



Crop Science Report

RESEARCH/EXTENSION

OREGON

FORAGE AND TURF GRASS VARIETY SEED YIELD TRIAL -- 1984

by Harold W. Youngberg, William C. Young, III, and David O. Chilcote¹

INTRODUCTION

Many new grass varieties and advanced breeding lines are developed in public and private plant breeding programs each year. In 1981 a pilot seed yield evaluation program was started at Oregon State University for recently-released varieties or advanced breeding lines from firms interested in seed production in the state. Seed yield of these varieties growing under western Oregon conditions was observed for two years and has been reported in Crop Science Reports 43 and 49.

The program was continued on a fee basis in 1983. Fifty-five entries were received for evaluation of plant height, lodging, 1000 seed weight and seed yield. Species included: perennial ryegrass (Lolium perenne), Italian ryegrass (Lolium multiflorum), fine-leaf fescue (Festuca rubra), Kentucky bluegrass (Poa pratensis), orchardgrass (Dactylis glomerata), and tall fescue (Festuca arundinacea).

METHODS

The trial, designed to follow commercial field practices of Willamette Valley seed growers was at Hyslop Crop Science Field Laboratory, Corvallis, on a Woodburn silt loam soil.

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

Seeding rates were adjusted for germination percentage to allow planting of equal amounts 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 circular belt 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. A standard variety was included for each species. Seeding rates and dates, and row width for each species are given in Table 1.

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

Species	Seeding rate		Mean number		Row width		Seeding date
	(lb/a)	(kg/ha)	(ft)	(30 cm)	(in)	(cm)	1983
Perennial ryegrass	10.7	12.0	58	57	12	30	May 2-3
Fine-leaf fescue	4.5	5.0	61	60	12	30	May 3
Bluegrass	4.5	2.2	61	60	12	30	May 3
Orchardgrass	4.5	5.0	64	63	18	45	May 4
Tall fescue	8.9	10.0	61	60	18	45	May 4
Italian ryegrass	13.4	15.0	55	54	12	30	Sept. 20

Weed control following establishment included bromoxynil at 0.5 lb ai/a (0.56 kg/ha) on June 2, 1983, and 0.75 lb ai/a (0.84 kg/ha) 2,4-D low volatile ester on September 23, 1983 to all perennial species. Additional autumn chemical weed control was applied on October 21, 1983 (see Table 2). Italian ryegrass entries were treated with Nortron^R at 1.0 lb ai/a (1.1 kg/ha) on November 12, 1983.

Table 2. Autumn 1983 herbicide application.

Species	Herbicide	Rate ¹	
		(lb/a)	(kg/ha)
Perennial ryegrass	Atrazine	1.5	1.7
Fine-leaf fescue	Simazine	2.0	2.2
Bluegrass, Orchardgrass & Tall fescue	Diuron	3.0	3.4

¹Applied October 21, 1983

All perennial species were irrigated with 2.0 inches (5.0 cm) of water on June 8, 1983.

Fertilizer applications before the first seed crop included 16-20-0 at 187 lb/a (210 kg/ha) applied on September 14, 1983, before seeding the Italian ryegrass. The same rate was also applied to all perennial species on October 3, 1983. Spring fertilizer was applied as 46-0-0 to all entries on March 8, 1984 (see Table 3).

Table 3. Spring 1983 fertilizer application

Species	Rate ¹		N (Actual)	
	(lb/a)	(kg/ha)	(lb/a)	(kg/ha)
Perennial ryegrass Italian ryegrass and Fine-leaf fescue	233	261	107	120
Tall fescue and Orchardgrass	174	195	80	90
Bluegrass	291	326	134	150

¹46-0-0 for all species applied on March 8, 1984.

Fungicide treatments included Bravo 500^R at 3 pints/a (3.6 l/ha) for tall fescue and orchardgrass on April 13, 1984 and again on May 7, 1984. Tilt^R was applied at 4 fl. oz/a (0.3 l/ha) for rust control on perennial ryegrass and bluegrass. Five applications were made on bluegrass: April 26, May 7 and 29, June 11 and 25 while four were used on perennial ryegrass: May 16, 29, June 11, and 25.

No irrigation was applied in 1984. Soil moisture was adequate to insure physiological maturity in all species.

Plant height was measured at approximately peak anthesis and estimates of lodging were made at maturity for all entries.

The entire plot area was harvested at maturity using a small plot harvester incorporating a sickle bar cutter and draper designed for efficient bagging of the above ground plant bio-mass. The bagged material was air-dried, threshed, cleaned and weighed. A 3 to 5 gram seed sample of each plot was taken with a seed divider to determine the 1000 seed weight. In addition, harvest index was calculated for each entry:

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

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 produced a good stand in all species. Two perennial ryegrass varieties, Trani, and to a lesser extent, Sisu, were extremely attractive to mice. They were selectively grazed in each replication and suffered reduced yield because of mouse damage. The Italian ryegrass variety, SB-S, began pollination on April 23, 1984, was severely infected by rust, and set very little seed. SB-S did exert a second flush of seed heads which pollinated around June 15, 1984, and contributed to a very low seed yield.

Harvest dates and other observations are presented in Tables 4-9. Yields expressed as a percent of the standard variety for each species are also reported.

Seed yields from these research plots should be compared with known standard varieties rather than use the absolute figures. Plot harvest methods reduce shattering and combining losses that normally occur in commercial production. Mean plot yield for perennial ryegrass, bluegrass and annual ryegrass as equal to five-year mean commercial seed yields for Oregon. Plot yield of fine-leaf fescue, orchardgrass, and tall fescue as approximately double the five-year mean seed yield for the state.

Table 4. 1984 seed yield of Perennial Ryegrass (*Lolium perenne*).

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD (lb/a)	(% Std.)
Prelude	91.9	4.5	7/13	14.5	1.76	1528	130
Palmer	90.6	4.5	7/13	14.0	1.73	1279	109
LP792	88.8	4.3	7/17	19.1	1.64	1193	102
Linn	91.3	5.0	7/11	13.6	2.07	1173	100
(Std)							
Agree	85.6	3.3	7/13	14.5	1.77	1126	96
2EE	81.9	5.0	7/6	14.9	1.56	993	85
Pennfine	93.1	4.8	7/13	10.5	1.76	821	70
SB-F	92.5	3.3	7/23	10.5	2.55	799	68
Pronto	92.5	5.0	7/11	10.7	1.70	717	61
Sisu	94.4	3.3	7/19	10.5	1.67	711 ²	61 ²
Vejo	96.9	5.0	7/13	9.1	1.88	638	54
Trani	71.3	3.3	7/27	4.9	1.42	306 ²	26 ²
LSD .05	8.5	0.6	-	4.1	0.11	341	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

²Severely damaged by selective mouse grazing.

TABLE 5. 1984 seed yield of Fine-Leaf Fescue (*Festuca rubra*).

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD (1b/a) (% Std.)	
ISI 829	80.5	3.5	7/6	21.0	1.11	1660	165
Eboli	83.1	5.0	6/28	16.2	0.94	1604	160
Tatjana	80.0	5.0	6/28	16.9	0.94	1513	151
Z7492	83.1	5.0	7/6	17.3	0.87	1429	142
Pernilla	80.6	4.3	7/9	20.8	0.95	1298	129
Premiere	83.9	4.5	7/9	16.3	0.95	1248	124
ASHF-82	79.4	5.0	7/2	15.5	0.79	1189	118
ZW42-100	75.6	5.0	7/9	19.7	0.84	1132	113
Cascade	88.8	5.0	7/6	14.9	0.93	1117	111
<u>Pennlawn</u> (Std.)	<u>83.1</u>	<u>5.0</u>	<u>7/9</u>	<u>16.1</u>	<u>0.85</u>	<u>1005</u>	<u>100</u>
LSD .05	5.1	0.4	-	3.5	0.06	256	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

TABLE 6. 1984 seed yield of Bluegrass (*Poa Pratensis*).

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD (1b/a) (% Std.)	
PP-02	68.1	2.3	7/17	20.8	0.42	1073	149
PP-01	68.8	2.8	7/17	18.8	0.39	1054	146
ZW42-96	71.9	2.8	7/17	16.6	0.43	990	138
Conni	41.9	2.0	7/17	19.9	0.39	781	108
<u>Newport</u> (Std.)	<u>81.9</u>	<u>2.8</u>	<u>7/17</u>	<u>18.5</u>	<u>0.38</u>	<u>720</u>	<u>100</u>
Annika	65.0	3.5	7/17	18.9	0.36	643	89
Arnolda	48.8	1.3	7/17	19.0	0.40	583	81
Cynthia	66.3	3.3	7/17	16.4	0.37	578	80
Charlotte	58.8	3.5	7/17	10.4	0.42	361	50
LSD .05	5.9	1.0	-	3.9	0.04	215	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

TABLE 7. 1984 seed yield of Orchardgrass (*Dactylis glomerata*).

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD (lb/a) (% Std.)	
Hallmark	141.3	1.5	7/6	18.7	0.99	1947	110
SB-SYN-2	140.6	2.8	7/6	18.3	0.95	1868	106
Paiute	140.0	1.5	7/6	17.7	0.99	1876	106
Sparta	125.0	2.5	7/9	24.0	0.89	1799	102
Potomac	<u>138.8</u>	<u>1.8</u>	<u>7/6</u>	<u>17.1</u>	<u>0.96</u>	<u>1765</u>	<u>100</u>
(Std)							
Jesper	139.4	2.5	7/9	19.7	0.96	1588	90
DG-04	149.4	1.0	7/11	16.0	0.96	1296	73
DG-02	148.8	1.3	7/11	14.9	1.01	1125	64
Marta	128.8	2.5	7/13	11.5	0.83	869	49
Cesarina	124.4	2.8	7/13	14.4	0.81	811	46
DG-03	124.4	1.3	7/17	13.6	0.91	585 ²	33 ²
DG-01	128.1	1.3	7/17	9.5	0.81	522 ²	30 ²
LSD .05	7.9	0.7	-	3.0	0.05	262	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

²Very poor stand due to low seed germination.

Table 8. 1984 seed yield in Tall Fescue (*Festua arundinacea*)

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD (lb/a) (% Std.)	
ASTF-82SP	140.0	4.0	7/6	17.4	2.06	2118	121
Fawn	<u>141.3</u>	<u>4.0</u>	<u>6/28</u>	<u>14.2</u>	<u>2.32</u>	<u>1754</u>	<u>100</u>
(Std)							
Rebel	136.3	4.0	7/6	16.0	2.10	1644	94
FA-01	137.5	4.0	7/9	12.7	2.15	1609	92
ASTF-82F	140.5	4.0	7/9	14.3	2.10	1547	88
Sibilla	136.9	3.5	7/9	12.2	1.94	1264	72
LSD .05	NS	0.4	-	2.5	0.09	NS	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

TABLE 9. 1984 seed yield in Italian Ryegrass (*Lolium multiflorum*)

VARIETY	PLANT HEIGHT (cm)	LODGING SCORE ¹	HARVEST DATE	HARVEST INDEX (%)	1000 SEED WEIGHT (g)	SEED YIELD	
						(lb/a)	(% Std.)
<u>Marshall</u> (std)	<u>100.8</u>	<u>4.0</u>	<u>7/2</u>	<u>18.1</u>	<u>2.70</u>	<u>1899</u>	<u>100</u>
WSG TB-1A	134.9	3.5	7/9	14.6	3.64	1751	92
SB-A	125.0	3.0	7/9	13.7	3.61	1460	77
Westerwold	123.8	3.0	7/9	11.7	3.53	1290	68
Aubade	125.0	3.8	7/9	12.0	3.31	1180	62
SB-S	98.1	4.0	7/2	5.2	2.43	308 ²	16 ²
LSD .05	NS	0.5	-	3.8	0.34	505	--

¹Lodging score 1-5, with 1 = no lodging and 5 = flat.

²Severe rust injury.