

PROJECT TITLE: Evaluation of durum variety performance in irrigated and dryland off-station trials in three counties in eastern Montana.

PROJECT LEADER:

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OBJECTIVE: To evaluate new varieties of durum in different environments in eastern Montana, and to compare experimental lines and new varieties with current varieties.

MATERIALS AND METHODS:

Fourteen durum varieties were planted at two dryland and two irrigated sites. Plots were 20 feet long and three feet wide, with one foot between rows. Entire plots were harvested using a plot combine. The irrigated site in Sheridan County was not harvested because the cooperater mistakenly harvested the plots. Planting and harvest dates were

Location	Planted	Harvested
Poplar, Roosevelt County – dryland	8 May	27 August
Reserve, Sheridan County – dryland	8 May	2 September
Scobey, Daniels County – irrigated	7 May	5 September
Dagmar, Sheridan County – irrigated	9 May	not harvested

RESULTS: Summaries of yields, test weights, heights and protein contents across off-station trials are shown in Tables 1-4. The highest yielding variety across all sites was Kyle.

Roosevelt County, Poplar, dryland, cooperater: Mark Swank Table 5. The experimental site was fallow in 1996. Plots were planted on 8 May and harvested on 27 August. Plenty and Dressler yielded most at this site. The average yield was 21.9 bu/acre. Five year summaries for yield, test weight, and protein are shown in Tables 6-8.

Sheridan County, Reserve, dryland, cooperater: Max Aasheim Table 9. The experimental site was fallow in 1996. Plots were planted on 8 May and harvested on 2 Sep. Kyle and Renville yielded most at this site. The average yield was 27.2 bu/acre. Five year summaries for yield, test weight, and protein are shown in Tables 10-12.

Daniels County, Scobey, irrigated, cooperators: Kenny Benson Table 13. The experimental site is under pivot irrigation. Plots were planted on 7 May and harvested on 5 Sep. Kyle and Dressler yielded most. Average yield was 39.5 bu/acre. Two year summaries for yield, test weight, and protein are shown in Tables 14-16.

SUMMARY: The highest yielding variety across all sites was Kyle. Kyle was the highest yielding variety at Reserve (dryland) and Scobey (irrigated), and Plenty was the highest yielding variety at Poplar (dryland).

FUTURE PLANS:

New varieties will continue to be evaluated and compared with existing varieties at these off-station sites. A fourth irrigated site in Dawson or Prairie County may be included in 1997. Closer cooperation with the Williston Research Center will result in the inclusion of experimental lines from North Dakota as well as Montana in these tests, so that information about their performance will be available when the lines are released as varieties.

Table 1. Summary of durum yields in bu/acre at two dryland and one irrigated off-station sites in eastern Montana.

Variety	dryland			irrigated
	Reserve	Poplar	average	Scobey
AC Melita	28.8	21.9	25.4	46.2
Belzer	23.8	23.3	23.6	42.4
Ben	28.4	18.8	23.6	41.3
Cortez	12.6	17.3	15.0	31.2
D87450	22.8	17.8	20.3	34.9
Dressler	27.2	26.2	26.7	47.5
Kyle	36.1	26.0	31.0	50.7
Medora	27.5	21.1	24.3	34.7
Monroe	24.0	18.4	21.2	36.1
Munich	30.8	20.9	25.8	42.0
Plenty	30.0	27.1	28.6	37.5
Renville	31.0	21.0	26.0	40.6
Vic	29.8	21.7	25.8	36.6
Voss	28.1	24.7	26.4	33.6
Sceptre				36.7
site average	27.2	21.9		39.5
p value	0.000	0.00		0.000
CV (S/Mean)	7.6	11.5		9.6
CV(SE/Mean)	4.4	6.6		5.6
LSD 0.05	3.4	4.2		6.4
Planting date	8 May	8 May		7 May
Harvest date	2 Sep	27 Aug		5 Sep

Cooperators:

Reserve, MT, Sheridan Co. - Max Aasheim

Poplar, MT, Roosevelt Co. - Mark Swank

Scobey, MT, Daniels Co. - Kenny Bensen

Table 2. Summary of durum test weights in lb/bu at two dryland and one irrigated off-station sites in eastern Montana.

Variety	dryland			irrigated
	Reserve	Poplar	average	Scobey
Ben	60.7	65.0	62.8	61.0
Renville	60.8	64.5	62.6	59.8
Vic	60.5	64.7	62.6	60.7
AC Melita	60.3	64.8	62.6	60.0
Medora	60.5	64.4	62.4	60.3
Monroe	60.2	64.1	62.2	59.7
Kyle	61.2	62.6	61.9	60.2
Voss	60.3	63.3	61.8	58.7
Dressler	60.5	63.1	61.8	58.8
Munich	59.2	64.1	61.6	58.5
Belzer	59.7	63.1	61.4	57.7
D87450	59.2	63.6	61.4	56.5
Plenty	59.2	62.4	60.8	58.2
Cortez	58.1	63.2	60.6	58.8
Sceptre				59.8
site average	60.0	63.8		59.2
p value	0.000	0.000		0.000
CV (S/Mean)	1.1	0.8		1.3
CV(SE/Mean)	0.6	0.5		0.8
LSD 0.05	1.1	0.9		1.3
Planting date	8 May	8 May		7 May
Harvest date	2 Sep	27 Aug		5 Sep

Cooperators:

Reserve, MT, Sheridan Co. - Max Aasheim

Poplar, MT, Roosevelt Co. - Mark Swank

Scobey, MT, Daniels Co. - Kenny Bensen

Table 3. Summary of durum heights in inches at two dryland and one irrigated off-station sites in eastern Montana.

Variety	dryland			irrigated
	Reserve	Poplar	average	Scobey
Kyle	28	27	27.5	40
Renville	24	21	22.5	36
Munich	20	19	19.5	32
Plenty	26	25	25.5	40
Vic	25	25	25.0	40
AC Melita	25	22	23.5	40
Ben	25	23	24.0	37
Voss	21	20	20.5	26
Medora	25	23	24.0	35
Dressler	23	23	23.0	39
Monroe	22	20	21.0	38
Belzer	24	23	23.5	35
D87450	22	19	20.5	27
Cortez	18	18	18.0	28
Sceptre				33
site average	23.4	22.1		35.1
p value	0.000	0.000		0.000
CV (S/Mean)	5.5	6.4		8.5
CV(SE/Mean)	3.2	3.7		4.9
LSD 0.05	2.1	2.4		5.0
Planting date	8 May	8 May		7 May
Harvest date	2 Sep	27 Aug		5 Sep

Cooperators:

Reserve, MT, Sheridan Co. - Max Aasheim

Poplar, MT, Roosevelt Co. - Mark Swank

Scobey, MT, Daniels Co. - Kenny Bensen

Table 4. Summary of durum grain protein contents at two dryland and one irrigated off-station sites in eastern Montana.

Variety	dryland			irrigated
	Reserve	Poplar	average	Scobey
Kyle	13.5	15.8	14.65	12.4
Renville	12.7	15.8	14.25	12.1
Munich	12.8	15.2	14.00	12.5
Plenty	13.3	15.6	14.45	12.6
Vic	12.4	15.3	13.85	12.0
AC Melita	12.8	15.8	14.30	12.7
Ben	13.0	16.3	14.65	12.2
Voss	12.2	14.5	13.35	12.3
Medora	12.9	15.7	14.30	12.5
Dressler	13.4	15.8	14.60	12.6
Monroe	13.3	15.6	14.45	12.3
Belzer	12.5	14.3	13.40	12.1
D87450	11.9	13.6	12.75	11.8
Cortez	13.7	15.5	14.60	12.4
Sceptre				12.2
site average	12.9	15.3		12.3
p value	0.000	0.000		0.015
CV (S/Mean)	1.6	3.6		2.2
CV(SE/Mean)	0.9	2.1		1.3
LSD 0.05	0.3	0.9		0.4
Planting date	8 May	8 May		7 May
Harvest date	2 Sep	27 Aug		5 Sep

Cooperators:

Reserve, MT, Sheridan Co. - Max Aasheim

Poplar, MT, Roosevelt Co. - Mark Swank

Scobey, MT, Daniels Co. - Kenny Bensen

Table 5. Performance of durum grown under dryland conditions at Poplar, MT.
Planted: 8 May 1997 Harvested: 27 August 1997 Cooperator: Mark Swank

Variety	height, inches	grain protein	test weight	yield, bu/acre
Plenty	25	62.4	15.6	27.1
Dressler	23	63.1	15.8	26.2
Kyle	27	62.6	15.8	26.0
Voss	20	63.3	14.5	24.7
Belzer	23	63.1	14.3	23.3
AC Melita	22	64.8	15.8	21.9
Vic	25	64.7	15.3	21.7
Medora	23	64.4	15.7	21.1
Renville	21	64.5	15.8	21.0
Munich	19	64.1	15.2	20.9
Ben	23	65.0	16.3	18.8
Monroe	20	64.2	15.6	18.4
D87450	19	63.6	13.6	17.8
Cortez	18	63.2	15.5	17.3
Average	22.1	63.8	15.3	21.9
p value	0.000	0.000	0.000	0.000
CV (S/Mean)	6.4	0.8	3.6	11.5
CV(SE/Mean)	3.7	0.5	2.1	6.6
LSD 0.05	2.4	0.9	0.9	4.2

Table 6. Relative yields of durum varieties as compared to Renville when grown under dryland conditions in Roosevelt County in cooperation with CES. Cooperator: Mark Swank

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
Belzer	1	--	--	--	--	23.3	23.3	111.0
Kyle	4	--	52.8	45.3	23.7	26.0	37.0	106.1
Plenty	4	--	54.2	40.6	24.4	27.1	36.6	105.0
AC Melita	1	--	--	--	--	21.9	21.9	104.3
Dressler	2	--	--	--	20.5	26.2	23.4	103.1
Munich	3	--	--	43.2	22.8	20.9	29.0	101.6
Voss	3	--	--	38.7	23.0	24.7	28.8	101.1
Renville	5	53.5	53.8	40.2	24.3	21.0	38.6	100.0
Vic	4	--	47.9	39.4	21.2	21.7	32.6	93.5
Medora	5	45.2	49.4	40.0	19.5	21.1	35.0	91.0
Ben	2	--	--	--	21.4	18.8	20.1	88.7
Monroe	5	43.7	48.2	37.3	21.0	18.4	33.7	87.6
D87450	1	--	--	--	--	17.8	17.8	84.8
Cortez	2	--	--	--	20.5	17.3	18.9	83.4

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 7. Relative test weights of durum varieties as compared to Renville when grown under dryland conditions in Roosevelt County in cooperation with CES. Cooperator: Mark Swank

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
AC Melita	1	--	--	--	--	64.8	64.8	100.5
Medora	5	62.0	61.9	61.4	61.8	64.4	62.3	100.4
Ben	2	--	--	--	61.7	65.0	63.4	100.4
Renville	5	61.8	61.5	60.8	61.7	64.5	62.1	100.0
Voss	3	--	--	61.1	62.3	63.3	62.2	99.8
Munich	3	--	--	61.9	60.7	64.1	62.2	99.8
Monroe	5	60.2	61.7	60.2	61.5	64.2	61.6	99.2
Kyle	4	--	61.6	61.0	61.0	62.6	61.6	99.1
Vic	4	--	61.9	59.2	60.5	64.7	61.6	99.1
Plenty	4	--	61.2	60.8	61.0	62.4	61.4	98.8
Cortez	2	--	--	--	61.2	63.2	62.2	98.6
D87450	1	--	--	--	--	63.6	63.6	98.6
Dressler	2	--	--	--	60.4	63.1	61.8	97.9
Belzer	1	--	--	--	--	63.1	63.1	97.8

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 8. Relative proteins of durum varieties as compared to Renville when grown under dryland conditions in Roosevelt County in cooperation with CES. Cooperator: Mark Swank

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
Dressler	2	--	--	--	16.6	15.8	16.20	108.0
Vic	4	--	12.2	16.7	16.1	15.3	15.08	105.8
Ben	2	--	--	--	14.8	16.3	15.55	103.7
Medora	5	12.3	11.9	15.8	14.8	15.7	14.10	103.4
Monroe	5	12.2	12.2	15.3	14.7	15.6	14.00	102.6
Cortez	2	--	--	--	15.2	15.5	15.35	102.3
Plenty	4	--	11.6	15.7	15.0	15.6	14.48	101.6
Kyle	4	--	11.6	16.0	14.0	15.8	14.35	100.7
Renville	5	11.2	11.4	15.6	14.2	15.8	13.64	100.0
AC Melita	1	--	--	--	--	15.8	15.80	100.0
Munich	3	--	--	14.9	15.0	15.2	15.03	98.9
Voss	3	--	--	14.9	13.0	14.5	14.13	93.0
Belzer	1	--	--	--	--	14.3	14.30	90.5
D87450	1	--	--	--	--	13.6	13.60	86.1

NOTE: Average proteins in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 9. Performance of durum grown under dryland conditions at Reserve, MT.
Planted: 8 May 1997 Harvested: 2 September 1997 Cooperator: Max Aasheim

Variety	Height, inches	Test weight	Grain protein	Yield, bu/acre
Kyle	28	61.2	13.5	36.1
Renville	24	60.8	12.7	31.0
Munich	20	59.2	12.8	30.8
Plenty	26	59.2	13.3	30.0
Vic	25	60.5	12.4	29.8
AC Melita	25	60.3	12.8	28.8
Ben	25	60.7	13.0	28.4
Voss	21	60.3	12.2	28.1
Medora	25	60.5	12.9	27.5
Dressler	23	60.5	13.4	27.2
Monroe	22	60.2	13.3	24.0
Belzer	24	59.7	12.5	23.8
D87450	22	59.2	11.9	22.8
Cortez	18	58.1	13.7	12.6
average	23.4	60.0	12.9	27.2
p value	0.000	0.000	0.000	0.000
CV (S/Mean)	5.5	1.1	1.6	7.6
CV(SE/Mean)	3.2	0.6	0.9	4.4
LSD 0.05	2.1	1.1	0.3	3.4

Table 10. Relative yields of durum varieties as compared to Renville when grown under dryland conditions in Sheridan County in cooperation with CES. Cooperator: Max Aasheim

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
Kyle	--	--	63.1	33.2	32.8	36.1	41.3	104.0
Renville	21.7	--	62.8	29.5	35.5	31.0	36.1	100.0
Vic	--	--	61.8	31.2	34.4	29.8	39.3	99.0
Plenty	--	--	65.3	26.9	32.8	30.0	38.8	97.6
Munich	--	--	--	27.5	34.0	30.8	30.8	96.1
Voss	--	--	--	28.7	32.5	28.1	29.8	93.0
AC Melita	--	--	--	--	--	28.8	28.8	92.9
Ben	--	--	--	--	32.7	28.4	30.6	91.9
Dressler	--	--	--	--	33.4	27.2	30.3	91.1
Medora	19.7	--	57.9	29.3	28.0	27.5	32.5	90.0
Monroe	17.9	--	57.4	28.9	27.5	24.0	31.1	86.3
Belzer	--	--	--	--	--	23.8	23.8	76.8
D87450	--	--	--	--	--	22.8	22.8	73.5
Cortez	--	--	--	--	21.6	12.6	17.1	51.4

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 11. Relative test weights of durum varieties as compared to Renville when grown under dryland conditions in Sheridan County in cooperation with CES. Cooperator: Max Aasheim

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
Kyle	--	--	58.8	63.3	63.5	61.2	61.7	100.9
Medora	62.3	62.3	60.1	62.2	64.0	60.5	61.8	100.8
Voss	--	--	--	62.5	64.3	60.3	62.4	100.7
Ben	--	--	--	--	64.5	60.7	62.6	100.5
Vic	--	--	61.0	61.0	63.5	60.5	61.5	100.5
Dressler	--	--	--	--	64.5	60.5	62.5	100.3
Plenty	--	--	59.5	62.1	64.0	59.2	61.2	100.0
Renville	61.8	61.8	58.9	61.2	63.8	60.8	61.3	100.0
Munich	--	--	--	62.0	64.0	59.2	61.7	99.7
Monroe	60.3	60.3	60.4	59.8	63.7	60.2	60.9	99.3
AC Melita	--	--	--	--	--	60.3	60.3	99.2
Belzer	--	--	--	--	--	59.7	59.7	98.2
D87450	--	--	--	--	--	59.2	59.2	97.4
Cortez	--	--	--	--	62.6	58.1	60.4	96.9

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 12. Relative proteins of durum varieties as compared to Renville when grown under dryland conditions in Sheridan County in cooperation with CES. Cooperator: Max Aasheim

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Renville
Cortez	--	--	--	--	15.2	13.7	14.45	114.2
Dressler	--	--	--	--	13.4	13.4	13.40	105.9
Plenty	--	--	14.8	9.3	14.4	13.3	12.95	105.1
Medora	14.2	14.2	15.6	9.7	13.6	12.9	13.20	104.4
Ben	--	--	--	--	13.4	13.0	13.20	104.3
Munich	--	--	--	9.4	13.3	12.8	11.83	104.1
Monroe	15.0	15.0	14.8	9.2	13.0	13.3	13.06	103.3
Voss	--	--	--	10.0	12.9	12.2	11.70	102.9
Kyle	--	--	14.1	9.2	13.5	13.5	12.58	102.0
Vic	--	--	15.1	9.2	13.5	12.4	12.55	101.8
AC Melita	--	--	--	--	--	12.8	12.80	100.8
Renville	13.9	13.9	15.2	8.8	12.6	12.7	12.64	100.0
Belzer	--	--	--	--	--	12.5	12.50	98.4
D87450	--	--	--	--	--	11.9	11.90	93.7

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 13. Performance of durum grown under irrigated conditions at Scobey, MT.
Planted: 7 May 1997 Harvested: 5 September 1997 Cooperator: Kenny Benson

Variety	Height, inches	Test weight	Grain protein	Yield, bu/acre
Kyle	40	60.2	12.4	50.7
Dressler	39	58.8	12.6	47.5
AC Melita	40	60.0	12.7	46.2
Belzer	35	57.7	12.1	42.4
Munich	32	58.5	12.5	42.0
Ben	37	61.0	12.2	41.3
Renville	36	59.8	12.1	40.6
Plenty	40	58.2	12.6	37.5
Sceptre	33	59.8	12.2	36.7
Vic	40	60.7	12.0	36.6
Monroe	38	59.7	12.3	36.1
D87450	27	56.5	11.8	34.9
Medora	35	60.3	12.5	34.7
Voss	26	58.7	12.3	33.6
Cortez	28	58.8	12.4	31.2
average	35.1	59.2	12.3	39.5
LSD 0.05	5.0	1.3	0.4	6.4

Table 14. Relative yields of durum varieties as compared to Renville when grown under irrigated conditions in Daniels County in cooperation with CES. Cooperator: Kenny Benson

Variety	# of years	1996	1997	average	As % of Renville
AC Melita	1	--	46.2	46.2	113.8
Kyle	2	64.0	50.7	57.4	111.9
Dressler	2	63.8	47.5	55.6	108.4
Belzer	1	--	42.4	42.4	104.4
Renville	2	62.0	40.6	51.3	100.0
Plenty	2	63.0	37.5	50.2	97.9
Munich	2	57.6	42.0	49.8	97.1
Ben	2	58.4	41.3	49.8	97.1
Voss	2	63.7	33.6	48.6	94.7
Vic	2	60.7	36.6	48.6	94.7
Sceptre	1	--	36.7	36.7	90.4
Medora	2	53.6	34.7	44.2	86.2
D87450	1	--	34.9	34.9	86.0
Cortez	2	53.6	31.2	42.4	82.7
Monroe	2	46.2	36.1	41.2	80.3

NOTE: Average yields in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.

Table 15. Relative test weights of durum varieties as compared to Renville when grown under irrigated conditions in Daniels County in cooperation with CES. Cooperator: Kenny Benson

Variety	# of years	1996	1997	average	As % of Renville
Ben	2	63.3	61.0	62.2	102.0
Medora	2	62.7	60.3	61.5	100.8
Vic	2	61.7	60.7	61.2	100.3
AC Melita	1	--	60.0	60.0	100.3
Renville	2	62.3	59.8	61.0	100.0
Kyle	2	61.8	60.2	61.0	100.0
Sceptre	1	--	59.8	59.8	100.0
Monroe	2	61.7	59.7	60.7	99.5
Voss	2	62.2	58.7	60.4	99.0
Dressler	2	61.5	58.8	60.2	98.7
Munich	2	61.3	58.5	59.9	98.2
Plenty	2	61.5	58.2	59.8	98.0
Cortez	2	60.0	58.8	59.4	97.4
Belzer	1	--	57.7	57.7	96.5
D87450	1	--	56.5	56.5	94.5

NOTE: Average test weights in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.

Table 16. Relative proteins of durum varieties as compared to Renville when grown under irrigated conditions in Daniels County in cooperation with CES. Cooperator: Kenny Benson

Variety	# of years	1996	1997	average	As % of Renville
Kyle	2	14.5	12.4	13.4	106.3
AC Melita	1	--	12.7	12.7	105.0
Plenty	2	13.9	12.6	13.2	104.8
Dressler	2	13.7	12.6	13.2	104.8
Cortez	2	13.6	12.4	13.0	103.2
Medora	2	13.6	12.5	13.0	103.2
Vic	2	13.8	12.0	12.9	102.4
Munich	2	13.2	12.5	12.8	101.6
Ben	2	13.3	12.2	12.8	101.6
Sceptre	1	--	12.2	12.2	100.8
Renville	2	13.0	12.1	12.6	100.0
Monroe	2	13.0	12.3	12.6	100.0
Voss	2	13.0	12.3	12.6	100.0
Belzer	1	--	12.1	12.1	100.0
D87450	1	--	11.8	11.8	97.5

NOTE: Average proteins in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.