

**PROJECT TITLE:** Statewide Durum Variety Performance - 2008

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**OBJECTIVE:** To evaluate new and existing varieties and experimental lines of durum under various growing conditions and environments in Montana.

**RESULTS:** The 2008 Statewide durum yield trial was grown at one irrigated and seven dryland sites. Irrigated site was at Sidney, and dryland sites were at Bozeman, Huntley, Havre, Moccasin, Conrad, Sidney, and Williston, ND. Replicated multiple-row plots were established at all locations using standard research techniques. Summaries of heading, height, test weight, protein content, seed weight, hard vitreous amber color (HVAC), sawfly damage, and yield are in Tables 1-8. A summary of all characters across sites is shown in Table 9.

The Bozeman site was hailed out, and not harvested. The Moccasin site suffered poor stands due to drought, which resulted in high variability. Highest yielding varieties at each site were MT1649 at **Havre**, MT01649 at **Moccasin**, Cimmyt #11 at **Conrad**, MT01649 at **Sidney dryland**, Mountrail and Alkabo at **Sidney irrigated**, MT01695 **Huntley**, and MT01695 at **Williston** (Table 8). Highest yielding variety across dryland sites was MT01695 (Table 9). Highest yielding variety across all sites was MT01695 (Table 9).

Earliest blooming line across sites was MT01649, latest blooming line was Divide (Table 1). Shortest line across sites was MT01649, tallest line was MT02DH82 (Table 2). MT01695 had the greatest test weight across sites (Table 3). Mountrail had the highest protein across sites (Table 4). MT02DH82 had the heaviest seed across sites (Table 5). MT04174 had the highest percent hard vitreous amber color across sites (Table 6). MT02DH82 had the most sawfly damage, while Cimmyt #5 had the least sawfly damage (Table 7).

**SUMMARY:** Highest yielding varieties at each site were MT1649 at **Havre**, MT01649 at **Moccasin**, Cimmyt #11 at **Conrad**, MT01649 at **Sidney dryland**, Mountrail at **Sidney irrigated**, MT01695 **Huntley**, and MT01695 at **Williston**. Highest yielding variety across dryland sites was MT01695 (Table 9). Highest yielding variety across all sites was MT01695.

**FUTURE PLANS:** New and existing varieties and experimental lines will continue to be evaluated at Bozeman and the Research Centers in Montana, so that breeders can release improved varieties and producers can have information on varieties best adapted to conditions in their areas.

Table 1. Heading (days from planting) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney Dry	Sidney Irr	Bozeman	Conrad	Moccasin	Havre	Huntley	Average
Mountrail	63.0	67.0	59.7	61	67	77.0	67.0	104.7	70.8
Divide	63.3	66.7	60.0	62	67	77.0	67.3	104.0	70.9
Pierce	61.7	67.0	59.0	61	66	77.0	66.0	102.7	70.1
Alkabo	61.3	67.0	58.0	61	65	76.3	67.3	102.7	69.8
Grenora	62.0	66.0	59.0	60	65	76.3	67.7	102.3	69.8
Alzada	57.3	64.0	56.0	59	62	74.0	65.7	99.7	67.2
Strongfield	61.7	67.3	58.7	61	65	76.7	67.7	104.0	70.3
Lebsock	62.0	65.7	59.7	60	64	77.0	67.3	102.0	69.7
Dilse	62.3	67.0	59.0	61	65	77.0	67.0	104.3	70.3
Svevo	58.0	64.3	56.7	57	61	75.7	66.3	100.3	67.4
Levante	58.3	64.0	57.0	58	62	74.0	66.3	101.3	67.6
Normanno	59.7	64.3	57.7	60	62	73.7	67.0	101.7	68.3
Saragolla	58.7	64.0	57.0	59	62	73.7	66.3	101.0	67.7
Cimmyt#5	60.3	65.0	58.7	61	64	77.0	66.7	102.7	69.4
Cimmyt#8	60.0	66.3	60.7	62	64	77.0	67.3	103.3	70.1
Cimmyt#11	58.7	64.7	58.7	59	62	75.7	65.7	101.7	68.3
MT02525	58.3	64.0	57.0	59	62	73.7	67.0	101.3	67.8
MT02DH55	61.3	66.3	59.7	60	64	77.0	67.0	103.3	69.8
MT03012	58.0	63.0	56.7	59	61	73.7	65.3	98.7	66.9
MT01649	56.0	62.7	55.7	56	61	74.7	65.7	101.0	66.6
MT02DH75	62.7	67.3	61.0	61	65	77.0	68.0	104.0	70.8
MT02DH82	61.0	64.7	59.7	60	64	76.3	65.3	102.3	69.2
MT04174	58.0	64.3	56.0	58	62	73.3	65.7	98.7	67.0
MT01695	59.0	65.3	58.3	59	63	75.3	67.0	101.7	68.6
Average	60.1	65.3	58.3	59.8	63.5	75.7	66.7	102.1	69.3
Probability		<0.001	<0.001			<0.001	4.13**		
CV (S/mean)	1.3	1.3	1.5			0.5	0.37	0.4	
CV (SE/mean)		0.8	0.8				0.21		
LSD 5%	1.3	1.4	1.4			1.4	1.11	1.2	

Table 2. Height (cm) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Average
		Dry	Irr					
Mountrail	67.3	62.3	92.3	76.2	57.3	83.8	103.9	77.6
Divide	69.3	67.3	88.7	83.8	61.7	80.1	98.8	78.5
Pierce	66.0	72.3	86.3	81.3	61.3	85.0	102.1	79.2
Alkabo	65.7	67.0	83.3	81.3	61.0	82.9	99.8	77.3
Grenora	60.0	64.3	69.7	76.2	54.7	77.4	94.7	71.0
Alzada	60.0	64.3	65.3	63.5	57.0	72.1	81.3	66.2
Strongfield	67.7	74.0	80.3	78.7	62.7	79.8	90.9	76.3
Lebsock	67.3	69.0	77.7	76.2	56.3	73.8	99.3	74.2
Dilse	63.0	73.0	86.3	73.7	64.0	79.6	99.3	77.0
Svevo	57.0	65.3	62.0	63.5	51.7	67.8	75.7	63.3
Levante	54.0	56.3	60.0	61.0	51.3	63.5	73.2	59.9
Normanno	56.3	58.0	66.7	61.0	53.3	65.1	70.9	61.6
Saragolla	53.7	57.0	61.3	61.0	53.0	67.8	73.4	61.0
Cimmyt#5	54.0	50.3	62.0	61.0	48.3	61.1	71.1	58.3
Cimmyt#8	58.3	64.0	63.3	68.6	56.0	70.1	85.3	66.5
Cimmyt#11	59.3	59.3	66.3	68.6	54.0	69.4	87.1	66.3
MT02525	59.0	62.3	59.3	66.0	58.0	70.4	75.4	64.4
MT02DH55	65.7	67.7	76.3	76.2	67.0	81.9	98.0	76.1
MT03012	59.7	58.0	64.0	68.6	56.3	72.6	75.4	64.9
MT01649	51.7	53.0	58.3	61.0	50.7	61.4	69.6	57.9
MT02DH75	65.7	67.0	71.7	78.7	63.0	80.6	90.7	73.9
MT02DH82	69.3	74.3	79.0	88.9	66.3	83.6	101.6	80.4
MT04174	60.7	59.0	63.0	71.1	55.7	69.3	77.2	65.1
MT01695	55.3	56.0	62.3	66.0	55.3	68.4	75.4	62.7
Average	61.1	63.4	71.1	71.3	57.3	73.7	86.3	71.1
Probability		<0.001	<0.001		<0.001	9.78**		
CV (S/mean)	6.7	4.9	7.7		8.5	5.67	5.5	
CV (SE/mean)		2.8	4.5			3.27		
LSD 5%	2.6	5.1	9.0		8.1	2.7	3.1	

Table 3. Test weight (lb/bu) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Average
		Dry	Irr					
Mountrail	56.5	57.3	62.8	59.6	56.8	55.7	60.7	58.5
Divide	57.9	59.0	63.5	60.7	58.7	57.8	62.3	60.0
Pierce	59.0	58.3	63.5	62.3	59.5	58.6	63.0	60.6
Alkabo	59.4	59.0	64.2	61.2	60.7	58.3	63.0	60.8
Grenora	57.8	58.3	62.8	60.7	59.9	57.4	62.9	60.0
Alzada	58.5	59.0	63.3	61.5	59.4	55.7	61.9	59.9
Strongfield	57.4	58.0	63.2	61.7	58.6	57.2	61.8	59.7
Lebsock	59.7	59.5	63.2	62.5	59.9	59.6	63.5	61.1
Dilse	58.8	58.7	63.0	62.2	59.1	58.2	62.7	60.4
Svevo	58.3	58.2	63.2	59.9	58.0	57.0	60.7	59.3
Levante	57.4	58.8	63.2	61.0	57.8	58.4	62.1	59.8
Normanno	56.9	57.5	62.7	59.4	58.1	55.7	61.4	58.8
Saragolla	56.4	57.8	62.7	60.1	58.7	55.3	61.6	58.9
Cimmyt#5	56.9	56.5	62.3	60.1	58.5	55.2	61.1	58.7
Cimmyt#8	57.2	57.8	64.2	62.1	58.9	56.8	62.1	59.9
Cimmyt#11	54.2	55.8	62.2	60.3	56.8	55.0	58.6	57.6
MT02525	59.0	59.3	63.3	62.4	58.9	58.0	62.2	60.5
MT02DH55	55.4	57.5	61.5	59.4	56.3	56.4	60.6	58.1
MT03012	57.0	58.0	62.7	59.7	57.5	55.6	61.9	58.9
MT01649	56.4	56.8	60.7	58.8	57.0	55.7	60.2	57.9
MT02DH75	56.9	57.3	61.7	58.2	58.4	57.7	61.2	58.8
MT02DH82	58.7	59.2	63.0	60.9	59.7	57.8	62.4	60.2
MT04174	57.7	57.8	63.2	61.6	59.0	57.0	61.8	59.7
MT01695	60.7	59.8	64.5	62.9	61.9	60.3	64.3	62.1
Average	57.7	58.1	62.9	60.8	58.64	57.1	61.8	59.7
Probability		<0.001	<0.001		<0.001	10.42**		
CV (S/mean)	0.5	1.0	1.0		1.5	1.4	0.9	
CV (SE/mean)		0.6	0.6			0.8		
LSD 5%	0.6	1.0	1.0		1.9	1.3	1.0	

Table 4. Grain protein (percent) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Havre	Moccasin	Average
		Dry	Irr				
Mountrail	15.33	14.75	11.17	12.57	17.23	14.51	14.26
Divide	14.76	14.16	11.28	12.39	16.10	14.20	13.82
Pierce	15.02	14.60	11.28	12.49	15.55	13.77	13.79
Alkabo	14.47	14.39	10.95	12.28	16.28	13.15	13.59
Grenora	15.17	14.65	11.57	12.73	15.83	12.97	13.82
Alzada	14.60	14.44	11.27	11.92	16.37	13.45	13.68
Strongfield	15.80	15.79	10.91	12.50	16.47	13.99	14.24
Lebsock	14.34	14.47	11.23	12.06	15.48	13.90	13.58
Dilse	15.07	14.79	11.24	12.35	15.98	14.54	13.99
Svevo	14.56	14.73	11.56	12.73	15.88	13.99	13.91
Levante	14.41	13.56	10.98	12.15	14.87	13.30	13.21
Normanno	14.82	13.97	11.05	11.78	15.26	12.97	13.31
Saragolla	14.82	14.27	10.99	12.02	15.99	12.75	13.47
Cimmyt#5	14.74	14.43	11.15	12.38	15.67	12.66	13.51
Cimmyt#8	14.92	14.61	10.10	11.42	15.64	12.32	13.17
Cimmyt#11	15.72	14.65	10.86	11.43	15.52	12.64	13.47
MT02525	14.28	13.94	10.83	12.07	15.14	12.47	13.12
MT02DH55	15.62	14.69	11.71	12.26	16.09	13.34	13.95
MT03012	15.30	14.24	11.77	12.82	16.01	13.53	13.95
MT01649	14.94	14.11	11.79	12.54	15.50	13.52	13.73
MT02DH75	14.72	13.65	11.23	12.43	14.65	12.80	13.25
MT02DH82	14.98	14.05	11.96	12.66	15.67	13.07	13.73
MT04174	14.85	14.40	11.17	12.54	15.28	13.02	13.54
MT01695	13.45	13.31	10.28	11.44	14.22	11.82	12.42
Average	14.86	14.36	11.18	12.25	15.70	13.28	13.60
Probability		<0.001	0.065				
CV (S/mean)		3.1	5.2				
CV (SE/mean)		1.8	3.0				
LSD 5%		0.73	0.96				

Table 5. Weight of 100 seed (gm) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Havre	Moccasin	Average
		Dry	Irr				
Mountrail	2.88	3.61	4.44	3.53	2.99	2.90	3.39
Divide	3.14	3.31	4.56	3.52	2.95	3.02	3.42
Pierce	2.93	2.88	4.79	3.43	2.90	2.91	3.31
Alkabo	3.06	3.16	5.12	3.81	2.90	3.11	3.53
Grenora	3.02	3.42	4.88	3.69	3.02	3.22	3.54
Alzada	3.29	3.30	5.20	3.89	2.90	3.33	3.65
Strongfield	3.00	3.42	4.82	3.70	2.91	3.02	3.48
Lebsock	2.84	3.35	5.01	3.43	2.99	2.87	3.42
Dilse	2.96	3.24	4.11	3.65	3.03	3.00	3.33
Svevo	2.91	3.57	4.22	3.67	3.20	3.07	3.44
Levante	3.09	3.29	4.53	3.38	3.09	3.02	3.40
Normanno	3.02	3.37	4.55	3.62	3.01	3.09	3.44
Saragolla	2.65	3.01	4.46	3.12	2.63	3.15	3.17
Cimmyt#5	2.58	2.85	4.60	3.02	2.31	2.85	3.04
Cimmyt#8	2.47	2.90	4.36	3.07	2.71	3.02	3.09
Cimmyt#11	2.79	3.32	5.23	3.17	2.50	3.00	3.34
MT02525	3.08	3.30	4.71	3.66	2.85	3.52	3.52
MT02DH55	2.72	3.10	5.31	2.90	2.80	2.94	3.30
MT03012	2.73	3.17	4.60	3.25	3.03	3.04	3.30
MT01649	2.98	3.47	4.83	3.40	3.23	3.07	3.50
MT02DH75	2.88	3.35	4.91	3.53	3.24	3.42	3.56
MT02DH82	3.10	3.91	5.47	3.64	3.62	3.74	3.91
MT04174	2.65	3.41	4.62	3.44	2.91	3.32	3.39
MT01695	3.20	3.68	4.54	3.64	3.32	3.54	3.65
Average	2.92	3.31	4.74	3.47	2.96	3.13	3.42

Table 6. Hard vitreous amber color (percent) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney Dry	Sidney Irr	Conrad	Havre	Moccasin	Average
Mountrail	80.3	79.3	81.3	75.9	81.8	73.5	78.7
Divide	82.8	77.2	84.0	76.8	77.4	83.3	80.2
Pierce	81.3	80.6	91.9	80.2	84.6	85.6	84.0
Alkabo	82.5	77.6	78.7	85.6	89.0	81.5	82.5
Grenora	82.1	80.6	82.3	81.0	83.2	81.4	81.8
Alzada	86.3	80.7	93.1	78.6	86.9	77.5	83.9
Strongfield	85.5	85.3	79.3	86.5	92.8	77.5	84.5
Lebsock	74.3	78.1	72.6	72.0	83.2	76.4	76.1
Dilse	81.2	79.9	78.5	79.8	82.6	81.3	80.5
Svevo	78.4	77.2	92.6	77.5	79.2	73.8	79.8
Levante	70.1	70.9	78.2	70.8	78.1	70.2	73.0
Normanno	72.1	78.3	91.1	74.1	76.1	68.6	76.7
Saragolla	66.6	69.4	63.0	70.9	68.1	69.3	67.9
Cimmyt#5	74.7	70.5	78.5	63.8	67.5	72.9	71.3
Cimmyt#8	69.4	67.9	73.7	74.2	69.7	76.2	71.8
Cimmyt#11	67.0	60.7	75.9	68.0	70.9	69.7	68.7
MT02525	76.3	78.7	74.5	79.5	84.3	73.6	77.8
MT02DH55	78.2	77.5	84.4	76.5	80.4	78.3	79.2
MT03012	85.7	77.3	86.0	81.6	86.6	77.3	82.4
MT01649	77.9	71.9	80.5	76.7	80.5	68.7	76.0
MT02DH75	75.6	72.9	70.3	70.1	78.7	78.3	74.3
MT02DH82	75.2	75.5	87.5	77.4	79.2	80.6	79.2
MT04174	82.5	81.0	86.7	82.7	90.4	85.0	84.7
MT01695	77.7	76.7	76.9	75.7	81.8	75.2	77.3
Average	77.7	76.1	80.9	76.5	80.5	76.5	78.0
Probability		<0.001	0.101				
CV (S/mean)		5.3	12.9				
CV (SE/mean)		3.1	7.5				
LSD 5%		6.7	17.2				

Table 7. Sawfly damage (percent cut) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Havre
Mountrail	30.0
Divide	21.7
Pierce	45.0
Alkabo	30.0
Grenora	38.3
Alzada	6.7
Strongfield	10.0
Lebsock	28.3
Dilse	40.0
Svevo	5.0
Levante	8.3
Normanno	2.3
Saragolla	5.0
Cimmyt#5	1.0
Cimmyt#8	2.3
Cimmyt#11	3.7
MT02525	2.3
MT02DH55	38.3
MT03012	6.7
MT01649	5.3
MT02DH75	40.0
MT02DH82	50.0
MT04174	21.7
MT01695	2.3
Average	18.5
Probability	6.78**
CV (S/mean)	59.7
CV (SE/mean)	34.47
LSD 5%	18.17

Table 8. Yield (bu/ac) of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Williston	Sidney Dry	Sidney Irr	Conrad	Moccasin	Havre	Huntley	average, all sites	average dryland
Mountrail	30.3	31.5	<b>109.1</b>	36.8	11.7	39.8	62.1	45.9	35.4
Divide	26.7	32.2	94.1	41.4	12.6	39.1	58.6	43.5	35.1
Pierce	26.3	29.7	82.2	40.6	14.7	38.8	56.3	41.2	34.4
Alkabo	30.9	32.1	<b>109.1</b>	40.3	19.0	40.5	63.3	47.9	37.7
Grenora	29.0	32.4	82.8	41.6	14.9	41.4	60.8	43.3	36.7
Alzada	29.5	34.9	86.5	46.3	17.6	45.2	62.0	46.0	39.2
Strongfield	29.8	35.0	89.1	50.7	20.9	46.6	61.2	47.6	40.7
Lebsock	31.0	30.8	77.7	38.8	12.1	40.9	63.5	42.1	36.2
Dilse	30.1	32.5	93.7	39.7	21.2	40.8	59.9	45.4	37.4
Svevo	32.3	35.7	93.5	44.1	13.9	48.2	62.8	47.2	39.5
Levante	30.2	35.3	89.4	45.0	16.6	49.2	63.1	47.0	39.9
Normanno	32.4	35.6	89.8	50.1	22.3	44.0	64.5	48.4	41.5
Saragolla	30.9	33.7	86.1	49.5	18.6	42.8	62.1	46.2	39.6
Cimmyt#5	31.3	31.5	84.1	49.4	17.6	43.7	61.6	45.6	39.2
Cimmyt#8	30.4	30.3	90.9	54.0	18.6	46.1	64.4	47.8	40.6
Cimmyt#11	28.5	30.8	100.3	<b>55.1</b>	19.4	50.9	63.5	49.8	41.4
MT02525	32.6	32.4	76.6	49.9	17.7	49.4	57.4	45.1	39.9
MT02DH55	29.9	31.5	90.2	40.9	20.0	43.1	60.6	45.2	37.7
MT03012	31.9	32.6	79.9	39.9	15.9	44.5	61.8	43.8	37.8
MT01649	31.3	<b>39.0</b>	87.2	49.3	<b>23.9</b>	<b>51.7</b>	67.1	49.9	43.7
MT02DH75	28.1	32.6	83.2	38.1	18.9	40.5	58.4	42.8	36.1
MT02DH82	31.0	34.5	83.7	42.8	15.2	44.4	66.2	45.4	39.0
MT04174	30.3	33.9	84.7	48.7	19.4	47.7	62.5	46.7	40.4
MT01695	<b>34.0</b>	37.4	89.7	54.9	21.1	50.2	<b>69.1</b>	<b>50.9</b>	<b>44.4</b>
Average	30.4	33.2	88.9	45.3	17.7	44.6	62.2	50.8	43.1
Probability		0.002	0.230	<0.001	0.419	5.00**			
CV (S/mean)	5.6	7.2	14.3	8.3	31.1	6.87	7.1		
CV (SE/mean)		4.2	7.2	4.8		3.97			
LSD 5%	2.8	4.0	8.2	6.2	ns	5.03	ns		

Table 9. Across sites summary of durum lines and varieties in the 2008 statewide durum yield trial.

entry	Heading*	Height, cm	Test wt, lb/bu	Grain protein, %	hvac	100-seed wt, gm	Yield, bu/ac, all sites	Yield, bu/ac, dryland sites	Yield, bu/ac, irrigated site
Mountrail	70.8	77.6	58.5	14.26	78.7	3.39	45.9	35.4	<b>109.1</b>
Divide	70.9	78.5	60.0	13.82	80.2	3.42	43.5	35.1	94.1
Pierce	70.1	79.2	60.6	13.79	84.0	3.31	41.2	34.4	82.2
Alkabo	69.8	77.3	60.8	13.59	82.5	3.53	47.9	37.7	<b>109.1</b>
Grenora	69.8	71.0	60.0	13.82	81.8	3.54	43.3	36.7	82.8
Alzada	67.2	66.2	59.9	13.68	83.9	3.65	46.0	39.2	86.5
Strongfield	70.3	76.3	59.7	14.24	84.5	3.48	47.6	40.7	89.1
Lebsock	69.7	74.2	61.1	13.58	76.1	3.42	42.1	36.2	77.7
Dilse	70.3	77.0	60.4	13.99	80.5	3.33	45.4	37.4	93.7
Svevo	67.4	63.3	59.3	13.91	79.8	3.44	47.2	39.5	93.5
Levante	67.6	59.9	59.8	13.21	73.0	3.40	47.0	39.9	89.4
Normanno	68.3	61.6	58.8	13.31	76.7	3.44	48.4	41.5	89.8
Saragolla	67.7	61.0	58.9	13.47	67.9	3.17	46.2	39.6	86.1
Cimmyt#5	69.4	58.3	58.7	13.51	71.3	3.04	45.6	39.2	84.1
Cimmyt#8	70.1	66.5	59.9	13.17	71.8	3.09	47.8	40.6	90.9
Cimmyt#11	68.3	66.3	57.6	13.47	68.7	3.34	49.8	41.4	100.3
MT02525	67.8	64.4	60.5	13.12	77.8	3.52	45.1	39.9	76.6
MT02DH55	69.8	76.1	58.1	13.95	79.2	3.30	45.2	37.7	90.2
MT03012	66.9	64.9	58.9	13.95	82.4	3.30	43.8	37.8	79.9
MT01649	66.6	57.9	57.9	13.73	76.0	3.50	49.9	43.7	87.2
MT02DH75	70.8	73.9	58.8	13.25	74.3	3.56	42.8	36.1	83.2
MT02DH82	69.2	80.4	60.2	13.73	79.2	3.91	45.4	39.0	83.7
MT04174	67.0	65.1	59.7	13.54	84.7	3.39	46.7	40.4	84.7
MT01695	68.6	62.7	62.1	12.42	77.3	3.65	<b>50.9</b>	<b>44.4</b>	89.7
average	69.3	71.1	59.7	13.6	78.0	3.4	50.8	43.1	88.9

\*days from planting