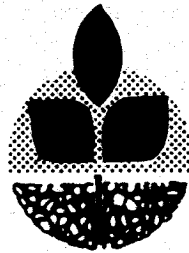


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# Harney County Spring Cereal Yield and Observation Trials



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## HARNEY COUNTY SPRING CEREAL YIELD AND OBSERVATION TRIALS

Mathias F. Kolding and Paul Friedrichsen

Harney County, Oregon, spring barley, wheat, and oat observation trials were conducted during 1977 on the Harlan Crawford farm near Burns and on the John Rankin farm near Crane. Only 26 of the 1,121 spring barley selections grown in the trials were kept for further evaluation. None of the 20 wheats were acceptable in 1977. The three spring oats were attractive, but did not ripen.

In 1978 three spring cereal grain and forage trials were planted. Two trials were on the same farms as in 1977 and one on the Trent Tiller farm near Burns. Only one selection, FB756454, had better grain yields than the check variety Steptoe. Spring wheat yields ranged from 21 bushels per acre (Anza at Rankin's) to 57.8 bushels per acre (Profit 75 at Tiller's). Forage and grain yields were determined for eight forage selections.

### 1977 SPRING BARLEY TRIALS

During 1977, two irrigated spring grain and forage observation trials were grown in Harney County. One trial was at the Harlan Crawford farm near Burns. The other trial was at the John Rankin farm near Crane. These two trials had a total of 1,100 (400 at Crawford's - 700 at Rankin's) spring barleys selected from the CYMMT breeding program at Obregon, Mexico, in 1976 plus 21 spring barleys and 4 spring oats (Table 1) from regional cereal breeding programs.

#### Field Operations

All field operations, except the seeding, were done by the growers. The plots were planted on May 16, 1977. Each plot had four 12-foot rows

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Table 1. Plot ratings of spring barley and oats from regional breeding programs when grown in Harney County

Grain & forage types	Adaptability Rating* (August 9, 1977)	
	John Rankin's farm	Harlan Crawford's farm
<u>Grain types</u>		
1. Trebi	2	1
2. Shabet	2	1
3. Vanguard	2	1
4. Klages	3	2
5. Zephyr	2	4
6. Unitan	3	4
7. Piroline	3	3
8. Vale	3	3
9. FB741209	2	5
10. FB73635-03	2	2
11. FB73782	3	1
12. FB73614-02	3	1
13. OSB71103-1E4	3	3
14. ID711767	3	4
15. ID704504	3	2
16. WA11304	4	2 Too late
17. WA6161	4	-
18. Park (Oats)	4	3
19. Random (Oats)	4	2
20. 71AB670 (Oats)	4	2 Too late
21. Steptoe in field around plots	4	4
<u>Forage types</u>		
1. Weal**	4	4
2. Horsford	2	2
3. Stepford	2	2
4. Awnless Ingrid	4	6
5. 72AB710 (Oats)	3	3

\*Adaptability Rating: 0-3 Not acceptable, often too late maturity or heads not extruded from sheath in these trials.  
 4-6 Normal plants, little disease, acceptable.  
 7-9 "Ideal" type - 7 rare, 8 very rare, 9 never observed

\*\*Weal also used as a border. At Rankin's, Weal in the border was the most attractive type.

spaced at 12 inches. Good stands were established, but later in the season the CYMMT material growing close to the field edge at both farms was severely stressed because of a shortage of irrigation water. A field of Steptoe spring barley surrounded the plot area at the Rankin farm. At the Crawford farm the plots were in a field of oats and peas for hay. Both farms were watered by wheel roll sprinklers.

### Selection of Promising Cultivars

Since the Harney Basin has a rather short growing season and the first damaging frosts may come during kernel filling, most attention was given to the earlier maturing barleys. Some barley selections which are normal at low elevations do not extrude their heads adequately at higher elevations, so a head extension of at least two inches from the leaf sheath was necessary before a selection was kept. In addition, selection was made for medium short, stiff strawed, shatter-resistant, types which tillered moderately, lacked major disease problems, and ripened uniformly. 1977 was a difficult year to discern relative plant height as several short strawed selections were mid-tall in 1978.

### 1978 SPRING BARLEY TRIALS

Three irrigated cereal forage and grain yield trials were grown in Harney County during 1978. Two plot sites, the Tiller and Crawford farms, were near Burns. These two plot sites were on a heavy clay loam soil with the surrounding fields planted to Steptoe barley. Both fields, including the plot area, were irrigated with a wheel roll irrigation system. The third site, at the Rankin farm near Crane some 30 miles southeast of Burns, has a sandy loam. The Rankin plot site was also in a Steptoe barley field watered by a wheel roll irrigation system.

Each of the three locations had a trial of 16 barley cultivars for grain yield and 8 forage-type cereals in a complete randomized block design with 4 replications. Plots were 4 rows wide and 15 feet long with a 12-inch row spacing. The plot sample area was 44 square feet for grain in the yield trials. In the forage trials the sample area was 8 square feet for forage and 36 square feet for grain. The wheats were single plots with a sample area of 132 square feet at Tiller's and Crawford's and 44 square feet at Rankin's.

### Barley grain yield trials

1978 was a good barley year in Harney County. Except for a brief, hot spell during kernel filling, the summer growing season was generally sunny, cool, and dry without damaging frosts during critical plant growth periods. Ripening, which was finished by mid-September, was followed by a favorable dry harvest season lasting to the last of October. Most barley fields observed had good clean even stands. Some fields of Steptoe (probably the most prevalent barley) were lodged as expected when this rather weak strawed variety is irrigated or grown in high fertility areas.

Steptoe barley is generally a good choice for producers since it has excellent yields over a wide geographic area. It appears to have an early flowering date and may gain much of its yield advantage from a long, grain-filling period. Where lodging is a problem, close attention to water applications is needed; otherwise, the plants fall over readily. There is some buyer-resistance to Steptoe for rolling since some claim its protein is too low, it is too flinty, and crumbles when rolled. Others find Steptoe acceptable for livestock feeding.

Gem, FB73782, FB741209, and Steptoe were used as the four check varieties in the grain trials. Gem was the most popular spring barley in Harney

County before the advent of Steptoe. Both FB73782 and FB741209 stand better and are shorter barley cultivars than Steptoe or Gem. They have yielded as well as Steptoe in feed grain trials at the Pendleton Station. The other twelve selections in the trials at Crawford's and Tiller's were selected from the 1977 Crawford trial just as the 12 in the Rankin trial were selected at Rankin's.

FB757545 gave the better grain yields (5,350 pounds per acre) at Harlan Crawford's (Table 4). Steptoe, however, was the higher yielder at Rankin's (Table 2) and Tiller's (Table 3) respectively at 4,443 pounds per acre and 4,981 pounds per acre.

Despite selection for short types in 1977, five selections at John Rankin's (Table 2) and seven at Harlan Crawford's (Table 4) were taller than Steptoe.

Low bushel weights at all locations probably reflect the hot period during kernel filling. Weights ranged from a low of 30.5 pounds for the hooded selection, FB757619, at Rankin's (Table 2) to 47.0 pounds per bushel for FB757589, a triple awned selection at Tiller's (Table 3).

All selections in the trials were six rowed and not normally as plump as the six-row Wocus barley types or two-row types, so kernel plumpness was determined by the percent of grain remaining on a 5-1/2/64 slotted screen (Tables 1, 2, and 3). The thin or pan percentage is expressed as the percent going through a 5/64 slotted screen. Most selections were rather uniform for seed size.

The first year of Feed Grain Project 096 and Extension Service spring barley trials in Harney County was in 1978. Future trials should give a broader base from which to make firmer decisions about desirable barley varieties for the Harney Basin. A one-year screening trial plus one year

Table 2. Yield, agronomic and quality data from the 1978 spring barley yield trial at the John Rankin farm, Crane, Oregon

Selection	Identity number	Grain yield			Plant height inches	Lodging percent	Plot* rating	Pounds per bushel	Kernel plumpness	
		Pounds per acre	Rank	Percent of Steptoe					Percent over 5-1/2/64	Pan through 5/64
1. Steptoe	C.I.15229	4,443	1	100	38	Trace	42.9	95.0	1.0	
2. MN66-102/WA6124-62	FB73782	2,813	12	63	35	0	41.6	81.0	4.5	
3. MN12-6, FB0B74-23	FB741209	3,087	9	69	33	0	43.8	88.0	3.0	
4. Gem	C.I.7243	3,179	7	72	39	Trace	43.3	94.5	1.0	
5. M69-69/HJA C4715/2/...	FB756318	3,091	8	70	34	0	44.6	95.0	1.5	
6. CH/DU/2/POR/U.S.1800...	FB756404	3,760	2	85	41	0	44.8	91.5	3.5	
7. API/CM67/2/WPG 708-21...	FB756454	1,869	16	42	42	0	39.7	87.0	3.0	
8. BOV/DM/2/CM67/GVR/3/...	FB756656	3,370	5	76	43	0	40.3	91.5	2.5	
9. H012-2/2/CO/CM/3/APAM...	FB756702	3,291	6	74	39	0	40.9	92.0	2.5	
10. APAM/RL/2/API/CM67	FB757023	3,005	10	68	44	0	41.0	82.5	5.5	
11. M66-85/ KD9	FB757117	2,978	11	67	33	0	42.2	90.0	2.5	
12. M69-82/Gateway 63/2/...	FB757212	3,390	4	76	29	0	41.0	88.5	3.0	
13. M69-82/Gateway 63/2/...	FB747213	3,455	3	78	29	0	43.5	92.0	2.0	
14. 10921, U.K.	FB757593	2,722	13	61	37	0	45.0	94.0	1.5	
15. OC640, Forage	FB757618	2,355	15	53	35	0	31.9	92.5	2.0	
16. OC640, Forage	FB757619	2,362	14	53	35	0	30.5	94.5	2.0	

CV = 17.0 LSD 5% = 616 pounds per acre F = 5.3\*\* Experiment average = 3,073 pounds per acre

\*Plot rating: 0-3 not acceptable, 4-6 normal plants, 7-9 "Ideal" type

\*\*Significant at the 99% level of probability

Planted May 12, 1978

Harvested September 15, 1978



Table 3. Yield, agronomic and quality data from the 1978 spring barley yield trial at the Trent Tiller farm, Burns, Oregon

Selection	Identity number	Grain yield			Plant height inches	Lodging percent	Plot* rating	Pounds per bushel	Kernel plumpness	
		Pounds per acre	Rank	Percent of Steptoe					Percent over 5-1/2/64	Pan through 5/64
1. Steptoe	C.I.15229	4,981	1	100	36	Trace	45.1	98.0	1.5	
2. MN66-102/WA6124-62	FB73782	3,606	8	72	35	0	44.4	92.5	3.0	
3. MN12-6, FB0B74-23	FB741209	2,989	15	60	30	0	45.1	95.5	2.0	
4. Gem	C.I.7243	3,869	5	78	36	Trace	44.7	97.0	1.5	
5. Apizago	FB757607	3,552	9	71	40	0	45.3	98.0	1.5	
6. Apizago/RM1508	FB757545	4,551	2	91	37	0	46.2	95.0	2.0	
7. RM1508/2/API/CM67/3/...	FB757012	4,043	3	81	36	0	44.9	89.5	4.0	
8. POR/U.S.1800/2/DC 640	FB757068	3,297	12	66	40	0	40.5	96.5	1.0	
9. U.S.1766/API/2/API/CM67	FB757069	3,654	7	73	35	0	46.7	99.0	1.0	
10. U.S.1766/API/2/API/CM67	FB757072	2,961	16	59	40	0	46.7	98.0	0.5	
11. M66-85/KD9	FB757113	3,335	11	67	43	0	47.2	98.0	1.5	
12. M66-85/KD9	FB757116	4,015	4	81	35	0	44.8	96.5	2.5	
13. M65-85/KD9	FB757119	3,848	6	77	46	0	45.8	96.5	1.5	
14. 10916, U.K.	FB757589	3,192	13	64	35	0	47.0	93.0	2.5	
15. 01918, U.K.	FB757587	3,444	10	69	35	0	46.0	95.5	1.5	
16. 10918, U.K.	FB757588	3,065	14	62	36	0	46.9	96.5	2.0	

CV = 18.4% LSD 5% = 795 pounds per acre F = 2.76\*\* Experiment average = 3,650 pounds per acre

\*Plot rating: 0-3 not acceptable, 4-6 normal plants, 7-9 "Ideal" type

\*\*Significant at the 99% level of probability

Planted May 12, 1978

Harvested September 15, 1978

Table 4. Yield, agronomic and quality data from the 1978 spring barley trial at the Harlan Crawford farm, Burns, Oregon

Selection	Identity number	Grain yield				Plant height inches	Lodging percent	Plot* rating	Pounds per bushel	Kernel plumpness	
		Pounds per acre	Rank	Percent of Steptoe	Percent over 5-1/2/64					Pan through 5/64	
1. Steptoe	C.I.15229	4,670	2	100	39	90	3	43.5	96.0	1.0	
2. MN66-102/WA6124-62	FB73782	4,291	7	92	37	05	4	42.3	95.5	1.5	
3. MN12-6, FB0B74-23	FB741209	3,222	16	69	34	Trace	6	44.0	96.5	0.5	
4. Gem	C.I.7243	3,724	12	80	44	90	2	42.8	96.0	1.5	
5. Apizago	FB757607	3,318	15	71	41	05	5	-----	-----	---	
6. Apizago/RM1508	FB757545	5,350	1	115	37	20	5	46.5	96.0	2.0	
7. RM1508/2/API/CM67/3/...	FB757012	3,832	11	82	39	20	4	45.4	88.0	4.0	
8. POR/U.S.1800/2/DC640	FB757068	4,002	10	86	43	50	4	-----	-----	---	
9. U.S.1766/API/2/API/CM67	FB757069	3,624	14	78	35	05	6	-----	-----	---	
10. U.S.1766/API/2/API/CM67	FB757072	4,034	9	86	43	60	4	44.8	99.0	0.5	
11. M66-85/KD9	FB757113	4,434	4	95	43	05	3	-----	-----	---	
12. M66-85/KD9	FB757116	4,458	3	95	35	05	5	42.9	96.0	1.0	
13. M66-85/KD9	FB757119	4,062	8	87	42	40	3	-----	-----	---	
14. 10916, U.K.	FB757586	3,627	13	78	37	90	4	-----	-----	---	
15. 10918, U.K.	FB757587	4,402	5	94	41	90	3	-----	-----	---	
16. 10918, U.K.	FB757588	4,334	6	93	40	40	5	-----	-----	---	

CV = 21.8% LSD 5% = 1,051 pounds per acre F = 1.4689\*\* Experiment average = 4,086 pounds per acre

\*Plot rating: 0-3 not acceptable, 4-6 normal plants, 7-9 "Ideal" type

\*\*Significant at the 99% level of probability

Planted May 12, 1978

Harvested September 15, 1978

of yield trial information (in an ideal year) can only give clues about which barley will have success in future years.

#### 1977-1978 SPRING BARLEY FORAGE TRIALS

Four spring barleys and one spring oat were grown at the Crawford farm in 1977. Visual plot evaluations are given in Table 5.

Table 5. Visual plot evaluations of the cereal forage varieties grown at the Harlan Crawford farm in 1977.

Variety	Adaptability Rating* (September 8, 1977)				Ave.
	I	II	III	IV	
Weal, Hooded type**	3	6	6	4	4.75
Awnless Ingrid	3	5	6	4	4.50
Stepford, Hooded type	3	2	2	3	2.50
Horsford, Hooded type	4	2	3	2	2.75
71AB710, Oats	1	4	3	3	2.75

\*Adaptability Rating 0-9: 0-3 unacceptable, 4-6 acceptable, 7-9 "Ideal".

\*\*Weal, used as border at Rankin's, was the most attractive type there in 1977.

In 1978, seven barleys and one oat were grown at each of the three locations in Harney County. Table 6 presents both forage and grain yields for the selections sampled.

Table 6. Grain, forage yield, and plant of cereal cultivars for the 1978 cereal grain and forage trials in Harney County, Oregon

Selection	Grain yield Pounds per acre		Forage yield, air dry Pounds per acre		Plot rating*				
	Tiller's Crawford's	Rankin's Ave.	Tiller's Crawford's	Rankin's Ave.					
Weal, Hooded	1,375	2,415	1,330	1,707	6,813	7,649	6,447	6,970	3.7
Awnless Ingrid	2,909	3,121	3,251	3,094	8,541	9,300	8,124	8,655	5.0
Stepford, Hooded	2,755	3,313	2,125	2,731	7,995	8,046	8,595	8,212	4.0
Horsford, Hooded	2,201	2,863	2,894	2,653	8,064	9,378	9,258	8,900	2.7
72AB710, Oats	1,620	3,303	2,044	2,322	8,883	9,930	9,234	9,349	5.0
FB757205, Hooded	2,258	3,654	2,691	2,868	-----	-----	-----	-----	4.0
FB757317, Hooded	3,116	3,144	3,020	3,093	-----	-----	-----	-----	3.0
FB757319, Hooded	3,060	3,014	1,937	2,670	-----	-----	-----	-----	3.3

\*Plot rating: 0-3 unacceptable, 4-6 normal plants, 7-9 "Ideal" type.

## 1977-1978 WHEAT TRIALS

The effort to find an acceptable spring wheat for the Harney Basin was not as vigorous as for finding a satisfactory barley. No success was noted in 1977. The twenty wheat cultivars planted did not mature or grow well in the plots (Table 7). A modest trial at the three 1978 trial locations is reported briefly in Table 8.

Table 7. Plot evaluations of 20 spring wheats at two locations in Harney County in 1977

	Adaptability Rating* (September 8, 1977)	
	John Rankin's farm	Harlan Crawford's farm
1. Anza	2	4
2. Borah	2	3
3. Profit 75	3	2
4. Fieldwin	2	1
5. Prospur	3	2
6. Twin	2	2
7. Springfield	2	1
8. Fielder	3	2
9. Sawtell	2	3 Ripening
10. Wared	3	2
11. Fortuna	3	2
12. Urquie	3	3
13. Federation	3	2 Too late
14. WS-1	2	3
15. WS-6	4	1
16. D7154	3	3
17. WA6101	4	2
18. OR743	2	2
19. ID0105	3	4
20. ID0106	2	2

\*Adaptability Rating: 0-3 Unacceptable, poor stands, and too late for 1977.  
 4-6 Acceptable in 1977.  
 7-9 "Ideal".

Table 8. Yield, bushel weight, and class of spring wheat grown in the 1978 spring wheat observation trial, Harney County, Oregon

	Bushels per acre			Bu.Wt.*	Class
	Site 1 Rankin's	Site 2 Tiller's	Site 3 Crawford's		
1. Anza	21.0	34.4	39.6	50.1	Red
2. Profit 75	29.6	57.8	53.1	51.3	Red
3. Fieldwin	----	48.9	43.8	52.8	White
4. Borah	33.6	54.3	51.0	56.1	Red
5. Cao-Gallo	36.5	----	----	----	Red
6. Prospur	32.8	----	----	----	Red
7. Shasta	38.8	----	----	----	Red

\*Bushel weights are low because the grain was not mature when harvested.

Planted May 12, 1978

Harvested September 15, 1978