

PROJECT TITLE: Off-station durum yield trials - 2000

OBJECTIVE: To evaluate varieties of durum under irrigated and dryland conditions at various sites in eastern Montana.

PROJECT LEADER: Joyce Eckhoff, MSU Eastern Agricultural Research Center, Sidney, MT

COOPERATORS:

County	Producers	CES Agents
Daniels, dryland	Bobbie Roos	Bobbie Roos
McCone, dryland	Victor Wagner	Nels Boe
Roosevelt, dryland	Mark Swank	Chet Hill
Roosevelt, irrigated	Richard Nygaard	Chet Hill
Sheridan, dryland	Max Aasheim	Terry Angvick
Sheridan, irrigated	Steve Brekke	Terry Angvick
Valley, dryland	Bill Lauckner	Verlin Koenig
Valley, irrigated	Kelly Donovan	Verlin Koenig
Wibaux, dryland	David Maus	Dave Bertelsen

MATERIALS AND METHODS: Fifteen durum varieties were planted at six 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. Planting and harvest dates were

Location	Planted	Harvested
Scobey, Daniels County – dryland	3 May	not harvested
Circle, McCone County – dryland	21 Apr	14 August
Poplar, Roosevelt County – dryland	1 May	15 August
Poplar, Roosevelt County – irrigated	1 May	18 August
Reserve, Sheridan County – dryland	2 May	21 August
Dagmar, Sheridan County – irrigated	2 May	21 August
Nashua, Valley County – dryland	19 Apr	16 August
Larslan, Valley County – irrigated	19 Apr	not harvested
Wibaux, Wibaux County – dryland	27 Apr	17 August

RESULTS: Summaries of yields, test weights, heights and protein contents across **dryland sites** are shown in Tables 1-4, and summaries of yields, test weights, heights and protein contents across **irrigated sites** are shown in Tables 22-25. Mountrail, Plaza, and AC Avonlea yielded most across dryland sites (Table 1). Mountrail yielded most across the irrigated sites (Table 22).

McCone County: Performance and relative values of durum varieties at **Circle** are shown in Tables 5-8. Munich and Renville yielded most.

Roosevelt County (dryland): Performance and relative values of durum varieties at **Poplar** are shown in Tables 9-12. Plaza and Mountrail yielded significantly more than the check variety, Renville.

Sheridan County (dryland): Performance and relative values of durum varieties at **Reserve** are shown in Tables 13-16. Plaza, Mountrail, and AC Avonlea yielded most.

Wibaux County (dryland): Performance and relative values of durum varieties at **Wibaux** are shown in Tables 17-20. Mountrail yielded significantly more than the check variety, Renville.

Valley County (dryland): Performances of durum varieties at **Nashua** are shown in Table 21. Mountrail yielded significantly more than the check variety, Renville. This is the first year for a dryland durum yield trial in Valley County, so relative tables are not yet available.

Sheridan County (irrigated): Performance and relative values of durum varieties at **Dagmar** are shown in Tables 26-29. Mountrail yielded significantly more than the check variety, Renville.

Roosevelt County (irrigated): Performances of durum varieties at Poplar are shown in Table 30. Lebsack yielded most. This is the first year for an irrigated durum yield trial in Roosevelt County, so relative tables are not yet available.

SUMMARY: The off-station yield trials are conducted at several sites in eastern Montana. These trials provide important information about performance in the Mondak region of experimental lines from Montana and North Dakota, and new varieties from state breeding programs and private companies. Regional durum producers make decisions on varieties to grow based on data from these trials.

FUTURE PLANS: Off-station durum yield trials will continue indefinitely. Expansion to other locations in future years is possible.

Table 1. Summary of durum yields in bu/acre at 5 dryland off-station sites in eastern Montana, 2000.

Variety	Circle	Wibaux	Poplar	Reserve	Nashua	average
Mountrail	30.5	48.4	58.7	32.9	68.6	47.8
Plaza	27.0	46.4	59.5	34.4	60.7	45.6
AC Avonlea	30.9	43.6	55.8	32.7	63.1	45.2
Munich	32.8	42.8	49.0	29.9	60.0	42.9
Renville	31.8	41.5	52.3	29.2	59.3	42.8
Belzer	28.3	43.4	54.4	30.3	56.6	42.6
Kyle	30.3	44.9	52.9	27.4	56.6	42.4
AC Morse	29.1	38.4	54.5	28.9	58.8	41.9
Maier	26.2	39.3	54.1	27.5	59.0	41.2
Lebsock	26.8	42.4	55.6	24.4	53.8	40.6
Ben	26.5	43.5	53.3	26.3	52.3	40.4
GM90005	27.8	40.5	52.5	24.5	55.1	40.1
AC Melita	26.4	39.9	49.2	26.4	54.2	39.2
GM90000	27.3	41.8	38.6	16.4	57.9	36.4
GM90002	26.3	39.8	41.1	18.7	46.5	34.5
site average	28.5	42.4	52.1	27.3	57.5	
p value	0.018	0.042	<0.001	<0.001	<0.001	
CV (S/Mean)	8.5	7.7	5.6	13.4	8.9	
CV(SE/Mean)	4.9	4.4	3.2	7.7	5.1	
LSD _{0.05}	4.1	5.5	4.9	6.1	8.5	

Table 2. Summary of durum test weights in lb/bu at 5 dryland off-station sites in eastern Montana, 2000.

Variety	Circle	Wibaux	Poplar	Reserve	Nashua	average
Lebsock	62.8	62.3	63.8	61.8	64.7	63.1
Ben	62.5	62.8	63.0	61.2	64.0	62.7
Maier	62.5	62.5	63.0	60.7	65.0	62.7
Plaza	62.5	62.2	62.5	61.2	64.7	62.6
Renville	62.8	62.3	62.3	60.8	63.5	62.3
GM90002	62.5	63.0	62.7	59.5	63.7	62.3
Mountrail	62.0	62.0	62.2	60.8	64.0	62.2
Kyle	62.8	61.8	62.0	60.3	64.0	62.2
GM90005	61.7	62.7	62.5	60.3	64.0	62.2
Munich	62.3	62.2	62.0	60.2	64.0	62.1
AC Melita	61.3	62.0	62.0	60.7	63.5	61.9
AC Avonlea	62.3	62.0	61.3	60.5	63.1	61.8
AC Morse	61.8	61.5	62.2	59.8	63.0	61.7
Belzer	61.0	60.8	61.7	59.8	63.2	61.3
GM90000	61.0	60.5	59.2	56.1	60.5	59.5
site average	62.1	62.0	62.2	60.3	63.7	
p value	<0.001	<0.001	<0.001	<0.001	<0.001	
CV (S/Mean)	0.9	0.6	0.5	1.4	0.6	
CV(SE/Mean)	0.5	0.4	0.3	0.8	0.3	
LSD _{0.05}	0.9	0.7	0.6	1.4	0.6	

Table 3. Summary of durum heights in inches at five dryland off-station sites in eastern Montana, 2000.

Variety	Circle	Wibaux	Poplar	Reserve	Nashua	average
Kyle	27.6	32.7	42.4	36.6	42.8	36.4
Renville	28.0	31.9	37.5	35.3	39.6	34.5
AC Melita	25.2	31.7	38.7	34.8	38.6	33.8
Ben	26.2	32.0	35.2	31.6	36.7	32.3
Belzer	26.0	28.6	35.8	33.2	37.5	32.2
AC Avonlea	25.8	27.4	35.4	34.0	35.8	31.7
Mountrail	24.8	29.4	34.8	29.7	35.3	30.8
Maier	26.2	28.0	32.2	30.3	34.5	30.2
Lebsock	24.0	28.4	32.5	29.4	34.6	29.8
Munich	24.3	26.0	31.0	31.7	33.6	29.3
GM90005	23.0	26.6	31.8	30.7	34.3	29.3
AC Morse	24.0	26.6	31.7	29.9	32.9	29.0
Plaza	23.0	25.9	29.2	29.5	28.2	27.2
GM90002	21.2	22.3	28.9	23.3	27.2	24.6
GM90000	21.5	22.9	25.6	20.9	25.5	23.3
site average	24.7	28.0	33.5	30.7	34.5	
p value	0.020	<0.001	<0.001	<0.001	<0.001	
CV (S/Mean)	9.0	6.1	4.9	9.3	3.3	
CV(SE/Mean)	5.2	3.5	2.8	5.4	1.9	
LSD _{0.05}	3.7	2.9	2.7	4.8	1.9	

Table 4. Summary of durum grain protein contents at 5 dryland off-station sites in eastern Montana, 2000.

Variety	Circle	Wibaux	Poplar	Reserve	Nashua	average
GM90005	11.8	17.0	14.7	13.5	12.5	13.9
Maier	11.8	17.4	14.7	13.7	11.2	13.8
AC Morse	12.1	16.8	15.0	13.3	11.7	13.8
Ben	12.4	16.9	14.6	13.1	11.4	13.7
AC Avonlea	11.5	17.2	14.7	12.9	11.5	13.6
Munich	11.1	17.1	14.4	13.2	11.4	13.4
AC Melita	11.7	16.5	14.5	13.2	11.3	13.4
Kyle	11.7	16.6	14.0	13.9	10.5	13.3
GM90002	11.8	15.8	14.0	13.2	11.8	13.3
Lebsock	11.0	16.8	14.2	12.3	11.2	13.1
GM90000	11.5	15.6	14.1	13.3	10.9	13.1
Belzer	11.0	16.3	13.8	12.6	10.1	12.8
Renville	11.0	16.5	14.3	12.5	9.7	12.8
Mountrail	10.8	16.1	13.6	12.4	10.5	12.7
Plaza	11.1	15.7	13.5	12.1	10.1	12.5
site average	11.5	16.6	14.3	13.0	11.0	
p value	0.091	<0.001	<0.001	<0.001	<0.001	
CV (S/Mean)	5.2	1.8	2.1	2.5	5.9	
CV(SE/Mean)	3.0	1.0	1.2	1.4	3.4	
LSD _{0.05}	ns	0.5	0.5	0.5	1.1	

Table 5. Performance of durum grown under dryland continuous cropping conditions at Circle, MT. Planted: 21 April 2000 Harvested: 21 August 2000 Cooperator: Victor Wagner

Variety	height, inches	grain protein	test weight	yield, bu/acre
Munich	24.3	11.1	62.3	32.8
Renville	28.0	11.0	62.8	31.8
AC Avonlea	25.8	11.5	62.3	30.9
Mountrail	24.8	10.8	62.0	30.5
Kyle	27.6	11.7	62.8	30.3
AC Morse	24.0	12.1	61.8	29.1
Belzer	26.0	11.0	61.0	28.3
GM90005	23.0	11.8	61.7	27.8
GM90000	21.5	11.5	61.0	27.3 x
Plaza	23.0	11.1	62.5	27.0 x
Lebsock	24.3	11.0	62.8	26.8 x
Ben	26.2	12.4	62.5	26.5 x
AC Melita	25.2	11.7	61.3	26.4 x
GM90002	21.2	11.8	62.5	26.3 x
Maier	26.2	11.8	62.5	26.2 x
average	24.7	11.5	62.1	28.5
p value	0.020	0.091	<0.001	0.018
CV (S/Mean)	9.0	5.2	0.9	8.5
CV(SE/Mean)	5.2	3.0	0.5	4.9
LSD 0.05	3.7	ns	0.9	4.1

x indicates significantly lower yield than check variety, Renville, at a probability of 0.05

Table 6. Relative yielding abilities of durum varieties compared to Renville when grown under dryland conditions in McCone County in cooperation with CES. Cooperator: Victor Wagner

Variety	1996	1998	1999	2000	average	As % of Renville
Mountrail	--	33.9	30.4	30.5	31.6	105.0
Kyle	12.4	35.1	30.5	30.3	27.1	103.3
Munich	13.1	30.0	31.9	32.8	27.0	102.9
AC Morse	--	31.2	--	29.1	30.2	101.7
Renville	14.5	27.5	31.0	31.8	26.2	100.0
AC Avonlea	--	--	--	30.9	30.9	97.2
Plaza	--	28.7	31.3	27.0	29.0	96.3
Maier	--	30.4	26.1	26.2	27.6	91.6
Belzer	--	--	--	28.3	28.3	89.0
GM90005	--	--	--	27.8	27.8	87.4
AC Melita	--	25.3	--	26.4	25.9	87.2
Ben	11.6	28.9	23.6	26.5	22.7	86.4
Lebsock	--	--	27.4	26.8	27.1	86.3
GM90000	--	--	--	27.3	27.3	85.8
GM90002	--	--	--	26.3	26.3	82.7

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 McCone County in cooperation with CES. Cooperator: Victor Wagner

Variety	1996	1998	1999	2000	average	As % of Renville
Kyle	63.4	62.0	63.0	62.8	62.8	100.7
Maier	--	62.3	63.7	62.5	62.8	100.6
Ben	63.2	61.8	62.9	62.5	62.6	100.4
Renville	62.2	61.5	63.0	62.8	62.4	100.0
Lebsock	--	--	63.0	62.8	62.9	100.0
Mountrail	--	62.0	63.0	62.0	62.3	99.8
Plaza	--	62.0	62.5	62.5	62.3	99.8
GM90002	--	--	--	62.5	62.5	99.5
AC Avonlea	--	--	--	62.3	62.3	99.2
Munich	61.6	61.3	61.5	62.3	61.7	98.9
GM90005	--	--	--	61.7	61.7	98.2
AC Melita	--	60.6	--	61.3	61.0	98.1
AC Morse	--	59.8	--	61.8	60.8	97.8
Belzer	--	--	--	61.0	61.0	97.1
GM90000	--	--	--	61.0	61.0	97.1

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 protein contents of durum varieties as compared to Renville when grown under dryland conditions in McCone County in cooperation with CES. Cooperator: Victor Wagner

Variety	1996	1998	1999	2000	average	As % of Renville
GM90005	--	--	--	11.8	11.8	107.3
GM90002	--	--	--	11.8	11.8	107.3
AC Avonlea	--	--	--	11.5	11.5	104.5
GM90000	--	--	--	11.5	11.5	104.5
AC Morse	--	14.9	--	12.1	13.5	103.1
AC Melita	--	15.2	--	11.7	13.4	102.7
Ben	13.0	15.1	10.9	12.4	12.9	101.4
Maier	--	15.6	11.1	11.8	12.8	101.3
Renville	12.7	15.2	11.8	11.0	12.7	100.0
Belzer	--	--	--	11.0	11.0	100.0
Munich	13.0	15.1	11.0	11.1	12.6	99.0
Kyle	12.9	14.7	10.9	11.7	12.6	99.0
Lebsock	--	--	11.4	11.0	11.2	98.2
Plaza	--	15.2	10.0	11.1	12.1	95.5
Mountrail	--	14.4	10.9	10.8	12.0	95.0

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 9. Performance of durum grown under dryland conditions at Poplar, MT.
 Planted: 2 May 2000 Harvested: 15 August 2000 Cooperator: Mark Swank

Variety	height, inches	grain protein	test weight	yield, bu/acre	
Plaza	29.2	13.5	62.5	59.5	a
Mountrail	34.8	13.6	62.2	58.7	a
AC Avonlea	35.4	14.7	61.3	55.8	
Lebsock	32.5	14.2	63.8	55.6	
AC Morse	31.7	15.0	62.2	54.5	
Belzer	35.8	13.8	61.7	54.4	
Maier	32.2	14.7	63.0	54.1	
Ben	35.2	14.6	63.0	53.3	
Kyle	42.4	14.0	62.0	52.9	
GM 90005	31.8	14.7	62.5	52.5	
Renville	37.5	14.3	62.3	52.3	
AC Melita	38.7	14.5	62.0	49.2	
Munich	31.0	14.4	62.0	49.0	
GM 90002	28.9	14.0	62.7	41.1	x
GM 90000	25.6	14.1	59.2	38.6	x
Average	33.5	14.3	62.2	52.1	
p value	<0.001	<0.001	<0.001	<0.001	
CV (S/Mean)	4.9	2.1	0.5	5.6	
CV(SE/Mean)	2.8	1.2	0.3	3.2	
LSD 0.05	2.7	0.5	0.6	4.9	

a indicates significantly greater yield than check variety, Renville, at a probability of 0.05
 x indicates significantly lower yield than check variety, Renville, at a probability of 0.05

Table 10. 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	1996	1997	1998	1999	2000	Ave	as % of Renville
Belzer	--	23.3	40.3	--	54.4	39.3	108.2
AC Avonlea	--	--	--	--	55.8	55.8	106.7
Mountrail	--	--	38.4	48.6	58.7	48.6	106.0
Plaza	--	--	35.9	49.5	59.5	48.3	105.4
AC Morse	--	--	--	--	54.5	54.5	104.2
Kyle	23.7	26.0	39.0	47.8	52.9	37.9	103.6
Maier	--	--	40.0	46.2	54.1	46.8	102.0
GM90005	--	--	--	--	52.5	52.5	100.4
Renville	24.3	21.0	35.8	49.4	52.3	36.6	100.0
Ben	21.4	18.8	41.5	45.3	53.3	36.1	98.6
AC Melita	--	21.9	35.8	--	49.2	35.6	98.0
Lebsock	--	--	--	43.7	55.6	49.7	97.6
Munich	22.8	20.9	34.3	45.1	49.0	34.4	94.1
GM 90002	--	--	--	--	41.1	41.1	78.6
GM 90000	--	--	--	--	38.6	38.6	73.8

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 Roosevelt County in cooperation with CES. Cooperator: Mark Swank

Cultivar	1996	1997	1998	1999	2000	Ave	as % of Renville
Lebsock	--	--	--	61.5	63.8	62.7	101.2
GM 90002	--	--	--	--	62.7	62.7	100.6
GM90005	--	--	--	--	62.5	62.5	100.3
Ben	61.7	65.0	63.3	61.0	63.0	62.8	100.3
Renville	61.7	64.5	63.0	61.5	62.3	62.6	100.0
Maier	--	--	62.8	61.0	63.0	62.3	100.0
AC Morse	--	--	--	--	62.2	62.2	99.8
AC Melita	--	64.8	62.0	--	62.0	62.9	99.5
Mountrail	--	--	62.2	61.0	62.2	61.8	99.3
Kyle	61.0	62.6	62.5	61.5	62.0	61.9	98.9
Plaza	--	--	61.3	60.8	62.5	61.5	98.8
Munich	60.7	64.1	61.8	60.5	62.0	61.8	98.8
AC Avonlea	--	--	--	--	61.3	61.3	98.4
Belzer	--	63.1	61.7	--	61.7	62.2	98.3
GM 90000	--	--	--	--	59.2	59.2	95.0

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 Roosevelt County in cooperation with CES. Cooperator: Mark Swank

Cultivar	1996	1997	1998	1999	2000	Ave	as % of Renville
AC Morse	--	--	--	--	15.0	15.0	104.9
Maier	--	--	15.8	13.4	14.7	14.6	104.0
AC Avonlea	--	--	--	--	14.7	14.7	102.8
GM90005	--	--	--	--	14.7	14.7	102.8
Ben	14.8	16.3	15.7	12.6	14.6	14.8	102.5
Lebsock	--	--	--	13.1	14.2	13.7	101.9
Munich	15.0	15.2	15.7	12.9	14.4	14.6	101.4
Renville	14.2	15.8	15.4	12.5	14.3	14.4	100.0
AC Melita	--	15.8	15.0	--	14.5	15.1	99.6
GM 90000	--	--	--	--	14.1	14.1	98.6
Kyle	14.0	15.8	14.6	12.5	14.0	14.2	98.2
GM 90002	--	--	--	--	14.0	14.0	97.9
Mountrail	--	--	15.2	12.5	13.6	13.8	97.9
Plaza	--	--	15.1	12.0	13.5	13.5	96.2
Belzer	--	14.3	14.8	--	13.8	14.3	94.3

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 13. Performance of durum grown under dryland conditions at Reserve, MT.
 Planted: 2 May 2000 Harvested: 21 August 2000 Cooperator: Max Aasheim

Variety	Height, inches	Grain protein	Test weight	Yield, bu/acre
Plaza	29.5	12.1	61.2	34.4
Mountrail	29.7	12.4	60.8	32.9
AC Avonlea	34.0	12.9	60.5	32.7
Belzer	33.2	12.6	59.8	30.3
Munich	31.4	13.2	60.2	29.9
Renville	35.3	12.5	60.8	29.2
AC Morse	29.9	13.3	59.8	28.9
Maier	30.3	13.7	60.7	27.5
Kyle	36.6	13.9	60.3	27.4
AC Melita	34.8	13.2	60.7	26.4
Ben	31.6	13.1	61.2	26.3
GM90005	30.7	13.5	60.3	24.5
Lebsock	29.4	12.3	61.8	24.4
GM90002	23.3	13.2	59.5	18.7 x
GM90000	20.9	13.3	56.1	16.4 x
average	30.7	13.0	60.3	27.3
p value	<0.001	<0.001	<0.001	<0.001
CV (S/Mean)	9.3	2.5	1.4	13.4
CV(SE/Mean)	5.4	1.4	0.8	7.7
LSD _{0.05}	4.8	0.5	1.4	6.1

x indicates significantly lower yield than check variety, Munich, at a probability of 0.05

Table 14. 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	1996	1997	1998	1999	2000	Ave	as % of Munich
Plaza	--	--	53.2	42.0	34.4	43.2	112.8
AC Avonlea	--	--	--	--	32.7	32.7	109.4
Mountrail	--	--	52.6	38.2	32.9	41.2	107.7
Renville	35.5	31.0	45.8	--	29.2	35.4	100.3
Munich	34.0	30.8	46.4	38.6	29.9	35.9	100.0
Maier	--	--	49.4	36.8	27.5	37.9	99.0
Kyle	32.8	36.1	43.0	38.2	27.4	35.5	98.8
AC Morse	--	--	--	--	28.9	28.9	96.7
Belzer	--	23.8	45.9	--	30.3	33.3	93.4
AC Melita	--	28.8	44.4	--	26.4	33.2	93.0
Ben	32.7	28.4	48.2	28.6	26.3	32.8	91.4
Lebsock	--	--	--	35.7	24.4	30.1	87.7
GM90005	--	--	--	--	24.5	24.5	81.9
GM90002	--	--	--	--	18.7	18.7	62.5
GM90000	--	--	--	--	16.4	16.4	54.8

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 15. 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	1996	1997	1998	1999	2000	Ave	as % of Munich
Ben	64.5	60.7	62.7	63.0	61.2	62.4	101.6
Plaza	--	--	62.0	63.5	61.2	62.2	101.5
Renville	63.8	60.8	62.3	--	60.8	61.9	101.4
Lebsock	--	--	--	63.0	61.8	62.4	101.3
Maier	--	--	62.2	63.3	60.7	62.1	101.2
AC Melita	--	60.3	61.3	--	60.7	60.8	101.2
Kyle	63.5	61.2	61.5	62.5	60.3	61.8	100.6
AC Avonlea	--	--	--	--	60.5	60.5	100.5
Mountrail	--	--	61.0	62.8	60.8	61.5	100.3
GM90005	--	--	--	--	60.3	60.3	100.2
Belzer	--	59.7	60.8	--	59.8	60.1	100.1
Munich	64.0	59.2	60.8	63.0	60.2	61.4	100.0
AC Morse	--	--	--	--	59.8	59.8	99.3
GM90002	--	--	--	--	59.5	59.5	98.8
GM90000	--	--	--	--	56.1	56.1	93.2

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 16. 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	1996	1997	1998	1999	2000	Ave	as % of Munich
Maier	--	--	13.1	11.7	13.7	12.8	102.4
GM90005	--	--	--	--	13.5	13.5	102.3
AC Morse	--	--	--	--	13.3	13.3	100.8
GM90000	--	--	--	--	13.3	13.3	100.8
Kyle	13.5	13.5	12.1	10.8	13.9	12.8	100.2
Munich	13.3	12.8	12.9	11.5	13.2	12.7	100.0
Ben	13.4	13.0	12.8	11.4	13.1	12.7	100.0
GM90002	--	--	--	--	13.2	13.2	100.0
AC Melita	--	12.8	12.3	--	13.2	12.8	98.5
AC Avonlea	--	--	--	--	12.9	12.9	97.7
Lebsock	--	--	--	11.5	12.3	11.9	96.4
Renville	12.6	12.7	12.4	--	12.5	12.6	96.2
Mountrail	--	--	12.2	11.4	12.4	12.0	95.7
Belzer	--	12.5	12.1	--	12.6	12.4	95.6
Plaza	--	--	12.3	10.2	12.1	11.5	92.0

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 17. Performance of durum grown under dryland conditions at Wibaux, MT.
 Planted: 27 April 2000 Harvested: 17 August 2000 Cooperator: David Maus

Variety	Height, inches	Grain protein	Test weight	Yield, bu/acre
Mountrail	29.4	16.1	62.0	48.4 ^a
Plaza	25.9	15.7	62.2	46.4
Kyle	32.7	16.6	61.8	44.9
AC Avonlea	27.4	17.2	62.0	43.6
Ben	32.0	16.9	62.8	43.5
Belzer	28.6	16.3	60.8	43.4
Munich	26.0	17.1	62.2	42.8
Lebsock	28.4	16.8	62.3	42.4
GM90000	22.9	15.6	60.5	41.8
Renville	31.9	16.5	62.3	41.5
GM90005	26.6	17.0	62.7	40.5
AC Melita	31.7	16.5	62.0	39.9
GM90002	22.3	15.8	63.0	39.8
Maier	28.0	17.4	62.5	39.3
AC Morse	26.6	16.8	61.5	38.4
average	28.0	16.6	62.0	42.4
p value	<0.001	<0.001	<0.001	0.042
CV (S/Mean)	6.1	1.8	0.6	7.7
CV(SE/Mean)	3.5	1.0	0.4	4.4
LSD 0.05	2.9	0.5	0.7	5.5

a indicates significantly greater yield than check variety, Renville, at a probability of 0.05

Table 18. Relative yielding abilities of durum varieties as compared to Renville when grown under dryland conditions in Wibaux County in cooperation with CES. Cooperator: David Maus

Cultivar	1999	2000	Ave	as % of Renville
Plaza	40.0	46.4	43.2	117.4
Lebsock	43.5	42.4	43.0	116.8
Mountrail	37.1	48.4	42.8	116.3
Kyle	38.7	44.9	41.8	113.6
Munich	36.5	42.8	39.7	107.9
Maier	38.4	39.3	38.9	105.7
AC Avonlea	--	43.6	43.6	105.1
Belzer	--	43.4	43.4	104.6
Ben	32.3	43.5	37.9	103.0
GM90000	--	41.8	41.8	100.7
Renville	32.1	41.5	36.8	100.0
GM90005	--	40.5	40.5	97.6
AC Melita	--	39.9	39.9	96.1
GM90002	--	39.8	39.8	95.9
AC Morse	--	38.4	38.4	92.5

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 19. Relative test weights of durum varieties as compared to Renville when grown under dryland conditions in Wibaux County in cooperation with CES. Cooperator: David Maus

Cultivar	1999	2000	Ave	as % of Renville
Lebsock	61.7	62.3	62.0	101.1
GM90002	--	63.0	63.0	101.1
Kyle	61.5	61.8	61.7	100.7
GM90005	--	62.7	62.7	100.6
Maier	60.2	62.5	61.4	100.2
Ben	60.0	62.8	61.4	100.2
Plaza	60.5	62.2	61.4	100.2
Mountrail	60.7	62.0	61.4	100.2
Renville	60.3	62.3	61.3	100.0
AC Avonlea	--	62.0	62.0	99.5
AC Melita	--	62.0	62.0	99.5
Munich	59.0	62.2	60.6	98.9
AC Morse	--	61.5	61.5	98.7
Belzer	--	60.8	60.8	97.6
GM90000	--	60.5	60.5	97.1

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 20. Relative protein contents of durum varieties as compared to Renville when grown under dryland conditions in Wibaux County in cooperation with CES. Cooperator: David Maus

Cultivar	1999	2000	Ave	as % of Renville
Maier	14.9	17.4	16.2	104.5
AC Avonlea	--	17.2	17.2	104.2
GM90005	--	17.0	17.0	103.0
Ben	14.8	16.9	15.9	102.6
Munich	14.5	17.1	15.8	101.9
AC Morse	--	16.8	16.8	101.8
Lebsock	14.6	16.8	15.7	101.3
Renville	14.5	16.5	15.5	100.0
Kyle	14.4	16.6	15.5	100.0
AC Melita	--	16.5	16.5	100.0
Belzer	--	16.3	16.3	98.8
Mountrail	14.2	16.1	15.2	98.1
Plaza	14.4	15.7	15.1	97.4
GM90002	--	15.8	15.8	95.8
GM90000	--	15.6	15.6	94.5

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 21. Performance of durum grown under dryland conditions at Nashua, MT.
 Planted: 19 April 2000, Harvested: 16 August 2000 Cooperator: Bill Lauckner

Variety	Height, inches	Grain protein	Test weight	Yield, bu/acre
Mountrail	35.3	10.5	64.0	68.6 a
AC Avonlea	35.8	11.5	63.7	63.1
Plaza	28.2	10.1	64.7	60.7
Munich	33.6	11.4	64.0	60.0
Renville	39.6	9.7	63.5	59.3
Maier	34.5	11.2	65.0	59.0
AC Morse	32.9	11.7	63.0	58.8
GM9000	25.5	10.9	60.5	57.9
Belzer	37.5	10.1	63.2	56.6
Kyle	42.8	10.5	64.0	56.6
GM90005	34.3	12.5	64.0	55.1
AC Melita	38.6	11.3	63.5	54.2
Lebsock	34.6	11.2	64.7	53.8
Ben	36.7	11.4	64.0	52.3
GM90002	27.2	11.8	63.7	46.5 x
average	34.5	11.0	63.7	57.5
p value	<0.001	<0.001	<0.001	0.006
CV (S/Mean)	3.3	5.9	0.6	8.9
CV(SE/Mean)	1.9	3.4	0.3	5.1
LSD 0.05	1.9	1.1	0.6	8.53

a indicates significantly greater yield than check variety, Renville, at a probability of 0.05.
 x indicates significantly lower yield than check variety, Renville, at a probability of 0.05.

Table 22. Summary of durum yields in bu/acre at two irrigated off-station sites in eastern Montana, 2000. All sites are under pivot irrigation.

Variety	Dagmar	Poplar	average
Mountrail	60.2	55.1	57.7
Lebsock	54.2	57.6	55.9
Renville	53.3	55.8	54.6
Maier	54.1	52.7	53.4
Munich	50.9	52.4	51.7
Belzer	49.6	52.9	51.3
AC Avonlea	54.5	47.5	51.0
GM 90005	50.2	48.5	49.4
Plaza	56.5	37.5	47.0
Ben	49.0	43.7	46.4
AC Morse	46.6	36.2	41.4
AC Melita	51.1	30.9	41.0
Kyle	44.0	17.2	30.6
GM 90000	30.4	20.4	25.4
GM90002	25.8	20.0	22.9
site average	48.7	41.9	
p value	<0.001	<0.001	
CV (S/Mean)	6.4	13.5	
CV(SE/Mean)	3.7	7.8	
LSD _{0.05}	5.2	9.5	

Table 23. Summary of durum test weights in lb/bu at two irrigated off-station sites in eastern Montana, 2000. All sites are under pivot irrigation.

Variety	Dagmar	Poplar	average
Lebsock	63.7	61.0	62.4
Ben	62.8	61.0	61.9
Maier	62.7	60.0	61.4
GM 90005	62.2	59.8	61.0
Mountrail	62.3	59.0	60.7
Belzer	62.0	59.2	60.6
Munich	61.8	59.3	60.6
Renville	62.0	59.0	60.5
AC Avonlea	60.8	58.7	59.8
Plaza	62.0	56.8	59.4
Kyle	61.8	57.0	59.4
AC Melita	61.8	56.7	59.3
AC Morse	60.5	56.2	58.4
GM90002	58.5	53.8	56.2
GM 90000	56.5	49.1	52.8
site average	61.4	57.8	
p value	<0.001	<0.001	
CV (S/Mean)	0.6	2.5	
CV(SE/Mean)	0.4	1.4	
LSD _{0.05}	0.7	2.4	

Table 24. Summary of durum heights in inches at two irrigated off-station sites in eastern Montana, 2000. All sites are under pivot irrigation.

Variety	Dagmar	Poplar	average
AC Melita	46.0	41.6	43.8
Kyle	46.7	40.9	43.8
Renville	45.0	41.1	43.1
AC Avonlea	41.1	40.0	40.6
Mountrail	40.8	39.5	40.2
AC Morse	38.7	40.4	39.6
Belzer	41.6	37.4	39.5
Ben	40.8	36.7	38.8
GM 90005	38.5	36.3	37.4
Maier	37.5	36.9	37.2
Lebsock	37.8	35.5	36.7
Munich	37.3	35.8	36.6
Plaza	31.5	34.9	33.2
GM 90000	27.1	34.9	31.0
GM90002	27.4	30.2	28.8
site average	38.5	37.5	
p value	<0.001	<0.001	
CV (S/Mean)	3.0	6.5	
CV(SE/Mean)	1.7	3.7	
LSD _{0.05}	1.9	4.0	

Table 25. Summary of durum grain protein contents in percent at two irrigated off-station sites in eastern Montana, 2000. All sites are under pivot irrigation.

Variety	Dagmar	Poplar	average
GM 90000	14.6	16.9	15.8
GM90002	14.9	16.1	15.5
AC Avonlea	14.8	15.9	15.4
AC Morse	14.6	16.2	15.4
Kyle	14.3	16.4	15.4
AC Melita	14.4	15.7	15.1
GM 90005	14.2	15.3	14.8
Maier	14.0	15.4	14.7
Ben	14.3	15.1	14.7
Plaza	13.6	15.3	14.5
Renville	13.6	15.1	14.4
Munich	14.0	14.8	14.4
Lebsock	13.2	14.7	14.0
Mountrail	13.0	14.8	13.9
Belzer	13.2	14.6	13.9
site average	14.0	15.5	
p value	<0.001	<0.001	
CV (S/Mean)	2.2	2.7	
CV(SE/Mean)	1.2	1.6	
LSD _{0.05}	0.5	0.7	

Table 26. Performance of durum grown under irrigated conditions at Dagmar, MT.
 Planted: 2 May 2000 Harvested: 21 August 2000 Cooperator: Steve Brekke

Variety	height, inches	grain protein	test weight	yield, bu/acre
Mountrail	40.8	13.0	62.3	60.2 a
Plaza	31.5	13.6	62.0	56.5
AC Avonlea	41.1	14.8	60.8	54.5
Lebsock	37.8	13.2	63.7	54.2
Maier	37.5	14.0	62.7	54.1
Renville	45.0	13.6	62.0	53.3
AC Melita	46.0	14.4	61.8	51.1
Munich	37.3	14.0	61.8	50.9
GM90005	38.5	14.2	62.2	50.2
Belzer	41.6	13.2	62.0	49.6
Ben	40.8	14.3	62.8	49.0
AC Morse	38.7	14.6	60.5	46.6 x
Kyle	46.7	14.3	61.8	44.0 x
GM90000	27.1	14.6	56.5	30.4 x
GM90002	27.4	14.9	58.5	25.8 x
average	38.5	14.0	61.4	48.7
p value	<0.001	<0.001	<0.001	<0.001
CV (S/Mean)	3.0	2.2	0.6	6.4
CV(SE/Mean)	1.7	1.2	0.4	3.7
LSD 0.05	1.9	0.5	0.7	5.2

a indicates significantly greater yield than check variety, Renville, at a probability of 0.05
 x indicates significantly lower yield than check variety, Renville, at a probability of 0.05

Table 27. Relative yields of durum varieties as compared to Renville when grown under irrigated conditions in Sheridan County in cooperation with CES. Cooperator: Steve Brekke

Cultivar	1993	1996	1998	1999	2000	Ave	as % of Renville
AC Melita	--	--	70.5	--	51.1	60.8	107.2
Mountrail	--	--	72.3	55.4	60.2	62.6	106.6
AC Avonlea	--	--	--	--	54.5	54.5	102.3
Maier	--	--	68.8	53.6	54.1	58.8	100.1
Renville	67.1	35.8	60.1	62.9	53.3	55.8	100.0
AC Morse	--	--	66.5	--	46.6	56.6	99.7
Ben	--	38.3	66.3	51.0	49.0	51.2	96.5
Munich	--	39.9	61.4	50.5	50.9	50.7	95.6
Plaza	--	--	67.3	44.5	56.5	56.1	95.5
GM90005	--	--	--	--	50.2	50.2	94.2
Belzer	--	--	--	--	49.6	49.6	93.1
Lebsock	--	--	--	52.6	54.2	53.4	91.9
Kyle	--	48.9	65.1	32.1	44.0	47.5	89.6
GM90000	--	--	--	--	30.4	30.4	57.0
GM90002	--	--	--	--	25.8	25.8	48.4

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 28. Relative test weights of durum varieties as compared to Renville when grown under irrigated conditions in Sheridan County in cooperation with CES. Cooperator: Steve Brekke

Cultivar	1993	1996	1998	1999	2000	Ave	as % of Renville
Ben	--	61.7	63.0	60.0	62.8	61.9	101.7
Lebsock	--	--	--	59.0	63.7	61.4	101.2
Maier	--	--	62.5	59.3	62.7	61.5	100.5
GM90005	--	--	--	--	62.2	62.2	100.3
Renville	59.7	59.8	62.3	59.3	62.0	60.6	100.0
Mountrail	--	--	61.0	60.3	62.3	61.2	100.0
Belzer	--	--	--	--	62.0	62.0	100.0
Kyle	--	61.7	61.8	56.3	61.8	60.4	99.3
Munich	--	60.3	60.7	58.0	61.8	60.2	98.9
AC Melita	--	--	60.5	--	61.8	61.2	98.4
Plaza	--	--	61.5	56.7	62.0	60.1	98.1
AC Avonlea	--	--	--	--	60.8	60.8	98.1
AC Morse	--	--	60.8	--	60.5	60.7	97.6
GM90002	--	--	--	--	58.5	58.5	94.4
GM90000	--	--	--	--	56.5	56.5	91.1

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 29. Relative protein contents of durum varieties as compared to Renville when grown under irrigated conditions in Sheridan County in cooperation with CES. Cooperator: Steve Brekke

Cultivar	1993	1996	1998	1999	2000	Ave	as % of Renville
GM90002	--	--	--	--	14.9	14.9	109.6
AC Avonlea	--	--	--	--	14.8	14.8	108.8
GM90000	--	--	--	--	14.6	14.6	107.4
GM90005	--	--	--	--	14.2	14.2	104.4
Maier	--	--	14.4	14.5	14.0	14.3	103.4
Kyle	--	10.5	14.6	14.5	14.3	13.5	102.1
Ben	--	10.9	14.0	13.8	14.3	13.3	100.4
Renville	14.2	11.3	14.4	13.5	13.6	13.4	100.0
Lebsock	--	--	--	13.8	13.2	13.5	99.6
Mountrail	--	--	14.3	13.9	13.0	13.7	99.3
Munich	--	10.5	13.8	14.0	14.0	13.1	99.1
Belzer	--	--	--	--	13.2	13.2	97.1
Plaza	--	--	13.1	13.3	13.6	13.3	96.4
AC Morse	--	--	14.0	--	14.6	14.3	68.9
AC Melita	--	--	14.2	--	14.4	14.3	68.9

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 30. Performance of durum grown under irrigated conditions at Poplar, MT.
 Planted: 2 May 2000 Harvested: 15 August 2000 Cooperator: Richard Nygaard

Variety	height, inches	grain protein	test weight	yield, bu/acre
Lebsock	35.5	14.7	61.0	57.6
Renville	41.1	15.1	59.0	55.8
Mountrail	39.5	14.8	59.0	55.1
Belzer	37.4	14.6	59.2	52.9
Maier	36.9	15.4	60.0	52.7
Munich	35.8	14.8	59.3	52.4
GM 90005	36.3	15.3	59.8	48.5
AC Avonlea	40.0	15.9	58.7	47.5
Ben	36.7	15.1	61.0	43.7 x
Plaza	34.9	15.3	56.8	37.5 x
AC Morse	40.4	16.2	56.2	36.2 x
AC Melita	41.6	15.7	56.7	30.9 x
GM 90000	34.9	16.9	49.1	20.4 x
GM90002	30.2	16.1	53.8	20.0 x
Kyle	40.9	16.4	57.0	17.2 x
Average	37.5	15.5	57.8	41.9
p value	<0.001	<0.001	<0.001	<0.001
CV (S/Mean)	6.5	2.7	2.5	13.5
CV(SE/Mean)	3.7	1.6	1.4	7.8
LSD 0.05	4.0	0.7	2.4	9.5

x indicates significantly lower yield than check variety, Renville, at a probability of 0.05