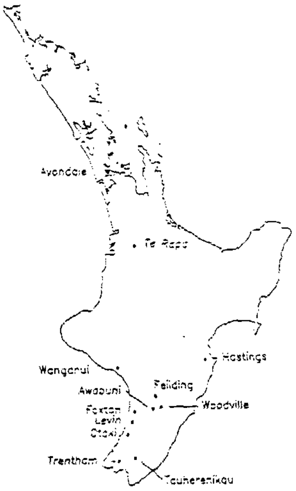

Figure 1: Location of the twelve racetracks surveyed for botanical composition

RESULTS

The number of species identified on racetracks varied markedly from 11 on Trentham to 36 on Foxton (Table 1). Within track analysis indicated that there were differences between sections on only one track. The 400m back straight section of the Foxton racetrack was browntop dominant and had less ryegrass than the remaining 1400 m of the track. Vegetation gradients were apparent across four other tracks, in each showing more ryegrass (*Lolium* species) present on the strip near the running rail that was subject to most wear. Differences noted were 42% more ryegrass on the inner strip on Feilding, 23% on Otaki, 12% on Awapuni and 10% on Avondale. In locations on tracks where ryegrass cover was found to be less, Poa (*Poa trivialis*) cover was generally increased, and on Feilding especially, browntop (*Agrostis capillaris*) cover was increased.

Turf on racetracks was classified into three types (Table 1) based mainly on the cover of ryegrass, Poa, browntop and white clover (*Trifolium repens*).

Type 1: Trentham, Awapuni and Otaki tracks had the highest proportion of Poa, with lower and similar cover of ryegrass and white clover. Among the minor species there was a consistently low presence of Yorkshire fog (*Holcus lanatus*) and chickweed (*Stellaria media*), and on Awapuni and Otaki a significant content of yarrow (*Achillea millifolium*), a hard-wearing weed.

Type 2: Feilding and Levin had more ryegrass and less Poa than Type 1 tracks. They also had a substantial browntop content and notable contributions from couch grass (*Agropyron repens*) and cocksfoot (*Dactylis glomerata*).

Type 3: More than half the tracks fall into this group which had a ryegrass dominant turf cover in the main. There was a variable contribution from Poa, but generally less of this species and white clover in comparison with Type 1. Other minor species showed no consistency within this group of tracks.

Table 1: Representative species profiles (percentage cover) for turf growing on twelve racetracks

	TYPE 1			TYPE 2				TYPE 3				
	Tr	Aw	Ot	Fe	Le	Av	Ha	Te	Wa	Wo	Ta	Fo
Lolium species	23	21	23	33	32	50	59	54	75	51	50	44
Poa trivialis	60	44	50	29	32	31	21	32	9	19	37	24
Agrostis capillaris	1	15		27	27		5	7		5	3	7
Agrostis stolonifera				2								
Holcus lanatus	1	1	2			5				2		2
Poa annua				4	1	3				3	1	2
Dactylis glomerata				2	2							
Agropyron repens				2	7				2			5
Phleum pratense							13					1
Poa pratensis												8
Cynodon dactylon												2
Bromus wildenowii					2						4	
Trifolium repens	17	20	22		3	4		2		21		4
Plantago major						1						1
Achillea millefolium		8	7									6
Stellaria media	1	2	2									
Taraxacum officinale			1						1			
TOTAL SPECIES	11	14	15	13	26	25	18	25	13	19	14	36

Location codes

Av Avondale	Ha Hastings	Te Te Rapa
Aw Awapuni	Le Levin	Tr Trentham
Fe Feilding	Ot Otaki	Wa Wanganui
Fo Foxton	Ta Tauherenikau	Wo Woodville

Table 2: Cover of *Poa trivialis* and aspects of racetrack management

	Poa triv. (% cover)	Fertiliser Nitrogen	Soil tests Phosphorus	Potassium	Cutting Height
Wanganui	9	High	High	LOW"	
Woodville	19	LOW	LOW	Medium	Medum
Hastings	21	LOW	Medium	High	Medium
Foxton	24	Medium	v High	Medium	High
Feilding	29	Low	Medium	v Low	Medium
Avondale	31	High	Medium	Medium"	Medium
Levin	32	Medium	Medium	Low	Medium
Te Rapa	32	Medium	High	v Low"	LOW
Tauherenikau	37	LOW	Medium	High	Medum
Awapuni	44	Medium	High	Medum	Medium
Otaki	50		Medum	Low	High
Trentham	60	Medium	v High	LOW	High

Fertiliser N: Medium = 75 – 175 kg N/ha/year
Olsen P test: Medium = 10-20ppm
Available K: Medium = 0.5 – 0.6 me %
Cutting height: Medium = 60-90mm
**Fertiliser K recently applied

DISCUSSION

Perennial ryegrass is a turfgrass rated as the most tolerant of heavy wear (Shildrick 1980). For this reason most tracks are consistently under- or oversown with cultivars of this species. Yet these results show that only half the tracks are ryegrass dominant and a number have a very low ryegress presence. Conversely, *Poa trivialis* is classified as one of the least wear tolerant grass species but in this study was found to be dominant on Type 1 tracks and made a major contribution to ground cover on most tracks. White clover is also an undesirable species on racetracks as it can produce slippery surfaces when covering hard ground and is less wear resistant than ryegrasses. This species also made a significant contribution to the vegetation cover (about 20%) of Type 1 tracks.

White clover, along with other broad-leaved weeds, is controlled easily on racetracks (Walker 1971), although management programmes on four of the tracks studied were not aimed at this. The significance of Poa on the various racetracks is more difficult to analyse. *Poa trivialis* does not appear to have a narrow well-defined ecological niche: Surveys of grassland in central England (Grime 1980) found it was a minor component of pastures (less than 10% cover) in 60% of samples with the remaining 40% of samples spread evenly over all other frequency classes up to complete cover; it was found at all altitudes and aspects; it was most frequent within the pH range from 5.5-7.0 but grew over the whole range tested from pH 3.5 to 8.0, and was mainly associated with slope categories less than 20 degrees.

New Zealand observations indicate *Poa trivia/is* thrives mainly on land which is wet throughout the year, or at least during the spring, and is said to be an invariable invader of sown grassland under high fertility conditions (Vartha 1965). When grown with perennial ryegrass, Poa has also been found to respond inconsistently to frequency and intensity of cutting but was always most competitive under a lax cutting treatment, in both winter and spring (Vartha 1973). Higher levels of mineral nutrition (both N and P) encouraged Poa especially under a cutting regime similar to that employed on many racetracks (130 cut to 50 mm). He concluded (Vartha 1972) that *Poa trivia/is* is very competitive with ryegrass under lax cutting with adequate mineral nutrition.

These generalisations are supported by the observed distribution of *Poa trivia/is* in relation to soil conditions and management practices in this survey (Table *2). Poa trivia/is* cover was lowest on a track (Wanganui) consistently cut from about 75 to 50 mm height, and where high dressings of N and K were applied to maintain ryegrass vigour. The two other low Poa tracks were either very low in P (Woodville), which would be expected to restrict Poa invasion, or high in K ensuring a very competitive ryegrass (Hastings). At the other end of the scale Poa was most important on tracks with high P levels in the soil.

Rank correlation analyses support this interpretation of the competitive balance between ryegrass and Poa. Ryegrass cover was negatively correlated with mowing height (R = —.78) and positively correlated with fertiliser K application (R = + .55). Poa, on the other hand, always had the opposite sign to tyegrass but showed no significant correlations.

From these limited results it appears that Poa becomes a major contributor when P applications are high, K applications are low and mowing is lax. Management procedures on most racecourses at present appear to ensure a significant contribution from this undesirable grass species. Conversion of these tracks to ryegrass dominance is possible, and probably desirable if the racing surfaces are to be improved. There are obviously increased costs associated with increasing K and N inputs and lowering mowing heights. These increased costs need to be weighed against the probability that repair of Poa dominant swards is inflating present maintenance costs, and that better safety margins associated with improved surface and subsurface conditions should be associated with a ryegrass dominant sward.

Acknowledgements

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