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Ohio Performance Trials of Spring Oat Cultivars

Including 1996 Results

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THE OHIO STATE UNIVERSITY
OARDC

The Ohio State University
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PERFORMANCE TRIALS OF SPRING OAT CULTIVARS IN OHIO -- 1996 Season[1]

Robert W. Gooding, Dr. Kimberly Garland Campbell, and Larry D. Herald[2]

Oat Growing conditions and Production in Ohio in 1996:

Wet soil conditions significantly delayed oat planting in the spring of 1996. According to the Ohio Agricultural Statistics Service, by the end of the first week in May only 51% of the oats in the state had been planted. Historically, nearly all oats in Ohio are sown by the last week of May. In 1996, however, only three quarters of the crop were sown by the beginning of June. Wet conditions persisted through the third week of June which helped reduce the number of acres planted to oats in the state.

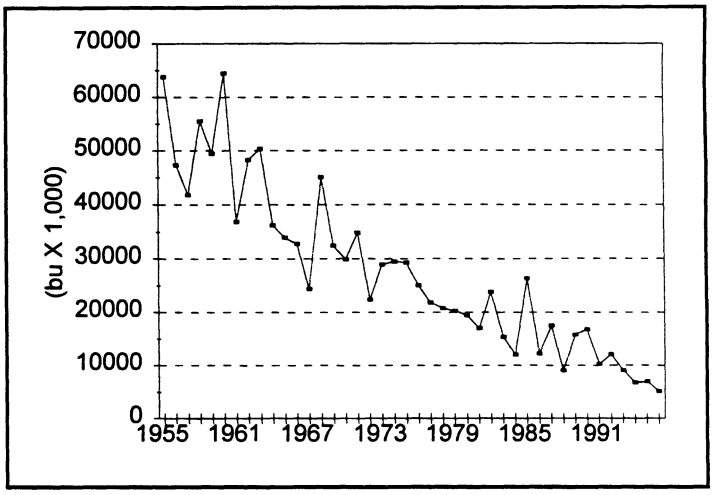

Figure 1: Production of spring oats in Ohio, 1955-1996.

In an average year, over 80% of oats have reached anthesis by the end of June. By the end of June,1996, however, just a little over half of the oat crop had headed. Late plantings and late heading meant that the grain filling period for the crop was unusually short this year. This had a negative impact on yield.

The Ohio Agricultural Statistics Service estimated that oats were harvested from 90,000 acres in Ohio. An average yield of 57 bushels per acre was also estimated; a decrease of over 17% from 1995 levels. This resulted in Ohio oat production of just over 5 million bushels in 1996; continuing the decline in oat production that has been evident over the last 40 years (Fig 1).

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1996 Statewide Drilled Plot Yield Test:

The objective of this oat cultivar evaluation is to provide an unbiased evaluation of cultivar characteristics and performance expectations for the soils and climates of Ohio. In 1996, spring oat performance trials were sown at four locations in Ohio (Fig. 2); (1) Main Campus, OARDC, Wooster; (2) NW Branch, OARDC, Custar; (3) Western Branch, OARDC, South Charleston; and (4) Southern Branch, OARDC, Ripley. Fertilization at each site was uniform and conformed to fertilizer recommendations published in the Ohio Agronomy Guide. Nitrogen was applied at 40 to 60 lbs/acre at each location depending on soil organic matter content. All locations were drilled in 7-inch rows, 7 to 11 rows per plot and averaged 100 feet in length.

Figure 2. Location of Spring Oat Nurseries in Ohio: 1. OARDC; 2. NW Branch; 3. Western Br.; 4. Southern Br.

Test Results:

Table 1 presents yield data obtained from the four test locations in 1996. CV's (coefficients of variation) were generally good except at Southern branch, which indicates that three out of the four tests present important yield data. The two experimental lines OH1087 and OH1149 ranked first and second, respectively, when averaged across the four locations. They were followed closely in yield by Armor, Burton, and OH1128. The cultivar Noble ranked last in the test in 1996.

Table 2 is comprised of test weight data from the four locations. Experimental lines OH1149, OH1120, OH1128 and the newly released cultivar Burton all ranked at the top for test weight when averaged across the four locations. OH1149 had a test weight of over 40 pounds per bushel at Wooster. OH1086, Ogle, and Armor had the lowest average test weights in 1996.

Table 3 presents heading dates, plant height, and percent lodging scores averaged across the four test locations. Chairman and OH1120 had the earliest average heading dates at 176d while OH1128, Burton, and Hercules had the latest at 180d; four days later than Chairman.

The shortest variety tested was OH1128 with an average plant height of 84.4 cm. The tallest varieties were OH1086, OH1120, and Burton.

The entry with the lowest average lodging score was Armor with an average score of 1.9% and the entry with the highest was OH1120 at 20.1%.

Tables 4 through 7 summarize the data collected in 1996 as well as data collected over the past 5 to 7 seasons at each test location. Table 8 presents mean yields averaged from 1982 to 1996. Table 9 summarizes agronomic data for entries grown in the test from 1982 to 1996.

Brief descriptions of cultivars of interest to Ohio growers follow the data tables.

Table1. 1996 Yield of 12 Spring Oat Varieties at Four Locations in Ohio, 1996.

Variety		OARDC Wooster	NW Branch Custar	Western Br. S. Charleston	Southern Br. Ripley	Average 4-loc.
				----------bu/a---------		
OH1087		90.9	42.0	58.3	44.4	58.9
OH1149		89.8	38.0	56.9	51.1	58.9
ARMOR		94.1	42.0	55.7	42.2	58.5
BURTON		88.3	36.0	53.6	55.8	58.4
OH1128		87.5	35.5	56.3	53.9	58.3
OH1065		85.3	40.9	57.6	45.4	57.3
OH1086		82.5	39.2	54.6	52.5	57.2
OH1120		87.7	36.7	59.4	36.3	55.0
OGLE		80.9	36.8	53.1	43.1	53.5
CHAIRMAN		85.6	31.3	52.1	42.2	52.8
HERCULES		87.7	34.7	50.2	33.2	51.4
NOBLE		78.6	32.3	48.3	40.4	49.9
Test Mean:		84.7	36.5	54.7	45.1	55.9
LSD.05:		8.4	5.6	4.2	ns	5.5
CV(%):		7.0	10.7	5.3	29.6	14.0

Table 2. Test Weight of 12 Spring Oat Varieties at four Locations in Ohio in 1996.

Variety		OARDC Wooster	NW Branch Custar	Western Br. S. Charleston	Southern Br. Ripley	Average 4-loc.
				-----lb/bu-----		
OH1149		40.7	34.7	35.7	30.8	35.5
OH1120		38.7	34.3	32.9	31.5	34.3
OH1128		35.6	34.8	34.1	32.7	34.3
BURTON		38.3	30.2	32.6	35.0	34.0
OH1065		38.5	31.5	33.4	32.3	33.9
HERCULES		38.3	35.2	31.6	29.5	33.6
OH1087		37.3	32.4	33.1	31.5	33.6
NOBLE		37.5	33.6	31.1	29.7	33.0
CHAIRMAN		35.8	29.9	31.1	31.1	32.0
OH1086		35.1	30.6	32.3	29.1	31.8
OGLE		35.4	31.1	29.6	30.9	31.7
ARMOR		35.6	31.6	31.5	27.4	31.5
Test Mean:		37.7	32.6	32.4	30.9	33.3
LSD.05:		1.8				
CV(%):		3.2				

Table 3. Average Days to Heading, Plant Height, and Percent Lodging of 12 Spring Oat Varieties at 4 Locations in Ohio in 1996.

	Date Headed	Rank	Plant Height	Rank	Lodging	Rank
	(d*)		(cm.)		(%)	
OGLE	178	4	88.8	5	4.7	6
CHAIRMAN	176	1	85.3	2	5.1	8
ARMOR	179	9	87.3	4	1.9	1
NOBLE	178	5	89.5	6	10.8	11
HERCULES	180	11	89.6	7	4.6	5
OH1128	180	10	84.4	1	2.8	3
BURTON	180	12	92.0	10	6.8	10
OH1087	177	3	90.3	9	4.9	7
OH1120	176	2	92.1	11	20.1	12
OH1065	179	7	90.1	8	6.8	9
OH1149	178	6	85.5	3	2.4	2
OH1086	179	8	94.3	12	3.2	4
MEAN:	178.3		89.1		6.2	
LSD.05:	0.7		3.4		4.2	
CV(%):	0.6		5.5		96.8	

* Days after January 1.

Table 4. Summary of Agronomic Characteristics for Spring Oat Varieties at the Ohio Agricultural Research and Development Center/OSU, Wooster, Ohio, 1990-1996.

VARIETY	YIELD (bu/a)	rank	DAYS TO HEADING (d from Jan. 1)	PLANT HEIGHT (cm.)	LODGING (%)	TEST WT. (lb/bu)	rank
			5-yr. averages 1990-1996*				
ARMOR	101.5	1	169	100.8	3.8	34.9	3
HERCULES	**91.4**	**2**	**169**	**103.1**	**10.4**	**36.3**	**2**
NOBLE	89.3	4	167	98.3	5	36.5	1
OGLE	**90.3**	**3**	**167**	**99.3**	**4.9**	**33.9**	**4**
MEAN:	93.1		168.0	100.4	6.0	35.4	
			1996				
ARMOR	94.1	1	175	115.1	0.0	35.6	10
BURTON	88.3	4	175	119.9	2.0	38.3	4
CHAIRMAN	85.6	8	172	113.0	0.0	35.8	8
HERCULES	**87.7**	**6**	**176**	**120.9**	**0.0**	**38.3**	**5**
NOBLE	**78.6**	**12**	**174**	**115.1**	**0.0**	**37.5**	**6**
OGLE	**80.9**	**11**	**174**	**119.9**	**0.8**	**35.4**	**11**
OH1065	85.3	9	175	119.1	6.8	38.5	3
OH1086	82.5	10	176	126.0	0.0	35.1	12
OH1087	90.9	2	174	119.9	2.0	37.3	7
OH1120	**87.7**	**5**	**172**	**122.9**	**5.3**	**38.7**	**2**
OH1128	**87.5**	**7**	**176**	**114.0**	**1.3**	**35.6**	**9**
OH1149	**89.8**	**3**	**174**	**113.0**	**1.8**	**40.7**	**1**
MEAN:	84.7		174.3	117.7	1.2	37.7	
LSD.05:	8.4		0.9	12.2	3.5	1.8	
CV(%):	7.0					3.2	

*Yield and Test Weight Data unavailable in 1994 & 1995.

Table 5. Summary of Agronomic Characteristics for Spring Oat Varieties at the Northwestern Branch, Custar, Ohio, 1990-1996

VARIETY	YIELD (bu/a)	rank	DAYS TO HEADING (d from Jan. 1)	PLANT HEIGHT (cm.)	LODGING (%)	TEST WT. (lb/bu)	rank
			----------7-yr. averages 1990-1996----------				
NOBLE	71.9	4	170	98	21.5	33.6	2
OGLE	**77.0**	**2**	**171**	**99**	**13.9**	**32.5**	**4**
HERCULES	72.7	3	173	103	9.8	33.9	1
ARMOR	**88.1**	**1**	**172**	**101**	**19.0**	**33.0**	**3**
MEAN:	77.4		171.5	100.4	16.1	33.3	
			----------1996----------				
ARMOR	42.0	1	193	65.0	1.3	31.6	7
BURTON	36.0	8	198	68.1	7.8	30.2	11
CHAIRMAN	31.3	12	188	65.0	0.3	29.9	12
HERCULES	**34.7**	**10**	**193**	**63.0**	**0.8**	**35.2**	**1**
NOBLE	**32.3**	**11**	**190**	**65.0**	**3.0**	**33.6**	**5**
OGLE	**36.8**	**6**	**190**	**66.0**	**0.5**	**31.1**	**9**
OH1065	40.9	3	195	71.1	5.3	31.5	8
OH1086	39.2	4	193	65.0	1.5	30.6	10
OH1087	42.0	2	190	65.0	1.5	32.4	6
OH1120	**36.7**	**7**	**188**	**65.0**	**7.8**	**34.3**	**4**
OH1128	**35.5**	**9**	**194**	**57.9**	**2.5**	**34.8**	**2**
OH1149	**38.0**	**5**	**191**	**64.0**	**0.5**	**34.7**	**3**
MEAN:	36.5		192.2	64.9	2.8	32.6	
LSD.05:	5.6		1.5	12.7	ns	--	
CV(%):	10.7					--	

Table 6. Summary of Agronomic Characteristics for Spring Oat Varieties at Western Branch, South Charleston, Ohio, 1990-1996.

VARIETY	YIELD (bu/a)	rank	DAYS TO HEADING (d from Jan. 1)	PLANT HEIGHT (cm.)	LODGING (%)	TEST WT. (lb/bu)	rank
			----------7-yr. averages 1990-1996----------				
ARMOR	59.6	1	168	82.0	3.8	33.0	3
HERCULES	**53.3**	**3**	**168**	**81.8**	**10.4**	**33.4**	**2**
NOBLE	49.6	4	165	80.8	5.0	33.8	1
OGLE	**58.2**	**2**	**165**	**81.8**	**4.9**	**32.6**	**4**
MEAN:	55.2		166.5	81.6	6.0	33.2	
			----------1996----------				
ARMOR	55.7	6	178	89.7	0.0	31.5	9
BURTON	53.6	8	176	87.1	0.0	32.6	6
CHAIRMAN	52.1	10	174	85.9	0.0	31.1	11
HERCULES	**50.2**	**11**	**178**	**88.9**	**0.0**	**31.6**	**8**
NOBLE	**48.3**	**12**	**176**	**88.4**	**0.0**	**31.1**	**10**
OGLE	**53.1**	**9**	**175**	**87.1**	**0.0**	**29.6**	**12**
OH1065	57.6	3	176	90.9	0.0	33.4	3
OH1086	54.6	7	178	92.2	0.0	32.3	7
OH1087	58.3	2	175	90.9	0.0	33.1	4
OH1120	**59.4**	**1**	**174**	**90.9**	**0.0**	**32.9**	**5**
OH1128	**56.3**	**5**	**177**	**85.1**	**0.0**	**34.1**	**2**
OH1149	**56.9**	**4**	**176**	**86.4**	**0.0**	**35.7**	**1**
MEAN:	54.7		175.9	34.9	0.0	32.4	
LSD.05:	4.2		1.3	4.1	--	--	
CV(%):	5.3						

Table 7. Summary of Agronomic Characteristics for Spring Oat Varieties at the Southern Branch, Ripley, Ohio, 1990-1996.

VARIETY	YIELD (bu/a)	rank	DAYS* TO HEADING (d from Jan. 1)	PLANT HEIGHT (cm.)	LODGING (%)	TEST WT. (lb/bu)	rank
			----------7-yr. averages 1990-96*----------				
ARMOR	70.5	1	165	89.2	7.2	33.4	4
HERCULES	**55.5**	**4**	**167**	**91.7**	**13.3**	**34.7**	**1**
NOBLE	56.8	3	164	91.4	15.9	34.6	2
OGLE	**63.4**	**2**	**164**	**91.2**	**15.3**	**34.3**	**3**
MEAN:	61.6		165.0	90.9	12.9	34.3	
			----------1996----------				
ARMOR	42.2	8	172	80.0	6.3	27.4	12
BURTON	55.8	1	171	92.7	17.5	35.0	1
CHAIRMAN	42.2	9	170	77.0	20.0	31.1	6
HERCULES	**33.2**	**12**	**173**	**85.9**	**17.5**	**29.5**	**10**
NOBLE	**40.4**	**10**	**171**	**89.7**	**40.0**	**29.7**	**9**
OGLE	**43.1**	**7**	**171**	**82.6**	**17.5**	**30.9**	**7**
OH1065	45.4	5	171	80.8	15.0	32.3	3
OH1086	52.5	3	171	94.0	11.3	29.1	11
OH1087	44.4	6	171	85.1	16.3	31.5	4
OH1120	**36.3**	**11**	**171**	**89.7**	**67.5**	**31.5**	**5**
OH1128	**53.9**	**2**	**172**	**80.8**	**7.5**	**32.7**	**2**
OH1149	**51.1**	**4**	**171**	**79.5**	**7.5**	**30.8**	**8**
MEAN:	45.1		171	84.8	20.3	30.9	
LSD.05:	ns		ns	ns	15.4	--	
CV(%):	29.6					--	

* 5-year avg. Days to Heading not available in 1994 or 1995.

Table 8. Yield of Spring Oat Varieties in Ohio Trials, 1982-96.

Cultivar	1982 4 Trials	1983 5 Trials	1984 5 Trials	1985 5 Trials	1986 4 Trials	1987 5 Trials	1988 5 Trials	1989 4 Trials	1990 5 Trials	1991 6 Trials	1992 5 Trials	1993 6 Trials	1994 6 Trials	1995 4 Trials	1996 4 Trials	Rank 1996 only	Avg. 36 Trials (1990-96)	rank	Avg. 46 Trials (1987-96)	rank	Avg. 73 Trials (1982-96)	rank
	----------bu/a----------																(bu/a)		(bu/a)		(bu/a)	
NOBLE	79.8	76.8	77.0	98.3	99.2	77.7	59.2	77.5	80.8	72.3	81.8	50.8	54.2	85.7	49.9	12	67.2	4	62.4	3	73.8	2
OGLE	91.0	92.1	84.5	105.7	120.9	84.4	68.7	95.2	92.7	79.6	69.8	60.5	66.0	93.3	53.5	9	73.2	2	76.9	1	82.8	1
HERCULES						80.9	55.4	81.7	76.4	74.2	81.4	56.9	60.8	77.4	51.4	11	68.2	3	72.2	2		
ARMOR									**96.8**	**84.3**	**89.3**	**65.3**	**71.9**	**90.6**	**58.5**	**3**	**79.3**	**1**				
CHAIRMAN											**89.5**	**56.6**	**61.4**	**92.8**	**52.8**	**10**						
BURTON											**93.1**	**67.2**	**72.7**	**97.5**	**58.4**	**4**						
OH1065													76.3	92.0	57.3	6						
OH1087													72.2	94.6	58.9	1						
OH1086													74.0	94.0	57.2	7						
OH1120														**92.7**	**55.0**	**8**						
OH1128														**98.6**	**58.3**	**5**						
OH1149															**58.9**	**2**						
MEAN:	85.4	84.5	80.8	102.0	110.1	81.0	61.1	84.8	86.7	77.6	84.2	59.6	67.7	91.7	55.9		72.0		70.5		78.3	

Table 9. Summary of Agronomic Characteristics of Spring Oat Varieties in Ohio Trials, 1982-1996.

Cultivar	Days to Heading		Plant Ht.		Lodging		Test weight		Whole kernel protein	
	68 trials (1982-96)	34 trials (1990-96)	69 trials (1982-96)	35 trials (1990-96)	71 trials (1982-96)	36 trials (1990-96)	66 trials (1982-96)	32 trials (1990-96)	46 trials (1982-93)	17 trials (1991-93)
	(from Jan. 1)		----(cm.)----		-------(%)-------		(lb/bu.)		------(%)------	
NOBLE	165	167	84.7	84.9	13.3	10.8	33.9	34.0	14.2	13.8
OGLE	165	168	86.0	86.3	12.0	9.3	32.6	32.8	13.1	13.0
ARMOR		170		87.7		7.4		33.9		14.0
HERCULES		169		86.2		7.2		33.1		12.4
MEAN:	164.7	168.5	85.3	86.3	12.7	8.7	33.2	33.4	13.6	13.3

Brief Descriptions of Spring Oat Cultivars

Armor - Armor was released by the Ohio Agricultural Research and Development Center in 1991. It is stiff-strawed with excellent yield potential, exceeding Noble, Ogle, and Porter in yield in statewide Ohio tests. Armor is a midseason cultivar with medium height. It is resistant to BYDV but susceptible to crown rust.

Brawn - This cultivar was released by the University of Illinois Agricultural Experiment Station and the USDA in 1993. Brawn has large, "brawny", yellow kernels. It has been equal to, or slightly better than, Ogle for yield in Illinois trials and in Ohio. It has crown rust and smut resistance and is moderately tolerant to BYDV. Brawn is a day later in maturity than Armor and several days later than Ogle.

Burton - Burton was released in 1996. It is a productive oat cultivar bred for Ohio and surrounding states. Burton is a high-yielding line, similar to Armor, averaging over 16% higher in yield than Ogle in Ohio tests from 1992 through 1994. Burton is similar to Armor in appearance and in resistance to lodging but is somewhat taller. It is midseason in maturity being equal to Armor and a day later than Ogle. Burton has excellent test weight averaging over 35 lbs/ bu in Ohio tests. Burton is less tolerant to Barley Yellow Dwarf Virus (BYDV) than either Armor or Ogle but is similar to Noble. Burton does not possess resistance to prevalent races of crown rust and should not be grown in areas in which this disease is a problem.

Chairman - Chairman was officially released by the Ohio Agricultural Research and Development Center in September, 1995. It will be available to growers in the spring of 1997. Chairman was released because of its high yield potential and early maturity. It is comparable to 'Ogle' and 'Armor' in yield while being two and three days earlier, respectively, in maturity. Chairman is susceptible to current races of crown rust (*Puccinia coronata*) showing a reaction similar to Ogle to this disease.

Dal - Released by the Wisconsin Agricultural Experiment Station in 1972, it is moderately late in maturity and of medium to tall height. It has good lodging resistance, large, plump kernels, high test weight and high groat protein. Dal has excellent resistance to smut and leaf rust, but is susceptible to Septoria and barley yellow dwarf virus. A U.S. Protected Variety, seed of this variety can be sold only as a class of certified seed.

Dane - Released by The Wisconsin Agricultural Experiment Station in 1990, it is early in maturity, averaging 5 days earlier than Ogle in both Wisconsin and Ohio tests, and has excellent yield potential. Dane has yellow kernels with high groat percentage. Test weights are average and straw strength is excellent. Although susceptible to barley yellow dwarf virus in screening tests, Dane has demonstrated field tolerance under severe natural infection.

Don - A 1986 Illinois release, Don is a high yielding early maturing variety with excellent test weight. It has short straw, but is only moderately resistant to lodging. Don has excellent resistance to crown rust and smut, is moderately resistant to BYDV, but is susceptible to stem rust.

Hamilton -A 1989 release by the Iowa Agriculture and Home Economics Experiment Station, it is a high yielding variety with midseason maturity and excellent lodging resistance. Hamilton is unusual in having both cytoplasmic and nuclear genes from Avena sterilis. It is intermediate in test weight, height and BYDV resistance.

Hazel - A 1986 Illinois release, it is a high yielding variety with midseason maturity. Hazel has short stiff straw and excellent resistance to lodging. It has excellent resistance to prevalent races of crown rust and BYDV, but is susceptible to prevalent races of stem rust and smut.

Hercules - A 1986 release by the Pennsylvania Agricultural Experiment Station, Hercules is a high yielding variety with excellent lodging resistance and test weight. It is resistant to currently known races of loose smut, and moderately resistant to BYDV, but susceptible to prevalent races of crown rust and stem rust.

Horicon - A 1989 release by the Wisconsin Agricultural Experiment Station, Horicon combines high yield potential with unusually high groat percentage. It is midseason in heading and has resistance to prevalent races of crown rust. Horicon is intermediate in test weight, height and maturity.

Larry - A 1981 Illinois release, it is early maturing, short and lodging resistant. Larry has good to excellent yield potential with moderate resistance to rusts and excellent resistance to barley yellow dwarf virus.

Newdak -A 1990 cultivar released jointly by the Agricultural Experiment Station of North Dakota State University and Cornell. Newdak is about a day earlier than Ogle in Ohio tests. It has excellent resistance to crown rust and tolerance to BYDV. Newdak has white hulls under unweathered conditions.

Noble - A 1973 Indiana release, it has good yield, good test weight and stiff, medium-short straw. It is medium-early in maturity, with moderate resistance to barley yellow dwarf virus and some of the oat rusts. A U.S. Protected Variety, seed can be sold only as a class of certified seed.

Ogle - A 1981 Illinois release, it has excellent yield capabilities with good test weight and will yield well under a wide range of environments. Ogle is medium-early in maturity with medium-short, stiff straw and moderate resistance to oat rusts. It has excellent resistance to barley yellow dwarf virus.

Pennuda - A 1987 release by the Pennsylvania Agricultural Experiment Station, Pennuda is an early maturing, lodging resistant naked-seeded cultivar with a relatively high yield potential[1]. It is high in protein and digestible energy and is especially useful in rations for poultry, swine and young animals. Pennuda is moderately resistant to BYDV but is susceptible to crown rust and loose smut.

Porter - A 1982 Purdue University release, it is rather late in maturity, but has an excellent yield record. It is resistant to barley yellow dwarf virus and moderately resistant to crown rust. A U.S. Protected Variety, seed of this variety can be sold only as a class of certified seed.

Premier - A 1990 release by The Minnesota Agricultural Experiment Station, it is similar to Ogle in heading date, height and lodging resistance. It has excellent test weight and groat percentage. Premier is moderately resistant to crown rust and slightly tolerant to barley yellow dwarf virus.

The cultivars Armor, Burton, Chairman, Hercules, Noble,and Ogle were grown by Ohio Certified Seed Producers in 1996. All other cultivars may not be available from Ohio suppliers unless purchased or produced out-of-state.

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[1] When compared to other cultivars on a dehulled basis, Pennuda yields comparably to cultivars such as Noble, Hercules, and Hamilton.


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