

IRRIGATED SPRING OAT VARIETY TRIALS FOR GRAIN*

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Abstract

Ten spring oat varieties were evaluated under irrigated conditions at Madras and Powell Butte during the crop years 1990 and 1991. In 1990, there was no statistical yield difference for the oat varieties. In 1991, 'Ogle', 'Ajay', 'Dane' and 'Monida' ranked first, second, third and fourth respectively for yield. All the varieties lodged badly both years except for 'Minimax', which did not lodge very much in 1991, but was last in yield both years.

Introduction

Oats are used for animal feed, forage, and for human consumption. Some cultivars are better suited for specific uses. If intended for grain for human consumption, 'Otana' and 'Monida' are the cultivars of choice. If production is intended for the horse market in California, a white hulled cultivar is a must (though hull color does not directly affect feed quality). If producing general feed grain oats is the goal, any high yielding, average or better test weight cultivar will do. Hay can be made from all cultivars, but thin stemmed types are often preferred.

It has been many years since an oat variety trial had been run in central Oregon and there was no recent data for farmers to aid them in cultivar selection. Ten oat cultivars were planted at Madras in 1990 and 1991 to evaluate various agronomic characteristics.

Yield potential: Yield potential varies from cultivar to cultivar, from area to area and from one year to another. Yield potential is a genetic trait that is moderated by other factors such as disease and stress tolerance. It is important to evaluate the yield potential of a cultivar, by reviewing data from test sites with a similar environment using performances over several years. A single year's data is often misleading.

Lodging: Oats as a whole are susceptible to lodging. Lodging reduces both grain yield and grain quality. As soil fertility levels increase, stiffer strawed, more lodging resistant

*Dr. Steve Broich of Grain Millers, Inc. in Eugene, Oregon provided quality evaluation for percent doubles, percent thins, percent groat yield and percent groat protein.

Lodging is more common under irrigated than dryland conditions.

Disease resistance: Barley yellow dwarf virus (BYDV) is the most widespread disease of oats in Oregon. Several cultivars are tolerant of BYDV. Smut can also lead to yield reductions. However, smut is generally not a problem if seed treatments are used and are applied properly. Crown rust has been observed in some lodged fields, but generally has not been of economic significance.

Maturity: Oats are generally later maturing than other grains; but, differences do exist among cultivars. If late season moisture stress is a problem in your area, choose one of the shorter season cultivars.

Materials and Methods

In 1990, 10 oat cultivars were planted on April 6 at the Madras site and Powell Butte. The varieties were replicated three times in a randomized block design. A single replication was planted at the Powell Butte site. Planting rates were based on 30 seeds per square foot (see data tables for pounds per acre) planted into 5 ft x 20 ft plots using a cone planter with 8 inch row spacing. Planting date was April 6. The plots were fertilized with 80 lbs of nitrogen and 60 lbs of sulfur per acre with a Barber metered feed fertilizer spreader. Weed control was applied in May, 1991. The plots were irrigated as needed with solid set lines. The plots were harvested on September 5 at Madras and on September 6 at Powell Butte with a Hege plot combine.

In 1991, planting date was April 23 and the soil test results at Madras were (based on a 0 to 12 in. sample): 6.8 pH, 50 ppm P, 308 ppm K, 14.0 meq/100 g Ca, 5.2 meq/100g Mg, 0.37 meq/100g Na, 25.3 ppm N-NO₃, and 1.7 ppm N-NH₄. Because of the high residual soil N, only 60 lbs of sulfur per acre was applied to the plots. Weed control was applied in May 1991. Harvesting was done on August 23. All other methods are the same as 1990.

Results and Discussion

Table 1 and 2 gives descriptions and general information of the oat cultivars. In 1990, the spring oat trial in Madras had no significant difference in grain yield. However the test weight for that year showed 'Rid' to have the greatest test weight of 38.0 lb/bu and 'Minimax' having the least with 30.1 lb/bu (Table 3). In the 1991 spring oat trial in Madras 'Rid' again had the highest test weight of 39.3 lb/bu. However libel' did not yield well at 99.7 bu/a compared to the highest yield in the trial, 'Ogle' with a grain yield of 138.2 bu/a (Table 4). The Powell Butte spring oat trial in 1990, had a large variation in yield with the least for 'Dane' of 16.0 bu/a, compared to the greatest 'Monida' with grain yield of 131.2 bu/a. This was a single replication trial, though.

Table 1. Recommended and Other Cultivars

Recommended Cultivars

AJAY: (82Ab1142) is a new release from the University of Idaho/USDA-ARS. It is a short-statured, lodging resistant line with excellent yield potential under irrigated conditions. It has light yellow seed and good test weight.

BORDER: Is a white hulled oat released by Wyoming in 1982. It's parentage is 'Otana'//CokerX848-1-1-2/Vayuse'. It is mid-to-late season, heading about 4 days later than Cayuse and is slightly taller than Cayuse. Lodging resistance is good.

CAYUSE: Is a yellow hulled oat released by WSU in 1966. It is the most popular cultivar in the Pacific Northwest at this time. It is the progeny of a 'Craig'/'Alamo' cross made at Cornell University in 1952. It is early maturing, is short in stature and has good lodging resistance. It has fair tolerance to BYDV.

MONIDA: Is a white hulled oat released by the University of Idaho/ARS in 1985. It is progeny of an 'Otana'rCayuse' cross. It is mid-to-late season, similar in height to Otana and has a test weight intermediate to those of Otana and Cayuse. It has good milling characteristics. Lodging resistance is good.

OGLE: Is a yellow hulled oat released by Illinois in 1983. It has excellent tolerance to BYDV and has been raised on limited acreage in the Pacific Northwest. It is a mid-tall, early maturing cultivar. Test weight and lodging resistance are good. Ogle is the progeny of a 'Brave'rTyler'PEGdolon 23' cross.

OTANA: Is a white hulled oat released by Montana in 1976. It is the progeny of a 'Clinton'POverland'aanster' (a Dutch cultivar) cross made in Aberdeen, ID in 1961. It is tall and somewhat susceptible to lodging. Otana consistently has a better test weight than most other Pacific Northwest cultivars and is a preferred milling oat.

Other Cultivars

CALIBRE: Is a yellow hulled oat released by Ag Canada in 1983. It is very tall, but has fair lodging resistance. It is late maturing and has shown good yield potential where soil moisture is not limiting late in the growing season. Test weights are excellent.

KANOTA: Is a red oat (*Avena byzantina*) released in Kansas during the 1920's. It is grown for hay. It is similar in maturity to Cayuse. Kanota is taller than most grain cultivars and has finer stems. Grain yields are generally low. Certified seed stocks are not available as there is no known source of breeder seed.

MONTEZUMA: Is a red hay (*Avena byzantina*) released by California in 1969. It is early in maturity and short statured. Lodging resistance is good.

PARK: Is a white hulled oat released by Idaho in 1953. It is the progeny of a 'Clinton'/2/'Overland' cross. It is similar in height and maturity to Otana, but is lower yielding and has lower test weights. Park is frequently used for oat hay.

PENNUDA: Is a naked (hulless) oat released by Pennsylvania in the mid-1980's. Hulless oats are thought to be beneficial in some feed uses (swine, poultry), but yields to date are low, even if lack of hull is considered.

SWAN: Is a tan hulled oat primarily grown for hay. It was developed in Western Australia and introduced into California in 1970. It is very early in maturity and is similar in height to Cayuse.

Table 2. Agronomic characteristics for various spring oat cultivars.

Cultivar	Year releasing	Releasing state	Species ¹	Hull color ²	Maturity ³	Height ⁴
Ajay	1991	ID	A. sativa	LY	L	S
Appaloosa	1978	WA	A. sativa		M	M
Border	1982	WY	A. sativa	W	M	M
Calibre	1983	CAN	A. sativa	Y	L	T
Cayuse	1966	WA	A. sativa	Y	E	M
Kanota	1916	KN	A. byzantina		E	M
Minimax	1990	Private	A. sativa		L	VS
Monida	1985	ID	A. sativa		ML	M-T
Montezuma	1969	CA	A. byzantina		VE	M
Ogle	1983	IL	A. sativa		M	M
Otana	1976	MT	A. sativa		M	T
Park	1953	ID	A. sativa		M	M-T
Swan	1970	CA	A. sativa		VE	S

Genus = Avena

² Li = light yellow, R = red, T = tan, W = white, Y = yellow

VE = very early, E = early, M = mid-season, L = late

⁴ VS = very short, S = short, M = mid-height, T = tall, VT = very tall

Table 3. Results of 1990 spring oat cultivar trial at Madras, Oregon.

Variety	Yield	Test Weight	Height	Lodging	Seeding Rate
	bu/acre	lbs/bu	inches		lbs/acre
Border	120.4	33.3	43	95	101
Cayuse	110.5	33.2	43	83	92
Dane	92.0	35.6	43	63	99
Grizzly	91.9	33.3	47	92	88
Minimax	85.6	30.1	33	70	72
Monida	114.9	30.9	43	80	86
Ogle	114.7	35.6	43	57	86
Otana	106.1	35.2	49	75	71
Riel	114.3	38.0	47	65	96
Ajay	127.8	33.9	43	68	90
Mean	107.8	33.9	43	68	88
PLSD .10	NS	2.1	3.8	NS	
PLSD .05	NS	2.5	4.6	NS	
PLSD .01	NS	3.5	6.4	NS	
CV %	21.1	4.4	6.3	47.1	

Table 4. Results of 1991 spring oat cultivar trial at Madras, Oregon

Variety	Yield	Test Wt.	Ht.	Lodging	Heading Date	Doubles	Thins	Groat Yield	Protein	Seeding Rate
	bu/acre	lbs/bu	inch	ok		%	%	%		lbs/ac
Border	114.8	38.3	46	73	7/15	1.2	11.8	69.9	15.8	95
Cayuse	112.7	38.0	46	81	7/11	1.7	8.4	71.0	15.5	89
Dane	124.0	38.5	45	37	7/1	2.5	8.9	70.2	15.4	97
Grizzly,	87.9	39.0	50	53	7/16	1.1	9.4	71.0	16.0	102
Minimax	94.8	32.9	35	3	7/19	0.6	27.2	69.7	16.6	95
Monida	120.1	38.6	49	85	7/12	1.2	11.6	66.7	15.3	82
Ogle	138.2	38.7	50	60	7/5	1.0	11.3	68.4	15.8	102
Otana	100.7	39.1	53	77	7/11	0.7	9.3	71.9	16.4	85
Riel	99.7	39.3	49	80	7/10	1.4	13.7	71.9	16.0	101
Ajay	130.2	37.9	38	72	7/13	1.4	15.1	70.2	15.7	94
Mean	112.3	38.0	46	62	7/11	1.3	12.7	70.1	15.9	94
PLSD .10	25.2	2.0	3.4	20.7	one	0.7	3.2	NS	one	
PLSD .05	30.5	2.4	4.1	25.1	rep	0.8	3.9	NS	rep	
PLSD .01	NS	3.3	5.6	34.3	only	1.1	5.3	NS	only	
CV%	15.8	3.7	5.2	23.5		36.8	17.8	5.2		

Table 5. Results of 1990 Spring Oat cultivar single rep observations at Powell Butte site, COARC, Oregon.

Variety	Yield	Test Wt.	HT	Lodge	Heading Date	Doubles	Thins	Groat Yield	Protein	Seeding Rate
	bu/ac	lbs/bu	in	%		%	%	%	%	lbs/ac
Border	116.3	41.3	44	0	7/10	1.1	8.9	69.2	13.2	101
Cayuse	102.1	41.1	44	5	7/6	1.6	9.1	69.4	13.0	92
Dane*	16.0	34.2	42	0	6/28	2.2	8.1	62.9	16.1	99
Grizzly	117.6	43.6	52	0	7/9	0.9	2.1	73.8	13.9	88
Minimax	110.7	37.7	36	0	7/10	1.9	9.0	74.5	15.3	72
Monida	131.2	41.6	49	0	7/8	1.0	7.5	72.5	14.3	86
Ogle	80.4	39.0	45	0	6/30	2.8	8.8	69.4	15.7	86
Otana	98.2	40.5	53	0	7/1	1.4	8.1	73.9.	15.7	71
Riel	101.8	41.6	51	0	6/31	0.4	6.6	74.8	15.1	96
Ajay	95.7	39.3	90	10	7/9	2.5	8.4	72.7	15.7	90
Mean	97.0	40.0	46	2	7/5	1.6	7.7	71.3	14.8	88

* Yield for Dane is correct

Table 6. Potential seeding rate for 30 seed/ft² in pounds per acre from 1991 harvested seed.

<u>Variety</u>	<u>Seeding Rate</u> lbs/acre
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Border	86
Cayuse	95
Dane	99
Grizzly	96
Minimax	77
Monida	93
Ogle	85
Otana	97
Riel	82
Mean	89