

Oregon Forage and Turf Grass Variety Seed Yield Trial, 1986-87

**Department of Crop and Soil Science
Oregon State University**



**Ext/CrS 82
December 1990**

OREGON FORAGE AND TURF GRASS VARIETY SEED YIELD TRIAL, 1986-87

Harold W. Youngberg and William C. Young¹

ABSTRACT

Forty perennial and 12 annual grass varieties were evaluated for seed production potential at Corvallis, Oregon. Perennial ryegrass, orchardgrass, Kentucky bluegrass, red fescue, Chewings fescue, tall fescue, and annual ryegrass were included in the study. Results of 1986 and 1987 harvest years are reported.

INTRODUCTION

Private and public plant breeding programs release many new varieties for commercial production each year. In many cases, seed producers are requested to produce seed of a new variety with very limited information about the comparative seed yield. Since 1981, a seed yield evaluation program has been conducted at Oregon State University. Seed yield and other characteristics of these varieties growing under western Oregon conditions were observed for two years and previously reported (Youngberg et al., 1985; 1986). A fee is charged for the service.

In this study, 52 entries and standards for each species were planted for evaluation. Species included: perennial ryegrass (*Lolium perenne*), Italian ryegrass (*Lolium multiflorum*), fine-leaf (Chewings and red) fescue (*Festuca rubra*), Kentucky bluegrass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*), and tall fescue (*Festuca arundinacea*).

METHODS

The trial was conducted at Hyslop Crop Science Field Laboratory, Corvallis, on a Woodburn silt loam soil and designed to follow commercial field practices of Willamette Valley seed growers. Perennial species in this trial were planted in May 1985 and the annual species in September 5, 1985 and September 19, 1986.

Seeding rates were adjusted for germination percentage to plant an equal number of pure live seed per length of row. Row spacing was 12 inches (30 cm) for all species except tall fescue and orchardgrass, which were spaced 18 inches (45 cm) apart. Four replications of each entry were established using a cone planter in either 2- or 3-row plots (depending on row spacing) so that all plots were 3 feet (0.9 m) wide and 15.6 feet (4.75 m) in length. A blank row was used to separate entries within blocks. Border plots were planted at the boundary of each species. A standard variety was included for each species. Seeding rates and dates, and row width for each species are given in Table 1.

¹Professor and Assistant Professor and Extension Agronomist, respectively. Address: Department of Crop and Soil Science, Oregon State University, Corvallis, OR 97331.

Table 1. Seeding rate, mean number of seeds per row, row width, and seeding date for seed yield evaluation trial

Species	Seeding rate		Mean number seeds per:		Row width		Seeding date	
	(lb/a)	(kg/ha)	(ft)	(m)	(in)	(cm)	1985	1986
	Perennial ryegrass	10.7	12.0	58	190	12	30	5 May
Fine-leaf fescue	4.5	5.0	61	200	12	30	4 May	--
Kentucky bluegrass	2.0	2.2	61	200	12	30	4 May	--
Orchardgrass	4.5	5.0	64	210	18	45	5 May	--
Tall fescue	8.9	10.0	61	200	18	45	5 May	--
Italian ryegrass	13.4	15.0	55	180	12	30	5 Sept.	19 Sept.

Crop Management During the Establishment Season, 1985-1986

Italian ryegrass varieties were seeded on September 5, 1985 following a surface application and incorporation of 200 lb/a (224 kg/ha) of 16-20-0 fertilizer into the seedbed on September 3, 1985. All Italian ryegrass varieties were subsequently treated with the herbicide Buctril (bromoxynil) at 0.5 lb acid equivalent per acre (ae/a) (0.56 kg ae/ha) on October 9, 1985, and Nortron GS (ethofumesate) at 1.0 lb active ingredient (ai/a) (1.12 kg ai/ha) on October 28, 1985.

Weed control following establishment of perennial varieties included Buctril at 0.5 lb ae/a (0.56 kg ae/ha) on May 30, 1985 and on October 9, 1985. Additional autumn chemical weed control was applied on October 28 as shown in Table 2.

All perennial and annual varieties were sprayed with a tank mix of 2,4-D low volatile (LV) ester at 0.75 lb ae/a (0.84 kg ae/ha) and dicamba at 0.25 lb ae/a (0.28 kg ae/ha) on February 10, 1986.

Table 2. Autumn 1985 and 1986 herbicide application and rate

Species	Herbicide	Rate (ai) ¹	
		(lb/a)	(kg/ha)
Perennial ryegrass	AAtrex 80W (atrazine)	1.2	1.35
Fine-leaf fescue	Princep 80W (simazine)	2.0	2.24
Kentucky bluegrass, Orchardgrass and Tall Fescue	Karmex 80W (diuron)	2.4	2.69

¹Applied October 28, 1985 and October 28, 1986.

All perennial species were irrigated with 1.5 inches (3.8 cm) of water on May 12 and May 21, 1985. A third irrigation with 2.0 inches (5.0 cm) was applied on August 9, 1985.

Spring fertilizer was applied as urea to all entries on February 16, 1986 (Table 3).

Table 3. Spring 1986 fertilizer application and rate.

Species	Rate ¹		Nitrogen (au)	
	(lb/a)	(kg/ha)	(lb/a)	(kg/ha)
Perennial ryegrass, Italian ryegrass and Fine-leaf fescue	240	269	110	123
Tall fescue and Orchardgrass	174	195	80	90
Kentucky bluegrass	304	341	140	157

¹46-0-0 for all species applied on February 26, 1986.

Fungicide treatments included Bravo 500 at 3 pt/a (3.6 l/ha) for tall fescue and orchardgrass on April 17, 1986. Tilt was applied at 4 fluid oz/a (0.3 l/ha) for rust control on perennial ryegrass and Kentucky bluegrass. Five applications were made to both species on April 17, 30, May 12, 23, and June 6, 1986.

Plots were checked weekly from March 26, 1986 until maturity for heading date (approximately 50% of the stand had headed), anthesis date (first appearance of exerted anthers), lodging date (when lodging first became apparent), area lodged (estimate of area lodged), and the severity of lodging (based on a scale of 1-5). Plant height measurements were recorded at peak anthesis.

Autumn 1986 and Spring 1987 Management

Italian ryegrass varieties were reseeded in the fall of 1986 for evaluation in 1987. Establishment methods previously reported were used for row spacing, seeding rate and plot size. Italian ryegrass varieties were seeded on September 19, 1986 following a surface application and incorporation of 250 lb/a (275 kg/ha) of 16-20-0 fertilizer into the seedbed on September 5, 1986. All Italian ryegrass varieties were subsequently treated with a tank mix of 2,4-D LV ester at 0.5 lb ae/a (0.56 kg ae/ha) and dicamba at 0.25 lb ae/a (0.28 kg ae/ha) on October 22, 1986. A second autumn herbicide treatment included Nortron GS at 1.0 lb ai/a (1.12 ai kg ai/ha) on October 28, 1986.

Italian ryegrass plots received a spring application of a tank mix of 2,4-D LV ester at 0.75 lb ae/a (0.84 kg ae/ha) and dicamba at 0.25 lb ae/a (0.28 kg ae/ha) on February 5, 1987. Three hundred lb/a (330 kg/ha) of 40-0-0-6(S) was applied on February 20, 1987.

Following the first seed harvest of the perennial species, straw was removed on July 25, 1986. The stubble remaining on the plots was burned two times with a propane flamer on July 28 and 30. An application of 185 lb/a (207 kg/ha) of 16-20-0 was broadcast on all perennial species on October 14, 1986. Herbicide sprays for fall and winter weed control were applied on October 28, 1986 at rates shown in Table 2.

All plots were sprayed with a tank mix of 2,4-D LV ester at 0.75 lb ae/a (0.84 kg ae/ha) and dicamba at 0.25 lb ae/a (0.28 kg ae/ha) on February 5, 1987.

Spring fertilizer was applied as 40-0-0-6(S) at 300 lb/a (kg/ha) to all perennial varieties on February 20, 1987.

Tilt was applied at 4 fluid oz/a (0.3 l/ha) for rust control on perennial ryegrass and Kentucky bluegrass. Five applications were made on Kentucky bluegrass: April 2, 16, May 5, 14, and 26; while four were used on perennial ryegrass: April 16, May 5, 14, and 26.

All varieties were checked on a weekly schedule from April 24, 1987 until maturity for anthesis date, area lodged, and severity of lodging. Plant height measurements were recorded at peak anthesis.

Harvest maturity was determined by seed moisture content. When mature, the entire plot was harvested with a small plot harvester incorporating a sickle bar cutter and draper designed for efficient bagging of harvested plant biomass (reported as total dry weight). The bagged material was air- and oven-dried, threshed, cleaned, and weighed to calculate seed yield. A 3 to 5-gram seed sample from each plot was taken with a seed divider to determine the 1000-seed weight. Harvest index, expressed as a percentage, was calculated for each entry:

$$\text{Harvest index} = \frac{\text{Clean seed weight}}{\text{Total dry weight harvested}} \times 100$$

Data from each species were subjected to a randomized block analysis of variance and Least Significant Difference test to determine differences among variety means.

RESULTS AND DISCUSSION

The planting method and irrigation during the seedling development period produced a good stand of all species in 1985. The rainfall during June 1986, the first seed crop season, was 26% below normal (Table 4) and the temperature was approximately 6% above normal. Several of the early species were observed to be drought stressed and high temperature may have interfered with effective pollination.

In both crop years the temperatures from January through June were equal to, or significantly above, the 30-year mean (Table 4). Precipitation during April through June was 17% and 42% below the 30-year mean in 1986 and 1987, respectively. This combination of higher temperatures and below normal precipitation resulted in earlier heading, anthesis, and harvest maturity, particularly in 1987.

Table 4. Monthly mean minimum and maximum temperatures, total precipitation in Corvallis, Oregon (30-year averages, 1985, 1986 and 1987)

Month	Temperature (° F)											
	Min				Max				Precipitation (inches)			
	30 Yr			1987	30 Yr			1987	30 Yr			1987
	avg	1985	1986		avg	1985	1986		avg	1985	1986	
Jan.	32.9	28.1	35.8	33.1	45.1	42.5	49.6	46.2	7.6	0.25	6.53	8.22
Feb.	35	31.9	37.4	36.6	50.4	48.5	50.0	51.6	4.9	3.65	9.90	4.50
Mar.	36.1	33.9	41.7	38.6	53.8	53.1	60.2	56.2	4.6	4.94	3.04	3.70
Apr.	38.8	41.9	39.3	40.3	59.3	62.2	59.2	65.3	2.5	1.05	1.84	1.56
May	43.2	42.8	44.5	46.1	66.2	67.3	65.7	70.2	1.9	0.94	2.50	1.40
June	48.3	47.4	51.2	49.2	72.6	75.3	77.4	77.8	1.2	2.22	0.31	0.29
July	50.6	52.3	50.0	--	80.7	87.1	76.4	--	0.3	0.54	1.15	--
Aug.	50.7	50.0	52.3	--	80.5	80.9	87.2	--	0.8	0.48	0.00	--
Sept.	47.7	45.8	47.4	--	75.5	71.6	71.2	--	1.5	0.78	3.56	--
Oct.	41.7	40.6	45.0	--	64.3	63.8	65.3	--	3.4	3.89	2.80	--
Nov.	37.2	31.5	40.0	--	52.3	44.8	53.9	--	6.2	4.69	8.62	--
Dec.	34.6	25.5	32.5	--	46.5	40.1	46.0	--	7.8	3.72	3.50	--
Year	41.4	39.3	43.1	--	62.3	61.4	63.5	--	42.6	27.2	43.8	--

In spite of the drier conditions in 1987, earliness of lodging and lodging severity were not significantly different between the two years. The main drought stress effect was on the later maturing varieties of perennial ryegrass. Harvest dates and other observations for the various species are presented in Tables 5-16.

Perennial ryegrass. Mean seed yield for 1986 and 1987 for the ryegrass varieties ranged from 253 to 1557 lb/a. In general, the later maturing varieties produced the lowest seed yields (Table 5). Mean seed yield of perennial ryegrass was 37% lower in the second season. This reduction was largely the result of lower yield due to drought stress on late maturing varieties in 1987. In spite of the drought stress conditions, mean seed weight was not reduced in 1987. Perennial ryegrass plants were shorter and lodging was delayed in 1987, and total dry weight of straw and seed was 42% less in 1987 (Table 6).

Fine-leaf fescue. Three entries produced significantly higher yields than the standard variety (Table 7). Mean seed yields were not reduced in 1987 although total dry weight was 42% smaller resulting in very high harvest indexes for the fine-leaf fescue varieties (Table 8). Larger seed was associated with higher seed yield of the superior varieties in these two harvests.

Kentucky bluegrass. Two Kentucky bluegrass varieties produced significantly less than the standard in both seasons. Higher yielding varieties tended to produce more dry weight (Tables 9 and 10).

Orchardgrass. Seed production of one variety was 41% greater than the standard over the first two harvests (Table 11). Seed yield of all varieties was greater in the second harvest (Table 11) and the harvest index was much higher in 1987 due to the reduced straw production in 1987 (Table 12). Drought conditions did not reduce production in the second harvest.

Tall fescue. Most of the tall fescue varieties included in the trial were good seed producers resulting in a high mean seed yield (Table 13). There were no outstanding differences in the two seasons except that the plants were 11% shorter in the second year (Table 14).

Italian ryegrass. Both seed yield and total dry matter production were 30% lower in 1987 than 1986 (Table 15). The area lodged was greater in 1987, suggesting that early vegetative growth may have reduced the seed yield potential by increasing lodging severity (Table 16).

Seed yields from these research plots should be compared with known standard varieties rather than using the absolute figures to estimate potential yields under commercial production conditions. Plot harvest methods reduce shattering and other harvest losses that normally occur in commercial production.

REFERENCES

- Redmond, K.T. 1986. Local climatological data for Corvallis, Oregon. 1985 summary with normals, means, extremes, monthly time series. Agricultural Experiment Station, Oregon State University in cooperation with Office of the State Climatologist, Climatic Research Institute. Agric. Expt. Sta. Spec. Rept. 777. 24 pp.
- Redmond, K.T. 1987. Local climatological data for Corvallis, Oregon. 1986 summary with normals, means, extremes, monthly time series. Agricultural Experiment Station, Oregon State University in cooperation with Office of the State Climatologist, Climatic Research Institute. Agric. Expt. Sta. Spec. Rept. 809. 26 pp.
- Youngberg, H.W., W.C. Young III, and D.O. Chilcote. 1985. Oregon forage and turf grass variety seed yield trial, 1982-83. Spec. Rept. 730. Agric. Expt. Sta., Oregon State Univ., Corvallis. 11 pp.
- Youngberg, H.W., W.C. Young III, and D.O. Chilcote. 1986. Oregon forage and turf grass variety seed yield trial 1984-85. Spec. Rept. 766. Agric. Expt. Sta., Oregon State Univ., Corvallis. 15 pp.

Table 5. Seed yield, total dry weight, thousand-seed weight, and heading date of perennial ryegrass, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
Kemal	1519	1594	1557	138	8.99	5.87	7.43	3.38	3.55	3.46	22 May	13 May
Mom Lp 763	1692	911	1301	115	6.71	3.87	5.29	1.66	1.85	1.76	22 May	10 May
Linn (Std)	1233	1029	1131	100	7.70	4.47	6.08	2.29	2.38	2.34	15 May	5 May
Verna	1281	945	1113	98	7.12	4.84	5.98	2.06	2.23	2.15	22 May	6 May
DP-73-4-32	1192	1023	1108	98	7.28	4.46	5.87	1.97	2.17	2.07	20 May	6 May
DP-1-6P	1174	972	1073	95	7.09	4.48	5.78	2.18	2.28	2.23	15 May	5 May
Sisu	1188	681	935	83	6.87	4.97	5.92	1.85	1.95	1.90	29 May	15 May
Tonga	982	869	926	82	7.12	3.87	5.50	3.40	3.60	3.50	22 May	8 May
Pennfine	1122	703	912	81	7.45	3.55	5.50	1.93	2.06	2.00	22 May	8 May
Chantal	1180	592	886	78	7.60	3.65	5.62	1.74	1.94	1.84	31 May	15 May
Vejo	1113	592	853	75	7.78	5.00	6.39	1.88	2.15	2.01	15 May	5 May
DP-73-4-51	928	696	812	72	6.78	3.63	5.20	2.09	2.14	2.11	17 May	6 May
DP-233	909	219	564	50	7.13	3.14	5.14	1.60	1.57	1.58	5 Jun.	24 May
DP-26	857	235	546	48	6.05	3.55	4.80	1.47	1.61	1.54	5 Jun.	31 May
DP-78-9-20	792	198	495	44	6.45	3.40	4.93	1.71	1.65	1.68	5 Jun.	31 May
DP-79-2-48	449	173	311	27	6.65	3.24	4.94	2.63	2.72	2.68	7 Jun.	30 May
Pippin	475	140	307	27	5.38	2.85	4.11	1.49	1.68	1.59	30 May	1 Jun.
Trani	394	112	253	22	5.65	3.67	4.66	1.61	1.78	1.69	10 Jun.	30 May
Mean	1027	649	--	--	6.99	4.03	--	2.05	2.18	--	--	--
LSD 0.05	234	120	--	--	1.29	0.77	--	0.13	0.20	--	3 ¹	6 ¹

¹Days

Table 6. Anthesis date, harvest date, harvest index, lodging rate and plant height of perennial ryegrass, 1986 and 1987

Variety name	<u>Anthesis date</u>		<u>Harvest date</u>		<u>Harvest index (%)</u>			<u>First lodging (1986)</u>			<u>First lodging (1987)</u>			<u>Plant height (cm)</u>		
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
Kemal	5 Jun.	16 May	5 Jul.	30 Jun.	9.7	13.6	11.6	3 May	33	2	29 Apr.	35	2	101	86	93
Mom Lp 763	5 Jun.	16 May	5 Jul.	30 Jun.	12.6	11.8	12.2	28 Apr.	30	2	23 May	38	3	87	69	78
Linn (Std)	29 May	13 May	5 Jul.	30 Jun.	8.0	11.5	9.8	29 Apr.	30	2	1 May	38	4	91	74	83
Verna	29 May	13 May	5 Jul.	30 Jun.	8.9	9.8	9.3	24 Apr.	33	2	27 Apr.	25	2	102	76	89
DP-73-4-32	29 May	15 May	5 Jul.	30 Jun.	8.3	11.7	10.0	29 Apr.	18	2	6 May	48	3	98	76	87
DP-1-6P	31 May	15 May	5 Jul.	30 Jun.	8.2	11.3	9.8	1 May	18	2	6 May	48	4	91	77	84
Sisu	5 Jun.	22 May	15 Jul.	6 Jul.	8.8	6.8	7.8	24 Apr.	45	2	18 May	38	3	88	73	80
Tonga	29 May	15 May	5 Jul.	30 Jun.	6.9	11.3	9.1	6 May	25	2	9 May	38	3	105	79	92
Pennfine	29 May	15 May	5 Jul.	30 Jun.	7.5	9.9	8.7	24 Apr.	38	2	4 May	40	2	94	69	82
Chantal	5 Jun.	25 May	15 Jul.	6 Jul.	7.8	8.1	8.0	24 Apr.	48	2	4 May	38	2	89	68	78
Vejo	29 May	16 May	5 Jul.	30 Jun.	7.3	5.9	6.6	29 Apr.	38	2	2 May	45	2	100	73	87
DP-73-4-51	29 May	15 May	5 Jul.	30 Jun.	6.8	9.6	8.2	24 Apr.	23	2	27 Apr.	33	3	97	77	87
DP-233	9 Jun.	1 Jun.	17 Jul.	21 Jul.	6.4	3.5	4.9	24 Apr.	55	2	24 May	30	3	82	61	72
DP-26	12 Jun.	4 Jun.	17 Jul.	21 Jul.	7.3	3.3	5.3	26 Apr.	50	2	8 Jun.	38	2	78	66	72
DP-78-9-20	10 Jun.	4 Jun.	15 Jul.	21 Jul.	6.1	2.9	4.5	24 Apr.	55	2	18 May	35	3	86	66	76
DP-79-2-48	20 Jun.	8 Jun.	23 Jul.	21 Jul.	3.4	2.7	3.1	24 Apr.	70	2	16 May	66	2	82	74	78
Pippin	21 Jun.	13 Jun.	23 Jul.	21 Jul.	4.4	2.7	3.5	24 Apr.	53	2	27 May	25	3	79	62	71
Trani	26 Jun.	10 Jun.	23 Jul.	21 Jul.	3.4	1.5	2.5	24 Apr.	58	2	22 May	35	2	82	62	72
Mean	--	--	--	--	7.3	7.7	--	--	40	2	--	38	3	90	71	--
LSD 0.05	4 ³	5 ³	--	--	1.7	1.7	--	5 ³	22	NS	18 ³	NS	1	9	7	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Days

Table 7. Seed yield, total dry weight, thousand- seed weight, and heading date of fine-leaf fescue, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
ISI-544 Cornet	1741	1932	1836	274	6.22	4.79	5.50	1.36	1.44	1.40	3 Apr.	3 Apr.
ISI-829 Enzet	1449	1620	1535	229	6.41	4.78	5.59	1.35	1.55	1.45	27 Mar.	27 Mar.
ISI-504 Fulda	1186	1498	1342	201	6.23	3.85	5.04	1.38	1.52	1.45	3 Apr.	4 Apr.
Mom Frc 626	1097	936	1017	152	5.65	2.64	4.15	1.09	1.19	1.14	10 Apr.	11 Apr.
Cascade	1090	940	1015	152	5.86	3.56	4.71	1.13	1.22	1.17	17 Apr.	24 Apr.
Z 72 Frc 205	1036	947	991	148	5.05	2.71	3.88	1.03	1.15	1.09	10 Apr.	15 Apr.
LW R75-2 ¹	806	547	676	101	5.48	1.72	3.60	1.06	1.15	1.10	10 Apr.	20 Apr.
Pennlawn (Std.)	756	581	669	100	4.82	2.49	3.65	1.01	1.13	1.07	24 Apr.	1 May
Mean	1145	1125	--	--	5.72	3.32	--	1.18	1.29	--	--	--
LSD 0.05	114	188	--	--	0.93	0.73	--	0.04	0.06	--	2 ²	4 ²

¹Furore

²Days

∞

Table 8. Anthesis date, harvest date, harvest index, lodging rate and plant height of fine-leaf fescue, 1986 and 1987

Variety name	Anthesis date		Harvest date		Harvest index (%)			First lodging (1986)		First lodging (1987)			Plant height (cm)			
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
ISI-544 Cornet	24 May	8 May	23 Jun.	17 Jun.	14.0	20.2	17.1	26 Apr.	33	2	11 May	30	3	73	76	74
ISI-829 Enzet	22 May	8 May	23 Jun.	17 Jun.	11.3	17.0	14.2	24 Apr.	38	3	29 Apr.	30	3	72	76	74
ISI-504 Fulda	24 May	8 May	23 Jun.	19 Jun.	9.8	19.6	14.7	1 May	33	3	13 May	13	3	72	88	80
Mom Frc 626	22 May	8 May	19 Jun.	19 Jun.	9.7	17.8	13.8	1 May	38	3	10 May	25	2	74	78	76
Cascade	29 May	8 May	23 Jun.	23 Jun.	9.4	13.7	11.5	1 May	28	2	1 May	10	2	89	89	89
Z 72 Frc 205	22 May	8 May	19 Jun.	17 Jun.	10.4	17.8	14.1	1 May	30	3	8 May	20	3	74	71	73
LW R75-2 ³	26 May	8 May	19 Jun.	19 Jun.	7.3	17.1	12.2	5 May	15	2	16 May	13	3	77	74	75
Pennlawn (Std.)	29 May	15 May	23 Jun.	23 Jun.	7.8	12.1	10.0	8 May	28	2	15 May	13	3	80	81	81
Mean	--	--	--	--	10.0	16.9	--	--	30	--	--	19	2	76	79	--
LSD 0.05	4 ⁴	0 ⁴	--	--	1.7	4.1	--	3 ⁴	21	1	11 ⁴	NS	NS	5	8	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Furore

⁴Days

Table 9. Seed yield, total dry weight, thousand- seed weight, and heading date of Kentucky bluegrass, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
Newport (Std.)	1023	1137	1080	100	4.12	4.30	4.21	0.38	0.35	0.36	1 May	8 May
ZW-42-116	803	1207	1005	93	4.14	4.59	4.37	0.32	0.33	0.33	8 May	1 May
Nimbus	607	481	544	50	3.65	2.10	2.87	0.36	0.35	0.35	15 May	8 May
Larissa	411	234	322	30	2.24	1.55	1.89	0.38	0.38	0.38	24 Apr.	24 Apr.
Mean	711	765	--	--	1.59	1.46	--	0.36	0.35	--	--	--
LSD 0.05	250	191	--	--	0.52	0.64	--	0.04	0.02	--	NS	NS

Table 10. Anthesis date, harvest date, harvest index, lodging rate and plant height of Kentucky bluegrass, 1986 and 1987

Variety name	Anthesis date		Harvest date		Harvest index (%)			First lodging (1986)			First lodging (1987)			Plant height (cm)		
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
Newport (Std.)	22 May	15 May	1 Jul.	2 Jul.	12.3	13.4	12.9	5 Jun.	18	2	31 May	20	3	71	72	72
ZW-42-116	29 May	8 May	1 Jul.	2 Jul.	9.6	13.3	11.4	22 May	40	3	15 May	25	4	67	68	67
Nimbus	29 May	8 May	1 Jul.	2 Jul.	8.3	11.4	9.9	5 Jun.	33	3	8 Jun.	38	3	63	61	62
Larissa	15 May	8 May	1 Jul.	2 Jul.	9.2	7.7	8.4	5 Jun.	43	3	29 May	13	3	49	54	52
Mean	--	--	--	--	9.9	11.4	--	--	34	--	--	24	--	63	64	--
LSD 0.05	NS	NS	--	--	2.4	4.1	--	NS	23	NS	16 ³	NS	NS	6	7	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Days

Table 11. Seed yield, total dry weight, thousand- seed weight, and heading date of orchardgrass, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
Hallmark	1880	2526	2203	141	7.90	5.99	6.95	1.09	1.19	1.14	8 May	1 May
Crown	1421	1934	1678	107	7.84	5.53	6.69	1.11	1.16	1.14	15 May	1 May
Potomac (Std.)	1250	1873	1561	100	6.76	5.12	5.94	1.12	1.19	1.16	15 May	5 May
Rancho	1096	1179	1137	73	6.14	4.05	5.10	0.99	1.05	1.02	20 May	8 May
Cesarina	660	756	708	45	5.60	2.57	4.08	0.85	0.90	0.87	15 May	8 May
Mean	1261	1653	--	--	6.85	4.65	--	1.03	1.10	--	--	--
LSD 0.05	251	316	--	--	0.91	0.62	--	0.07	0.05	--	2 ¹	3 ¹

¹Days

10

Table 12. Anthesis date, harvest date, harvest index, lodging rate and plant height of orchardgrass, 1986 and 1987

Variety name	Anthesis date		Harvest date		Harvest index (%)			First lodging (1986)		First lodging (1987)			Plant height (cm)			
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
Hallmark	29 May	8 May	23 Jun.	19 Jun.	12.0	21.1	16.5	5 Jun.	55	3	4 Jun.	65	2	147	134	141
Crown	29 May	8 May	27 Jun.	23 Jun.	9.2	17.5	13.3	22 May	58	3	4 Jun.	63	2	155	136	146
Potomac (Std.)	29 May	9 May	27 Jun.	23 Jun.	9.3	18.2	13.8	22 May	53	3	4 Jun.	60	2	145	136	141
Rancho	29 May	11 May	30 Jun.	1 Jul.	9.0	14.2	11.6	23 May	15	2	4 Jun.	38	2	147	132	139
Cesarina	29 May	13 May	8 Jul.	1 Jul.	5.9	14.7	10.3	22 May	83	4	6 Jun.	50	2	125	112	118
Mean	--	--	--	--	9.1	17.1	--	--	53	3	--	55	2	144	130	--
LSD 0.05	NS	NS	--	--	2.0	2.4	--	2 ³	22	NS	NS	NS	0	6	7	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Days

Table 13. Seed yield, total dry weight, thousand- seed weight, and heading date of tall fescue, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
Fawn (Std.)	2158	2533	2345	100	8.26	6.93	7.60	2.56	2.87	2.71	17 Apr.	17 Apr.
Rebel II	2551	2075	2313	99	8.71	6.48	7.60	1.97	2.29	2.13	8 May	8 May
Forager	2192	2388	2290	98	8.73	6.65	7.69	2.63	2.92	2.78	17 Apr.	17 Apr.
Rebel	2238	1943	2090	89	8.40	7.45	7.92	2.17	2.32	2.24	8 May	8 May
Sibilla	1955	1854	1904	81	8.20	6.80	7.50	2.02	2.27	2.15	8 May	1 May
Mean	2219	2158	--	--	8.46	6.86	--	2.27	2.53	--	--	--
LSD 0.05	377	491	--	--	NS	NS	--	0.16	0.60	--	2 ¹	1 ¹

¹Days

11

Table 14. Anthesis date, harvest date, harvest index, lodging rate and plant height of tall fescue, 1986 and 1987

Variety name	Anthesis date		Harvest date		Harvest index (%)			First lodging (1986)		First lodging (1987)			Plant height (cm)			
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
Fawn (Std.)	29 May	8 May	19 Jun.	16 Jun.	12.5	17.4	14.9	15 May	68	2	4 May	75	2	136	127	131
Rebel II	29 May	15 May	30 Jun.	23 Jun.	13.8	15.2	14.5	22 May	75	4	20 May	45	3	125	118	121
Forager	29 May	8 May	19 Jun.	16 Jun.	11.8	17.0	14.4	15 May	78	2	1 May	65	3	145	134	140
Rebel	3 Jun.	15 May	30 Jun.	23 Jun.	12.9	12.3	12.6	22 May	68	3	13 May	28	2	132	110	121
Sibilla	31 May	15 May	30 Jun.	25 Jun.	11.3	12.9	12.1	22 May	78	4	16 May	80	3	142	117	129
Mean	--	--	--	--	12.5	15.0	--	--	73	3	--	59	3	136	121	--
LSD 0.05	4 ³	1 ³	--	--	2.1	2.4	--	2 ³	NS	1	7 ³	33	NS	8	7	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Days

Table 15. Seed yield, total dry weight, thousand- seed weight, and heading date of Italian ryegrass, 1986 and 1987

Variety name	Seed yield (lb/a)				Total dry weight (t/a)			1000-seed wt. (g)			Heading date	
	1986	1987	Mean	% Std.	1986	1987	Mean	1986	1987	Mean	1986	1987
Marshall (Std.)	2272	1386	1829	100	7.44	5.26	6.35	2.86	3.35	3	27 May	15 May
Westerwold	1262	*	1262	69	6.22	*	6.22	3.97	*	4	29 May	*
Sikem	1410	889	1150	63	5.59	3.99	4.79	2.58	2.88	3	24 May	15 May
Aubade	1327	952	1139	62	7.31	4.96	6.13	3.83	4.16	4	27 May	15 May
Bambi	1440	790	1115	61	6.41	3.54	4.97	4.09	4.47	4	26 May	13 May
SI-4	1085	1085	1085	59	6.07	4.95	5.51	2.99	3.30	3	24 Apr.	24 Apr.
Top 1	1076	847	961	53	5.90	4.57	5.24	4.03	4.45	4	29 May	15 May
Wencke	1030	878	954	52	5.01	4.57	4.79	2.54	2.98	3	24 May	15 May
Lunar	*	924	924	50	*	4.89	4.89	*	4.47	4	*	15 May
WSG TB-1A	959	809	884	48	6.06	3.98	5.02	3.66	4.83	4	27 May	15 May
Roberta	962	537	750	41	6.51	3.52	5.02	4.00	4.37	4	24 May	15 May
Catalpa	872	589	731	40	5.60	3.61	4.60	3.91	4.09	4	22 May	9 May
Kitti	942	468	705	39	5.09	3.05	4.07	2.41	2.71	3	22 May	15 May
Mean	1220	846	--	--	6.10	4.24	--	3.41	3.84	--	--	--
LSD 0.05	221	261	--	--	0.92	0.97	--	0.17	0.42	--	--	--

*Variety entered for planting one year only.

Table 16. Anthesis date, harvest date, harvest index, lodging rate and plant height of Italian ryegrass, 1986 and 1987

Variety name	Anthesis date		Harvest date		Harvest index (%)			First lodging (1986)			First lodging (1987)			Plant height (cm)		
	1986	1987	1986	1987	1986	1987	Mean	Date	Area ¹	Score ²	Date	Area	Score	1986	1987	Mean
Marshall (Std.)	3 Jun.	15 May	2 Jul.	30 Jun.	14.7	11.3	13	26 Apr.	43	3	24 Apr.	50	2	159	116	138
Westerwold	2 Jun.	*	2 Jul.	*	9.6	*	10	1 May	33	3	*	*	*	133	*	133
Sikem	2 Jun.	15 May	30 Jun.	30 June	12.0	9.5	11	28 Apr.	40	3	29 Apr.	59	4	140	107	124
Aubade	3 Jun.	15 May	2 Jul.	30 Jun.	8.6	8.2	8	28 Apr.	33	3	24 Apr.	40	2	131	119	125
Bambi	3 Jun.	15 May	30 Jun.	30 Jun.	10.6	9.6	10	29 Apr.	50	3	1 May	53	4	134	112	123
SI-4	15 May	8 May	19 Jun.	30 Jun.	8.4	9.4	9	24 Apr.	50	3	25 Apr.	40	2	124	112	118
Top 1	3 Jun.	15 May	2 Jul.	16 Jun.	8.8	7.9	8	29 Apr.	48	3	24 Apr.	68	2	143	110	126
Wencke	2 Jun.	15 May	30 Jun.	30 Jun.	9.7	8.3	9	29 Apr.	45	3	27 Apr.	65	3	137	107	122
Lunar	*	15 May	*	30 Jun.	*	8.2	8	*	*	*	25 Apr.	40	2	*	108	108
WSG TB-1A	3 Jun.	15 May	30 Jun.	30 Jun.	7.5	8.8	8	1 May	38	3	25 Apr.	31	2	143	111	127
Roberta	3 Jun.	15 May	2 Jul.	30 Jun.	7.0	6.8	7	28 Apr.	40	3	1 May	66	4	130	104	117
Catalpa	29 May	15 May	30 Jun.	30 Jun.	7.3	7.1	7	29 Apr.	50	3	1 May	68	5	129	102	116
Kitti	29 May	15 May	30 Jun.	30 Jun.	8.8	6.7	8	28 Apr.	48	3	27 Apr.	89	3	126	111	118
Mean	--	--	--	--	9.4	8.5	--	--	43	3	--	56	3	136	110	--
LSD 0.05	4 ³	2 ³	5 ³	2 ³	1.7	2.2	--	5 ³	NS	NS	4 ³	NS	1	12	NS	--

¹Percentage

²Lodging score 1-5; 1 = no lodging and 5 = flat

³Days

*Variety entered for planting one year only.



Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, Energy, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Oregon counties cooperating. The Extension Service offers its programs and materials equally to all people.