

PROJECT TITLE: Statewide durum yield trial - Evaluation of durum varieties and experimental lines in Montana – 2013 (4W4145)

PRINCIPAL INVESTIGATOR:

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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 2013 Statewide durum yield trial was grown at one irrigated and seven dryland sites. The irrigated site was at Sidney, and dryland sites were at Bozeman, Huntley, Havre, Moccasin, Conrad, Sidney, and Williston, ND. Both Sidney sites were severely damaged by hail on August 10, so yield data from these sites are not included in the summary. Replicated multiple-row plots were established at all locations using standard research techniques. Summaries of heading, height, test weight, protein content, seed weight, sawfly damage, and yield are in Tables 1-7. A summary of all characters across sites is shown in Table 8.

Earliest blooming line across sites was Kronos and latest blooming line was Carpio (Table 1). Shortest line across sites was Kronos, tallest line was Tioga (Table 2). MT05157 had the greatest test weight across sites (Table 3). Viterra Peak had the highest protein content across sites (Table 4). Tioga had the heaviest seed across sites (Table 5). Carpio sustained the most sawfly damage. (Table 6).

Highest yielding varieties at each site were Carpio at **Williston**, MT06578 at **Conrad**, DG Max at **Moccasin**, MT06584 at **Havre**, Tioga at **Huntley** and Kronos at **Bozeman** (Table 7). Alzada yielded most across sites (Table 7).

SUMMARY: The statewide durum trial is conducted under dryland and irrigated conditions each year. All experiments reported under this project are of the replicated small plot type. These trials provide important information about performance of experimental lines and varieties from Montana, other states, and private companies. Regional durum producers make decisions on what varieties to grow based on data from these trials.

FUNDING SUMMARY: Expenditure information to be provided by OSP. No other grants support this project.

MWBC FY2014 GRANT SUBMISSION PLANS: It is planned to submit this project for funding consideration in the next fiscal year.

Table 1. Heading (days from planting) of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Sidney	Sidney	Conrad	Moccasin	Havre	Huntley	Bozeman	average
		Dry	Irr						
Mountrail	58.0	58.7	54.0	63.7	65.3	68.0	97.3	62.7	66.0
Divide	60.0	58.7	53.3	64.0	66.0	67.7	97.3	63.7	66.3
Alkabo	58.0	59.0	54.0	63.7	65.3	66.3	96.3	62.0	65.6
Grenora	58.0	55.3	51.7	63.7	65.7	67.0	95.3	62.0	64.8
Tioga	59.0	59.0	54.0	64.3	65.3	67.0	94.7	62.0	65.7
Carpio	59.0	59.7	54.3	64.7	67.0	68.3	95.3	64.0	66.5
Silver	58.0	54.7	50.7	63.7	64.0	64.0	94.0	59.0	63.5
Alzada	58.0	54.0	50.7	63.0	64.0	65.0	96.0	59.3	63.8
DG Max	58.0	55.0	52.0	64.0	64.7	66.0	93.3	61.3	64.3
VT Peak	58.0	57.0	53.0	64.0	66.0	66.7	95.3	61.7	65.2
Normanno	59.0	58.3	53.7	63.3	65.0	65.7	95.7	59.3	65.0
Kronos	58.0	53.0	49.0	61.0	64.0	63.0	94.7	59.0	62.7
APB D7-12	59.0	58.0	53.7	63.0	66.0	69.7	95.3	62.7	65.9
APB D6-419	58.0	54.3	51.0	63.7	64.7	65.3	95.3	60.7	64.1
MT06584	58.0	54.7	52.0	64.0	65.0	66.7	95.3	61.0	64.6
MT05157	59.0	58.3	54.0	63.7	65.7	68.0	96.7	62.3	66.0
MT06578	59.0	56.0	53.0	64.0	65.3	67.7	96.3	62.7	65.5
MT07707	59.0	59.0	54.0	64.3	66.0	68.0	96.0	63.3	66.2
Average	58.5	56.81	52.7	63.7	65.3	66.7	95.6	61.6	65.1
Probability	0.383	<0.001	<0.001	0.088	<.0001	<.0001			
CV (S/mean)	1.4	1.172	1.2	1.6	1.1	0.4	0.9		
LSD 5%	1.7	1.105	1.0	1.7	1.3	1.2	2.6		

Table 2. Height in inches of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Bozeman	Average
		Dry	Irr						
Mountrail	26.5	23.2	33.1	34.7	29.5	29.5	34.5	36.8	31.0
Divide	27.0	22.0	33.5	37.3	27.8	33.2	37.6	38.6	32.1
Alkabo	27.0	22.7	31.2	36.3	26.5	30.8	34.9	36.2	30.7
Grenora	27.0	20.6	30.6	34.0	31.0	31.2	33.2	34.8	30.3
Tioga	28.5	27.0	34.8	38.3	31.9	33.7	38.6	38.6	33.9
Carpio	27.0	25.1	34.3	37.7	28.2	31.9	36.2	37.2	32.2
Silver	23.0	21.1	28.7	27.3	26.0	26.7	28.1	27.1	26.0
Alzada	23.5	24.3	27.8	28.0	27.0	27.2	30.5	29.6	27.2
DG Max	27.5	27.0	30.4	36.0	28.1	33.2	36.7	37.0	32.0
VT Peak	26.5	23.2	29.7	35.7	29.8	32.3	34.9	36.2	31.0
Normanno	21.0	19.7	25.6	24.0	26.8	24.7	26.4	26.1	24.3
Kronos	21.5	21.0	25.2	25.7	19.8	25.4	25.9	26.0	23.8
APB D7-12	22.0	23.6	28.2	28.0	28.5	26.3	29.7	28.0	26.8
APB D6-419	24.0	24.7	29.5	30.0	25.9	28.3	32.5	30.1	28.1
MT06584	21.0	20.3	25.6	24.7	23.6	25.2	28.9	26.4	24.5
MT05157	24.0	19.2	27.4	26.3	24.0	25.9	27.3	27.1	25.2
MT06578	24.0	20.6	26.0	26.3	28.7	23.3	27.3	25.8	25.3
MT07707	23.0	19.7	27.7	26.3	26.2	24.4	28.1	26.1	25.2
Average	24.7	22.5	29.4	30.9	27.2	28.5	31.7	31.6	28.3
Probability	<0.001	<0.001	<0.001			<.0001		<0.05	
CV (S/mean)	5.3	10.04	4.6			4.2	3.2	16.3	
LSD 5%	2.8	3.7	2.3	2.2	5.0	2.0	1.7	7.4	

Table 3. Test weight as lb/bu of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Bozeman	Average
		Dry	Irr						
Mountrail	60.6	55.5	58.0	57.2	59.1	63.4	59.7	59.5	59.1
Divide	61.2	56.5	58.0	61.1	60.4	63.6	61.1	58.6	60.0
Alkabo	61.2	57.3	58.5	61.2	61.0	63.6	60.6	60.4	60.5
Grenora	59.8	55.7	59.3	60.2	60.6	63.3	59.9	57.7	59.6
Tioga	61.2	58.6	58.8	60.7	60.1	64.0	60.9	58.0	60.3
Carpio	60.9	57.2	56.5	58.6	59.7	63.4	60.7	56.6	59.2
Silver	59.8	58.0	59.8	60.1	60.9	62.9	59.3	59.4	60.0
Alzada	59.3	56.3	59.5	59.8	60.3	62.8	60.1	58.5	59.6
DG Max	61.4	57.7	59.3	59.7	62.2	63.4	62.0	60.0	60.7
VT Peak	61.4	57.5	58.5	60.2	62.5	64.5	62.6	59.2	60.8
Normanno	60.3	57.7	58.8	57.8	58.9	62.9	59.9	54.9	58.9
Kronos	58.9	57.5	57.5	57.0	58.9	62.5	56.9	57.7	58.3
APB D7-12	60.0	56.7	55.5	57.0	58.3	61.9	58.8	55.8	58.0
APB D6-419	60.2	57.7	60.2	58.3	58.9	63.1	60.2	58.0	59.6
MT06584	60.7	57.5	60.2	58.0	58.7	64.2	60.0	55.8	59.4
MT05157	61.6	58.3	58.5	62.1	63.0	64.8	62.6	55.5	60.8
MT06578	60.3	57.7	58.8	60.9	57.3	63.8	59.3	56.0	59.3
MT07707	59.3	54.2	55.2	56.5	58.0	61.8	57.5	54.4	57.1
Average	60.5	57.1	58.4	59.3	59.9	63.3	60.1	57.6	59.5
Probability	0.007	<0.001	<0.001	<0.001	0.00	<.0001			
CV (S/mean)	1.4	1.4	1.5	2.2	1.1	0.8	1.9		
LSD 5%	1.5	1.3	1.5	2.2	1.3	0.8	1.9		

Table 4. Grain protein as percent of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Sidney Dry	Sidney Irr	Moccasin	Conrad	Havre	Huntley	Bozeman	Average
Mountrail	14.70	17.40	13.78	16.98	14.93	15.97	9.68	15.48	14.86
Divide	14.97	17.60	13.68	15.73	13.73	16.20	9.14	16.08	14.64
Alkabo	14.43	15.55	13.37	16.56	12.65	15.50	10.67	15.95	14.34
Grenora	14.50	18.16	13.42	16.07	13.99	15.33	9.72	16.33	14.69
Tioga	14.30	15.88	13.86	16.07	13.93	16.03	10.10	17.12	14.66
Carpio	14.90	15.19	14.18	15.60	14.83	15.53	10.38	17.60	14.78
Silver	15.20	17.86	14.43	15.38	13.61	16.30	10.87	15.58	14.90
Alzada	14.37	15.98	13.85	14.55	13.89	16.00	9.82	15.04	14.19
DG Max	15.03	18.05	14.33	15.59	13.32	16.50	9.31	16.45	14.82
VT Peak	14.60	17.86	14.38	16.19	14.31	16.33	9.98	16.64	15.04
Normanno	15.13	14.76	13.89	15.55	13.61	15.70	9.99	17.50	14.52
Kronos	14.30	16.43	14.33	15.55	13.31	15.77	10.59	15.39	14.46
APB D7-12	14.27	16.41	12.56	15.29	12.63	14.57	9.69	15.48	13.86
APB D6-419	14.40	16.97	14.48	15.90	13.89	16.47	10.58	16.14	14.85
MT06584	14.37	15.35	12.77	16.37	13.76	14.97	9.52	16.54	14.21
MT05157	14.47	16.93	13.31	14.96	13.39	15.27	9.80	16.54	14.33
MT06578	14.20	14.68	13.69	16.51	11.97	15.20	10.30	16.83	14.17
MT07707	14.30	17.50	13.00	17.11	13.02	15.80	10.58	17.91	14.90
Average	14.58	16.59	13.74	15.89	13.60	15.75	10.04	16.37	14.57
Probability		<0.001	<0.001			<.0001			
CV (S/mean)	2.9	4.176	3.4			2.0			
LSD 5%	0.6	1.1	0.77			0.5			

Table 5. Weight of 100 seed in gm of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Sidney		Moccasin	Conrad	Havre	Huntley	Bozeman	Average
		Dry	Irr						
Mountrail	3.73	3.32	4.40	2.88	3.46	4.26	3.23	3.63	3.61
Divide	3.85	3.75	4.16	3.13	3.69	4.23	3.75	3.37	3.74
Alkabo	3.72	3.67	4.31	3.02	4.11	4.19	3.40	3.52	3.74
Grenora	3.59	3.60	4.41	2.96	3.47	4.29	3.40	3.07	3.60
Tioga	3.80	5.05	4.43	3.03	3.93	4.66	3.77	3.24	3.99
Carpio	3.64	4.07	4.24	2.99	3.57	4.26	3.60	3.10	3.68
Silver	3.83	4.51	4.07	2.80	3.52	3.71	3.02	3.24	3.59
Alzada	3.63	3.63	4.12	3.17	3.53	4.48	3.69	3.45	3.71
DG Max	4.00	4.53	4.55	3.37	3.64	4.16	3.48	3.52	3.91
VT Peak	4.15	3.70	4.48	3.20	3.88	4.75	3.78	3.11	3.88
Normanno	3.72	3.64	4.53	3.14	3.46	4.24	3.57	3.03	3.67
Kronos	4.04	4.18	4.72	3.18	3.78	4.53	3.68	3.41	3.94
APB D7-12	3.69	4.54	3.85	2.86	3.14	3.94	3.16	2.94	3.52
APB D6-419	3.85	4.25	4.66	3.02	3.32	4.43	3.66	3.32	3.81
MT06584	4.07	4.05	4.31	2.84	3.18	4.30	3.22	3.06	3.63
MT05157	4.03	4.05	4.25	3.32	3.45	4.17	3.47	2.77	3.69
MT06578	4.92	3.97	4.38	2.70	3.65	4.17	3.19	2.97	3.74
MT07707	3.80	3.52	4.10	2.73	3.49	4.02	3.30	2.79	3.47
Average	3.89	4.00	4.33	3.02	3.57	4.27	3.47	3.20	3.72

Table 6. Sawfly damage (percent cut) of durum lines and varieties in the 2013 statewide durum yield trial, Havre site only.

entry	Percent cut stems
Mountrail	2.3
Divide	1.0
Alkabo	2.3
Grenora	2.3
Tioga	2.3
Carpio	3.7
Silver	2.3
Alzada	2.3
DG Max	2.3
VT Peak	1.0
Normanno	0.3
Kronos	1.0
APB D7-12	1.0
APB D6-419	0.7
MT06584	0.3
MT05157	0.3
MT06578	0.7
MT07707	0.3
Average	1.5
Probability	0.062
CV (S/mean)	86.9
LSD 5%	2.1

Table 7. Yield in bu/ac of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Williston	Conrad	Moccasin	Havre	Huntley	Bozeman	Average
Mountrail	44.7	56.3	29.6	57.0	46.0	51.0	47.4
Divide	43.9	60.4	26.9	55.7	48.7	46.7	47.0
Alkabo	44.1	79.7	26.4	61.3	47.5	46.4	50.9
Grenora	40.9	70.1	27.2	62.3	49.4	50.2	50.0
Tioga	42.4	68.5	29.9	54.1	51.0	45.8	48.6
Carpio	44.9	56.3	28.3	59.8	46.1	42.3	46.3
Silver	38.1	75.7	36.1	54.9	47.2	55.4	51.3
Alzada	38.6	78.5	32.5	58.7	50.1	52.9	51.9
DG Max	41.5	61.7	36.6	57.5	50.2	51.4	49.8
VT Peak	40.7	58.7	33.8	58.5	49.6	51.6	48.8
Normanno	38.3	63.1	32.0	55.0	47.6	47.8	47.3
Kronos	37.0	63.6	33.7	58.3	49.7	57.5	50.0
APB D7-12	35.9	64.7	26.0	51.3	41.7	46.9	44.4
APB D6-419	36.2	67.5	30.5	52.6	48.8	54.8	48.4
MT06584	38.6	60.2	33.3	64.8	45.8	55.1	49.6
MT05157	37.4	65.1	36.6	58.6	50.4	48.8	49.5
MT06578	37.3	80.1	26.8	55.0	44.6	47.5	48.5
MT07707	35.9	70.4	31.9	57.9	46.6	53.5	49.4
Average	39.8	66.7	31.0	57.4	47.8	50.3	48.8
Probability	0.054	0.117	0.02	0.002		<0.001	
CV (S/mean)	10.0	15.9	13.3	5.8	6.2	13.5	
LSD 5%	6.6	14.0	6.8	5.5	4.9	7.7	

Table 8. Across site summary of durum lines and varieties in the 2013 statewide durum yield trial.

entry	Source ¹	Heading*	Height, inches	Test wt, lb/bu	Grain protein, %	100-seed wt, gm	Yield, bu/ac ^{2/}
Mountrail	NDSU	66.0	31.0	31.0	14.86	3.61	47.4
Divide	NDSU	66.3	32.1	32.1	14.64	3.74	47.0
Alkabo	NDSU	65.6	30.7	30.7	14.34	3.74	50.9
Grenora	NDSU	64.8	30.3	30.3	14.69	3.60	50.0
Tioga	NDSU	65.7	33.9	33.9	14.66	3.99	48.6
Carpio	NDSU	66.5	32.2	32.2	14.78	3.68	46.3
Silver	MSU	63.5	26.0	26.0	14.90	3.59	51.3
Alzada	WB	63.8	27.2	27.2	14.19	3.71	51.9
DG Max	VT	64.3	32.0	32.0	14.82	3.91	49.8
VT Peak	VT	65.2	31.0	31.0	15.04	3.88	48.8
Normanno	BA	65.0	24.3	24.3	14.52	3.67	47.3
Kronos	APB	62.7	23.8	23.8	14.46	3.94	50.0
APB D7-12	APB	65.9	26.8	26.8	13.86	3.52	44.4
APB D6-419	APB	64.1	28.1	28.1	14.85	3.81	48.4
MT06584	MSU	64.6	24.5	24.5	14.21	3.63	49.6
MT05157	MSU	66.0	25.2	25.2	14.33	3.69	49.5
MT06578	MSU	65.5	25.3	25.3	14.17	3.74	48.5
MT07707	MSU	66.2	25.2	25.2	14.90	3.47	49.4
overall average		65.1	65.1	28.3	28.3	14.57	3.72

*days from planting

^{1/}WB – WestBred, APB – Arizona Plant Breeders, BA – Barilla, VT – Viterra

^{2/} Sidney dryland and irrigated sites badly damaged by hail, so yield data from those sites not included