INSTITUTE OF
ARABLE CROPS RESEARCH
Long Ashton Research Station

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UNIVERSITY OF
BRISTOL

TECHNICAL REPORT No.103

ASSESSMENT OF AMENITY GRASS MIXTURES FOR USE IN LOW-MAINTENANCE SITUATIONS

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February, 1988

Price: £2.75

Long Ashton Research Station,
Long Ashton, Bristol BS18 9AF England

ISSN 0551 4136
ISBN 07084 04766

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DONALDSON, G., ARNOLD, G.M.A., PERRY, M. Assessment of Amenity Grass Mixtures for Use in Low Maintenance Situations. Technical Report. Institute of Arable Crops Research, Long Ashton Research Station. 1988, No. 103 pp. 8.

ASSESSMENT OF AMENITY GRASS MIXTURES FOR USE IN LOW MAINTENANCE SITUATIONS

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SUMMARY

A field trial was sown in the Spring of 1987 at Long Ashton Research Station, to compare the growth of three amenity-type grass mixtures.

The results are for assessments taken in the first season. Mixture 'B' was the slowest to reach 50% ground cover, but when established it required less mowing, and produced far less yield when measured at mid-season and end of season. Mixture 'A' was by far the most prolific and 'C' was intermediate in all aspects.

The trial will continue for a further 2-3 years.

INTRODUCTION

The work was funded by British Seed Houses Limited who supplied the mixtures 'A', 'B' and 'C'.

MIXTURE 'A'

Cultivars traditionally used for non-sportsfield areas

60% Kent Perennial Ryegrass
35% Boreal Creeping Red Fescue
5% Highland Browntop Bent

MIXTURE 'B'

Containing two cultivars with the highest rating for short growth in the Sports Turf Research Institute Turfgrass Seed Guide

60% Lorina Perennial Ryegrass
35% Logro Slender Creeping Red Fescue
5% Highland Browntop Bent

MIXTURE 'C'

Containing good quality Amenity Grass cultivars.

60% Elka Perennial Ryegrass
35% Dawson Slender Creeping Red Fescue
5% Highland Browntop Bent

(% constituents are by weight)

Assessments were made on the percentage ground cover during establishment average grass height was measured at mid and end of season, and grass yields taken at end of season either after a full seasons growth or after a mid-season cut. Frequency of cutting was assessed on a weekly basis.

METHODS AND MATERIALS

The grass mixtures were sown on 28/4/87 in eight randomised blocks on a silty clay loam at Long Ashton Research Station. Each 12 m x 12 m main plot was divided into three sub-plots (4 m x 2 m) to allow three cutting regimes. All mixtures were broadcast with an Oyjord drill at a seed rate of 35 Kg/ha, no basal fertiliser was applied, but a mid-season dressing of Nitrochalk at 32.5 Kg N/ha was applied on 3/8/87. Broadleaved weeds were controlled with a spray of Agroxone (2.8 l/ha) on 6/8/87.

The percentage ground cover of each main plot (grass mixture) was recorded by assessing random quadrats (20 cm x 20 cm) on ten occasions during establishment. Five quadrats per plot were used initially on 13/5/87, 10 quadrats from 15/5/87 to 22/6/87 and finally eight quadrats on 30/6/87 and 7/7/87.

Plant counts were done on 16/6/87 by taking two soil cores (10.8 cm diameter) per main plot. The appearance of the grass mixtures was assessed each month by scoring the intensity of greenness.

The height of the grass mixtures was assessed each week (cutting regime X) from 24/6/87 (approximately 75% ground cover) until early November when grass growth effectively ceased. A graduated 'stick' was used to measure grass height (20 places in each plot). The plots were mown to 7.6 cm (3") when 10% of the grass had reached a height of 15.2 cm (6"). The last date that a plot required cutting was 7/10/87, thus giving 16 occasions (weeks) when a plot could possibly be cut.

It was originally intended to record the average height of sub plots that were left uncut until flowering (cutting regime Y). However as the experiment was not sown until late spring, the species did not receive the required vernalisation period of 'short days' and low temperatures necessary to initiate flowering. In consequence average height of the sub-plots was measured in mid season (3/8/87) and the plots mown to 7.6 cm (3") tall. Height and yield were measured at the end of season (4/11/87).

The remaining sub-plots (cutting regime Z) were left uncut all season and measurements of height and yield of grass were taken on 4/11/87. A 4 m x 0.4 m wide strip was mown to 5 cm (2") tall, the grass collected and weighed fresh; subsequently sub-samples were taken for oven dry matter determination.

RESULTS

The experiment established well and within six weeks all grass mixtures had achieved at least 50% ground cover. However indigenous broadleaved weeds also established well, and these had to be hand weeded in June and July. Shepherds purse (Capsella bursa-pastoris), field bindweed (Convolvulus arvense) and white clover (trifolium repens) were prevalent; the Agroxone spray in August controlled the remaining weeds except the clover.

Throughout this report, the LSDs quoted give the minimum difference which is statistically significant ($p<0.05$) between any pair of means from those for the three grass mixtures (A, B and C).

Percentage Ground Cover During Establishment

If the percentage ground cover of each mixture, during establishment, is plotted against time, typical S-shaped growth curves are produced. 50% ground cover is achieved during the most rapid (experimental) phase of growth. In order to further quantify the speed of growth a Gompertz curve (an asymmetric sigmoidal growth curve) was fitted to the weighted means for each main plot using a generalised linear model approach with a binominal distribution and complementary log-log link function. From the fitted curve for each plot estimates of the time to reach 50% ground cover and measure of maximum growth rate were obtained, and then analysed using analysis of variance with respect to grass mixtures. (Table 1).

TABLE 1

Grass Mixture	Growth: Time to reach 50% Ground Cover (days)	Growth: Maximum Growth Rate (% cover/day)
A	41.46	2.704
B	49.03	2.255
C	44.45	2.553
SED (14 df)	0.793	0.0699
LSD	1.78	0.157

Mixture 'A' reached 50% ground cover the quickest, and had a greater growth rate than 'C' which was significantly quicker than 'B'. The results indicate that the earlier establishment of 'A' is due both to an earlier start and a faster growth rate.

Plant Populations

The high seeding rate of 35 Kg/ha (equivalent to 35 g/m^2) used for all mixtures produced high plant populations (Table 2).

TABLE 2

Grass Mixture	Plants/m2 (16/6/87)
A	18,100
B	20,500
C	15,700
SED (14 df)	4,020
LSD	9,030

It appeared that the same seed rate resulted in higher plant numbers in Mixture 'B', which was because of the smaller seed size of the varieties of Creeping Red Fescue and Perennial Ryegrass used in this mixture. However these large differences in plant numbers between mixtures are not statistically significant.

Appearance

Mixture 'B' was darkest green, 'A' lightest and 'C' intermediate throughout the season. However during June and July 'C' was closer in colour to 'A', but by September the colour of 'C' became more like 'B'. All mixtures became relatively darker green after the nitrogen was applied in August.

Frequency of Cutting (Regime X)

The distribution of the number of plots cut (out of 8) on each of the 16 weekly occasions during the season is shown in Table 3.

TABLE 3

Date	No. of Plots Cut (Out of 8) Grass Mixture		
	A	B	C
24th June	6	2	2
1st July	5	4	5
9th	3	0	2
16th	2	0	2
22nd	2	0	0
30th	1	2	1
5th August	4	1	0
12th	4	0	2
19th	6	2	6
26th	2	1	2
2nd September	5	4	6
8th	1	1	0
17th	2	0	0
23rd	2	0	0
29th	3	6	5
7th October	0	1	0

An analysis of variance was carried out on the number of cuts per season expressed as a percentage of the total possible. If a grass plot was cut only once per season this would represent 1 out of 16 or 6.25%. The results are summarised in Table 4.

TABLE 4

Grass Mixture	% Total Possible Cuts
A	37.5
B	18.8
C	25.8
SED (14 df)	3.40
LSD	7.6

'A' required cutting significantly more often than 'B' or 'C', the difference between 'B' and 'C' was large and nearly significant at the 5% confidence level. In terms of number of cuts per season to reduce the height from 15.2 cm (6") to 7.6 cm (3"), 'B' required 3.00 cuts, 'C' 4.13 and 'A' 6.00 cuts.

Grass Height

TABLE 5

Grass Mixture	Grass Height		
	Mid-Season	End of Season	
		Cut Mid-Season	Uncut
	cm	cm	cm
A	17.3	16.5	16.8
B	10.1	10.2	10.9
C	13.0	12.5	14.9
SED (14 df)	0.93	0.60	0.78
LSD	2.1	1.3	1.8

The differences in height between the grass mixtures are statistically significant at each assessment. At each occasion 'B' was by far the shortest, never growing to more than an average height of 10.9 cm (4.3") whereas 'C' grew to nearly 15 cm (6") and 'A' just over, by the end of the season. It should be noted that these figures are the mean of 10 'scores' per plot and will obviously differ from the scoring method used in assessing frequently of cutting (Regime X), when a plot was cut if 10% of the scores were over 15 cm (6").

Grass Yield

The grass yields for each mixture at the end of season cut (4/11/87) for sub-plots cut mid-season (cutting Regime Y) are given in table 6, and for sub-plots with a whole seasons growth (cutting Regime Z) in table 7.

TABLE 6

Yields After a Mid-Season Cut (Regime Y)

Grass Mixture	Fresh Weight t/ha	Moisture %	Dry Matter t/ha
A	8.67	73.9	2.26
B	3.03	73.3	0.80
C	6.30	73.6	1.61
SED (14 df)	0.551	0.67	0.125
LSD	1.24	1.5	0.28
C of V	18.4%	1.8%	16.1%

The differences in fresh weight and dry weight production are statistically significant. Mixture 'B' yielded the least, 'C' twice as much and 'A' nearly three times as much.

TABLE 7

Yields After Whole Seasons Growth (Regime Z)

Grass Mixture	Fresh Weight t/ha	Moisture %	Dry Matter t/ha
A	12.27	76.2	2.90
B	4.01	72.7	1.07
C	10.33	74.9	2.56
SED (14 df)	0.721	0.97	0.117
LSD	1.62	2.2	0.26
C of V	16.3%	2.6%	10.7%

The difference in grass production are again statistically significant, 'B' yielded the least, 'C' well over twice as much and 'A' nearly three times as much. The moisture content of 'B' was significantly less than either 'A' or 'C'.

CONCLUSIONS

Grass mixture 'B' was the slowest to establish and reach 50% ground cover. It took 49 days, 5 days longer than 'C' and 9 days longer than 'A'.

In all other measurements of growth 'B' produced the least and 'A' the most, 'C' was intermediate. For simple comparison, table 8 shows all measurements of 'B' as 100 and 'A' and 'C' expessed as a percentage of 'B'.

TABLE 8

Grass Mixture	Frequency of Cutting	Uncut Height	Dry Matter Yield when Cut at End of Season	
		At End of Season	After Mid-Season Cut	No Mid-Season Cut
B	100	100	100	100
C	137	137	200	238
A	200	154	281	270

Of the three mixtures 'B' is by far the most suitable for use in low maintenance situations, it needs cutting less often, was shorter and it produced lower yields.

Photography

The following show the variation in colour between the mixtures in early June.

1. 9.6.87

2. 3.6.87