

PROJECT TITLE: Statewide durum yield trial - Evaluation of durum varieties and experimental lines in Montana – 2014 (4W4640)

PRINCIPAL INVESTIGATOR:

Joyce Eckhoff, Agronomist, EARC, Sidney, MT

Personnel:

Hwa-Young Heo, Department of Plant Sciences, Bozeman

Dave Wichman, CARC, Moccasin, MT

Peggy Lamb, NARC, Havre, MT

Ken Kephart, SARC, Huntley, MT

John Miller, WTARC, Conrad, MT

Diana Amiot, WREC, Williston, ND

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

RESULTS: The 2014 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. 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 Silver and latest blooming line was MT101730 (Table 1). Shortest lines across sites were Silver and MT101427, tallest line was MT101730 (Table 2). Joppa had the greatest test weight across sites (Table 3). Strongfield had the highest protein content across sites (Table 4). Alzada had the heaviest seed across sites (Table 5). Joppa sustained the most sawfly damage and MT101730 had the most solid stems. (Table 6).

Highest yielding varieties at each site were Alkabo at **Williston, Sidney dryland, and Bozeman**, Mountrail at **Sidney irrigated**, Strongfield at **Conrad**, Silver at **Moccasin and Huntley**, and MT06584 at **Havre** (Table 7). Alkabo 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: The Statewide Durum Yield Trials are not a component of the Research Center's umbrella project. This information is presented here for the convenience of the MWBC and the growers who generate MWBC check-off dollars.

FUTURE PLANS: These trials will continue in 2014.

Table 1. Heading (days from planting) of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Bozeman	average
		Dry	Irr						
Mountrail	58.0	65.7	56.3	73.0	75	66.0	65.7	74.0	66.7
Divide	58.7	64.3	57.7	70.7	71	63.3	65.7	70.0	65.2
Alkabo	58.7	65.0	53.7	71.0	71	63.0	66.3	70.7	64.9
Grenora	59.3	64.7	53.0	71.3	73	63.0	67.0	70.3	65.2
Tioga	58.7	64.0	56.3	72.0	73	63.3	66.3	72.3	65.7
Carpio	58.0	64.0	56.3	73.7	75	65.7	67.0	73.7	66.7
Joppa	58.0	63.7	55.3	71.0	72	61.3	64.3	69.7	64.4
Silver	58.0	59.3	52.3	69.0	70	59.3	63.7	66.3	62.2
Alzada	58.7	61.0	52.0	70.0	70	60.0	65.7	67.3	63.1
Strongfield	60.0	64.0	56.0	73.3	74	63.0	64.0	72.0	65.8
MT06584	55.7	63.0	53.3	73.0	74	63.3	66.3	72.7	65.1
MT101395	59.3	65.3	56.7	74.0	76	67.3	65.3	75.3	67.4
MT101427	58.7	63.7	56.3	71.0	72	63.7	66.7	69.3	65.2
MT101730	59.3	67.7	57.0	73.3	75	69.0	65.3	76.0	67.8
Average	59	64.0	55.17	71.9	73	63.7	65.7	71.4	65.4
Probability		<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	
CV (S/mean)	2.4	1.3	1.784	1.1	0.8	0.7	1.2	0.4	
LSD 5%	2.4	1.3	1.652	1.3	2.5	2.2	ns	1.3	

Table 2. Height in inches of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Havre	Huntley	Bozeman	Average
		Dry	Irr					
Mountrail	27.3	30.8	40.9	39.3	26.0	39.1	37.3	34.4
Divide	28.3	32.7	41.9	37.3	31.9	38.7	40.7	35.9
Alkabo	29.0	31.6	38.6	36.0	29.7	38.9	39.5	34.8
Grenora	26.5	29.9	39.4	35.0	27.7	44.3	36.5	34.2
Tioga	29.7	32.7	43.8	40.0	32.5	36.3	41.1	36.6
Carpio	27.3	31.5	41.3	39.0	31.1	42.0	40.0	36.0
Joppa	29.3	34.4	43.3	37.7	31.3	38.5	40.1	36.4
Silver	25.0	24.5	35.0	26.3	24.6	39.4	28.9	29.1
Alzada	27.3	27.4	32.9	28.3	23.5	39.2	31.6	30.0
Strongfield	27.3	32.7	41.2	38.3	32.0	37.7	38.9	35.5
MT06584	25.0	26.0	30.3	26.3	24.7	42.3	27.1	28.8
MT101395	27.7	30.2	41.7	39.0	28.5	34.5	38.1	34.2
MT101427	26.3	24.0	31.8	26.7	24.8	39.1	28.8	28.8
MT101730	34.0	37.8	44.9	47.3	35.4	38.5	39.3	39.6
Average	27.9	30.4	39.1	35.5	28.8	39.2	36.3	33.9
Probability		<0.001	<0.001	<0.001	<0.001		<0.001	
CV (S/mean)	4.9	4.0	3.3	5.1	4.8	ns	8.6	
LSD 5%	2.1	2.1	2.2	3.0	2.3	14.3	5.2	

Table 3. Test weight as lb/bu of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Williston	Sidney		Conrad	Moccasin	Havre	Huntley	Bozeman	Average
		Dry	Irr						
Mountrail	59.5	61.2	60.0	59.7	60.1	56.3	53.4	59.5	58.7
Divide	60.2	61.3	60.8	59.8	62.0	57.6	55.9	59.7	59.7
Alkabo	61.1	61.8	59.7	60.0	61.9	57.8	54.5	61.0	59.7
Grenora	60.0	61.2	58.8	60.1	60.9	56.9	53.2	60.5	58.9
Tioga	60.9	61.3	59.2	60.8	62.2	56.9	52.5	60.0	59.2
Carpio	59.7	60.8	60.5	60.8	60.3	56.7	53.1	59.1	58.9
Joppa	60.6	61.2	60.2	61.4	61.7	58.1	53.6	61.5	59.8
Silver	59.7	60.8	58.7	60.2	61.2	58.8	53.7	62.0	59.4
Alzada	59.8	61.5	57.7	60.2	60.3	58.1	50.1	60.8	58.6
Strongfield	59.6	61.5	59.0	60.9	60.8	56.6	51.0	59.5	58.6
MT06584	59.5	60.2	58.0	60.0	59.1	56.1	48.2	58.2	57.4
MT101395	58.2	58.0	58.2	57.4	58.9	52.4	47.9	58.8	56.2
MT101427	59.2	58.5	58.7	59.0	60.1	54.9	48.8	59.2	57.3
MT101730	58.5	61.2	56.3	60.5	59.5	56.8	53.3	56.8	57.8
Average	59.8	60.8	58.98	60.1	60.6	56.7	52.1	60.1	58.6
Probability		<0.001	<0.001	0.002	<0.001	<0.001			
CV (S/mean)	0.5	1.1	0.672	1.4	0.5	1.0	2.0		
LSD 5%	0.5	1.1	0.7	1.4	0.7	1.0	2.3		

Table 4. Grain protein as percent of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Williston	Sidney		Moccasin	Conrad	Havre	Huntley	Bozeman	Average
		Dry	Irr						
Mountrail	16.4	10.80	13.61	18.49	11.14	16.50	19.1	14.22	15.04
Divide	16.7	10.16	13.98	17.29	10.48	17.03	19.3	13.77	14.83
Alkabo	15.8	10.36	12.49	17.42	10.37	16.40	19.8	13.77	14.56
Grenora	16.1	10.99	12.73	17.52	9.98	16.47	19.1	13.94	14.61
Tioga	16.3	10.35	11.91	18.10	11.15	17.57	21.9	13.91	15.15
Carpio	16.0	10.44	12.60	18.16	10.07	16.70	20.7	14.07	14.84
Joppa	16.2	10.77	12.14	17.21	10.20	16.73	19.5	13.71	14.56
Silver	17.0	11.06	14.03	16.16	10.77	16.53	18.9	13.77	14.77
Alzada	16.4	10.02	13.93	15.72	10.88	15.87	19.0	13.44	14.41
Strongfield	17.0	10.72	14.40	17.21	10.99	17.47	21.3	14.24	15.42
MT06584	15.8	10.01	12.13	16.24	10.03	17.00	20.8	13.98	14.50
MT101395	16.2	10.58	12.67	17.54	10.68	17.30	20.9	13.89	14.97
MT101427	15.7	10.88	12.40	16.47	10.18	16.97	21.1	13.26	14.62
MT101730	16.6	11.72	13.99	16.08	10.19	16.43	19.7	14.33	14.88
Average	16.3	10.63	13.07	17.11	10.51	16.78	20.1	13.88	14.80
Probability		0.265	0.004			<0.001			
CV (S/mean)	0.7	6.6	6.27			1.6	1.8		
LSD 5%	2.6	1.17	1.376			0.4375	5.4		

Table 5. Weight of 100 seed in gm of durum lines and varieties in the 20134 statewide durum yield trial.

entry	Williston	Sidney		Moccasin	Conrad	Havre	Bozeman	Average
		Dry	Irr					
Mountrail	3.5	3.5	4.4	3.3	3.6	3.4	3.7	3.63
Divide	3.6	3.6	4.7	3.4	3.6	3.6	3.8	3.76
Alkabo	3.8	3.8	4.7	3.6	4.1	3.7	3.8	3.93
Grenora	3.9	3.8	4.7	3.3	4.1	3.5	3.9	3.89
Tioga	3.7	3.8	4.7	3.4	4.0	3.6	4.1	3.90
Carpio	3.6	3.8	4.7	3.2	3.8	3.2	3.6	3.70
Joppa	3.6	3.4	4.3	3.4	4.0	3.5	3.9	3.73
Silver	3.2	3.1	4.2	3.1	3.5	3.3	3.7	3.44
Alzada	3.8	3.8	4.5	3.5	4.4	3.7	4.4	4.01
Strongfield	3.5	3.5	4.1	3.2	3.7	3.3	3.8	3.59
MT06584	3.5	3.5	3.7	3.0	3.7	3.3	3.3	3.43
MT101395	3.4	3.1	4.0	2.7	3.3	2.8	3.6	3.27
MT101427	3.4	3.0	3.9	3.0	3.5	3.1	3.5	3.34
MT101730	3.9	3.7	4.4	3.7	4.2	3.5	4.0	3.91
Average	3.6	3.5	4.4	3.3	3.8	3.4	3.8	3.68

Table 6. Sawfly damage (percent cut) of durum lines and varieties in the 2014 statewide durum yield trial, Havre site only, and stem solidness rating at Sidney sites.

entry	sawfly cutting Havre	Stem solidness	
		Sidney dry	Sidney irr
Mountrail	0.33	7.4	5.8
Divide	1.00	7.4	5.6
Alkabo	1.00	7.7	5.4
Grenora	0.67	8.4	6.5
Tioga	1.00	6.2	
Carpio	1.00	7.8	
Joppa	2.33	9.6	
Silver	1.00	10.0	
Alzada	0.33	9.0	
Strongfield	1.00	10.6	
MT06584	0.67	8.2	
MT101395	1.00	6.8	
MT101427	0.67	13.4	
MT101730	0.67	20.1	17.3
Average	0.90	9.5	8.1
Probability	0.165	<0.001	
CV (S/mean)	73.9	10.3	
LSD 5%	1.12	1.8	

Table 7. Yield in bu/ac of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Williston	Sidney dry	Sidney irr	Conrad	Moccasin	Havre	Huntley	Bozeman	Average
Mountrail	42.3	33.2	118.0	74.0	34.8	42.3	50.5	67.8	57.9
Divide	42.7	36.9	114.8	81.3	37.7	42.2	54.5	74.2	60.5
Alkabo	45.4	39.5	112.6	78.3	39.1	44.0	50.4	77.3	60.8
Grenora	42.6	33.1	112.2	84.2	34.5	41.0	51.3	65.8	58.1
Tioga	44.7	36.5	100.4	79.8	33.7	39.5	52.5	71.8	57.4
Carpio	37.9	30.7	103.7	82.2	37.8	43.2	49.9	70.8	57.0
Joppa	43.4	36.0	112.4	83.3	34.1	43.8	51.5	66.7	58.9
Silver	36.5	32.2	106.4	80.5	41.7	44.1	61.2	65.9	58.6
Alzada	39.4	35.4	91.8	85.0	41.6	43.7	51.8	64.6	56.6
Strongfield	41.2	34.3	110.5	87.9	37.6	41.4	51.2	57.4	57.7
MT06584	41.0	38.3	100.3	85.6	39.6	47.3	44.9	70.5	58.4
MT101395	39.8	31.6	112.3	79.9	33.0	37.7	46.6	66.4	55.9
MT101427	33.3	28.4	107.8	76.9	35.5	40.1	48.5	70.5	55.1
MT101730	34.0	31.5	67.1	77.2	28.2	37.3	38.5	71.2	48.1
Average	40.3	34.1	105.0	81.2	36.4	42.0	50.2	68.6	57.2
Probability		<0.001	<0.001	0.831	<0.001	0.002		<0.001	
CV (S/mean)	6.8	6.8	7.0	10.5	7.23	5.7	8.7	4.8	
LSD 5%	4.6	3.9	12.3	14.2	4.41	4.0	10.3	5.5	

Table 8. Across site summary of durum lines and varieties in the 2014 statewide durum yield trial.

entry	Heading*	Height, inches	Test wt, lb/bu	Grain protein, %	100-seed wt, gm	Yield, bu/ac ^{2/}
Mountrail	66.7	34.4	58.7	15.04	3.67	57.9
Divide	65.2	35.9	59.7	14.83	3.78	60.5
Alkabo	64.9	34.8	59.7	14.56	3.97	60.8
Grenora	65.2	34.2	58.9	14.61	3.95	58.1
Tioga	65.7	36.6	59.2	15.15	3.95	57.4
Carpio	66.7	36.0	58.9	14.84	3.78	57.0
Joppa	64.4	36.4	59.8	14.56	3.77	58.9
Silver	62.2	29.1	59.4	14.77	3.47	58.6
Alzada	63.1	30.0	58.6	14.41	4.07	56.6
Strongfield	65.8	35.5	58.6	15.42	3.63	57.7
MT06584	65.1	28.8	57.4	14.50	3.45	58.4
MT101395	67.4	34.2	56.2	14.97	3.35	55.9
MT101427	65.2	28.8	57.3	14.62	3.38	55.1
MT101730	67.8	39.6	57.8	14.88	3.98	48.1
overall average	65.4	33.9	58.6	14.80	3.73	57.2

*days from planting