PROJECT TITLE: Evaluation of spring durum variety performance in trials near Moccasin, Denton, Fort Benton, and Winifred.

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OBJECTIVES:
To evaluate the performance of spring durum varieties in environments and cropping methods representative of the southern triangle and central Montana.

RESULTS:
Yield – Grain yields ranged from 24.8 to 35.8 bu/a at the two Moccasin sites with McNeal being the top yielding variety (Table 35). Yields at off-station nurseries were considerably lower. YU894-75, a variety from Western Plant Breeders, was the second highest yielding variety. Long-term yield summaries are reported in Tables 39-42.

Heading Date – Heading dates were recorded for the Moccasin sites only with the average heading date being June 26. Kyle was the last variety to head and was 5 and 9 days later in heading than Monroe (Table 35). The average heading date of 177 days after January 1 is equal to the average heading date for spring wheat nurseries planted on the same day.

Test weight – Test weights for the Moccasin sites where the highest rainfall was recorded averaged 62.1 lbs/bu (Table 36). Test weights at the dryer locations were generally below 60 lbs/bu.

Protein – Proteins were high at all sites accept on Moccasin fallow. The fall fertilizer application was not made to this nursery location and grain protein averaged only 11.2 percent (Table 37). Protein levels on Moccasin recrop however averaged 17.8 percent with Plaza being highest at 19.6 percent. Grain protein at off-station nurseries ranged from 16.2 to 18.8 percent.

Plant Height – Plant heights generally averaged about 26 inches except those at the Fort Benton site where moisture level was lowest (Table 38).

SUMMARY:
McNeal was grown as a hard red spring wheat check and again out-yielded durum varieties. Mountrail was higher in yield than McNeal at the Denton and Winifred sites but McNeal topped the list when averaged across all locations and in long-term averages for any one location. Equations predicting durum wheat yields based on past variety performance are presented in Table 43.

FUTURE PLANS:
Spring durum variety evaluations will continue at Moccasin, Denton, Fort Benton, and Winifred. The Uniform Statewide trial with 20 entries will be planted at Moccasin. The off-station trials at Denton, Fort Benton, and Winifred will consist of six entries with Kyle being the check.

Table 35. 2001 Durum multi-location heading date and yield performance.
Exp. 9800 Central Agricultural Research Center, Moccasin, MT.

ID	Pedigree	Mocc Fallow 9807	Mocc Recrop 9871	Mocc Fallow 9807	Mocc Recrop 9871	Denton Recrop 9871	Fort Benton Recrop 9872	Winifred Fallow 9873	Average Grain Yield
		Julian	Julian	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a
PI574642	McNeal	178	177	**35.8**	**34.0**	24.4	**12.2**	25.3	26.3
CANKYLE	Kyle	**184**	**179**	30.7	29.5	**21.8**	11.1	23.4	23.3
D901442	Lebsock	177	176	29.6	30.2	23.5	8.5	24.0	23.1
D89135	Maier	179	176	29.8	28.9	24.0	10.6	22.9	23.2
D901313	Mountrail	179	177	32.3	27.4	**25.9**	8.8	**25.8**	24.1
D91080	Plaza	180	178	29.5	24.9	25.1	**8.1**	**22.8**	22.1
ACAVONLE	Avonlea	177	175	33.9	28.8				
D87130	Ben	178	176	28.7	29.4				
GM90001	GM90001	178	176	30.4	29.0				
GM90002	GM90002	179	177	30.0	**24.8**				
GM90014	GM90014	177	176	30.6	26.6				
GM90015	GM90015	178	177	28.1	26.8				
WPBLAKER	Laker	180	178	32.6	28.1				
DT 433	Medora	176	175	**28.0**	27.3				
PI478289	Monroe	**175**	**174**	29.2	28.1				
NDMUNICH	Munich	178	177	30.5	26.4				
PI510696	Renville	178	177	29.6	27.2				
DT 380	Sceptre	177	176	29.0	26.7				
97DU2	Utopia	177	176	30.1	27.2				
CI 17789	Vic	177	176	29.5	29.5				
CI 15892	Ward	176	174	29.5	26.1				
YU894-75	WPB YU 894-75	176	176	35.5	30.0				
Average		177.9	176.3	30.6	28.0	24.1	9.9	24.0	
CV (s/mean)*100		0.6	0.4	7.3	8.6	8.4	12.8	10.7	
LSD (0.05)		1.6	1.2	3.7	4.0	3.7	2.3	4.7	
Planting Date:		4/19	4/18	4/19	4/18	5/9	4/23	4/24	
Harvcest Date:		8/14	8/13	8/14	8/13	8/24	8/16	8/17	
Previous Crop:		Fallow	Peas	Fallow	Peas	Peas	Wtr Wheat	Fallow	
Fertilizer (actual lbs N/a):		10	77	10	77	70	90	70	
Growing Season Precipitation (in):		7.29	7.29	7.29	7.29	5.75	4.65	5.00	
Producer/Cooperator:						Barber	Birkeland	Udelhoven	

Table 36. 2001 Durum multi-location test weight performance.
Exp. 9800 Central Agricultural Research Center, Moccasin, MT.

ID	Pedigree	Mocc Fallow 9807	Mocc Recrop 9871	Denton Recrop 9871	Fort Benton Recrop 9872	Winifred Fallow 9873	Average Test Weight
		lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
PI574642	McNeal	60.9	62.6	57.7	**57.0**	**58.3**	59.3
CANKYLE	Kyle	63.2	**60.6**	**57.5**	**60.9**	**61.4**	60.7
D901442	Lebsock	63.7	61.6	**60.5**	59.1	60.3	61.0
D89135	Maier	63.7	62.0	58.5	58.4	59.8	60.5
D901313	Mountrail	62.8	60.8	59.2	57.8	59.4	60.0
D91080	Plaza	62.3	61.7	58.8	58.1	59.7	60.1
ACAVONLE	Avonlea	64.0	62.6				
D87130	Ben	63.0	63.1				
GM90001	GM90001	62.0	62.4				
GM90002	GM90002	**64.7**	61.3				
GM90014	GM90014	63.3	63.3				
GM90015	GM90015	59.6	62.8				
WPBLAKER	Laker	63.3	63.3				
DT 433	Medora	61.9	61.8				
PI478289	Monroe	**59.2**	**63.6**				
NDMUNICH	Munich	60.9	62.3				
PI510696	Renville	61.6	61.3				
DT 380	Sceptre	60.1	60.7				
97DU2	Utopia	61.2	61.7				
CI 17789	Vic	62.6	61.3				
CI 15892	Ward	61.2	63.4				
YU894-75	WPB YU 894-75	61.6	61.4				
Average		62.1	62.1	58.7	58.9	60.1	
CV (s/mean)*100		2.0	3.0	1.5			
LSD (0.05)		2.1	3.0	1.6			

Table 37. 2001 Durum multi-location grain protein performance.
Exp. 9800 Central Agricultural Research Center, Moccasin, MT.

ID	Pedigree	Mocc Fallow 9807	Mocc Recrop 9871	Denton Recrop 9871	Fort Benton Recrop 9872	Winifred Fallow 9873	Average Grain Protein
		%	%	%	%	%	%
PI574642	McNeal	11.7	**16.1**	18.2	**16.2**	17.8	16.0
CANKYLE	Kyle	11.2	18.1	**18.8**	16.4	17.7	16.4
D901442	Lebsock	10.5	16.5	17.7	**17.1**	**17.3**	15.8
D89135	Maier	11.0	18.0		16.9	**18.3**	16.1
D901313	Mountrail	**10.3**	18.2	17.9	16.6	17.6	16.1
D91080	Plaza	12.1	**19.6**	**17.6**	17.0	17.4	16.7
ACAVONLE	Avonlea	11.9	18.2				
D87130	Ben	10.8	18.5				
GM90001	GM90001	10.8	18.2				
GM90002	GM90002	11.4	18.3				
GM90014	GM90014	11.1	17.9				
GM90015	GM90015	12.0	16.7				
WPBLAKER	Laker	10.7	16.8				
DT 433	Medora	11.1	18.1				
PI478289	Monroe	11.6	16.9				
NDMUNICH	Munich	10.7	18.7				
PI510696	Renville	10.4	18.4				
DT 380	Sceptre	11.5	18.3				
97DU2	Utopia	11.1	17.8				
CI 17789	Vic	12.1	16.7				
CI 15892	Ward	**12.2**	19.1				
YU894-75	WPB YU 894-75	10.3	16.4				
Average		11.2	17.8	18.0	16.8	17.7	

Table 38. 2001 Durum multi-location plant height performance.
Exp. 9800 Central Agricultural Research Center, Moccasin, MT.

ID	Pedigree	Mocc Fallow 9807	Mocc Recrop 9871	Denton Recrop 9871	Fort Benton Recrop 9872	Winifred Fallow 9873	Average Plant Height
		in	in	in	in	in	in
PI574642	McNeal	27.0	29.3	24.0	17.3	26.3	24.8
CANKYLE	Kyle	30.0	33.3	**32.0**	**18.3**	24.7	27.7
D901442	Lebsock	27.7	28.3	26.0	16.3	25.0	24.7
D89135	Maier	27.3	29.3	24.0	15.7	**26.7**	24.6
D901313	Mountrail	28.0	28.0	25.0	**15.0**	**23.7**	23.9
D91080	Plaza	22.7	24.3	**22.0**	17.3	**23.7**	22.0
ACAVONLE	Avonlea	29.0	31.0				
D87130	Ben	28.3	30.0				
GM90001	GM90001	**20.3**	22.7				
GM90002	GM90002	22.3	23.3				
GM90014	GM90014	22.0	24.7				
GM90015	GM90015	20.7	22.7				
WPBLAKER	Laker	24.7	23.7				
DT 433	Medora	31.3	**33.7**				
PI478289	Monroe	29.0	30.3				
NDMUNICH	Munich	26.0	28.0				
PI510696	Renville	30.0	30.7				
DT 380	Sceptre	26.0	29.3				
97DU2	Utopia	20.7	**22.0**				
CI 17789	Vic	30.0	32.3				
CI 15892	Ward	**32.0**	32.0				
YU894-75	WPB YU 894-75	24.0	25.7				
Average		26.3	27.9	25.8	16.7	25.0	
CV (s/mean)*100		5.3	4.2		7.6	6.9	
LSD (0.05)		2.3	1.9		ns	ns	

Table 39. Moccasin re-crop spring durum multi-year yield summary of selected varieties.
Exp. 9807 Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1996	1997	1998	1999	2000	2001	Average
	---------- bu/a ----------						
McNeal[1/]	24	65	32	41	31	34	37.8
Monroe	23	56	33	31	27	28	33.0
Laker	23	50	34	34	28	28	32.9
Medora	23	51	29	31	24	27	30.9
Ben	23	53	33	32	27	29	32.9
Renville	22	59	29	34	24	27	32.5
Ward	22	50	27	32	27	26	30.7
Kyle	21	56	31	32	29	30	33.1
Vic	21	58	35	31	31	30	34.3
Plenty	20	56	32	34	27	-	33.8
Munich	20	57	33	34	31	26	33.6
Sceptre			33	33	28	27	30.2
Nursery Mean	21.8	55.0	31.4	34.0	28.8	28.0	

[1/] McNeal is used as a hard red spring wheat check.

Table 40. Denton re-crop spring durum multi-year yield summary of selected varieties.
Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1997	1998	1999	2000	2001	Average
	---------- bu/a ----------					
McNeal[1/]	43	34	21	31	24	30.6
Kyle	28	33	17	23	22	24.6
Maier			14	23	24	20.3
Mountrail			16	26	26	22.5
Lebsock				26	24	24.8
Plaza				24	25	24.6
Nursery Mean	26.8	28.3	14.5	25	24.1	

[1/] McNeal is used as a hard red spring wheat check.

Table 41. Fort Benton recrop spring durum multi-year yield summary of selected varieties. Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1998	1999	2000	2001	Average
			bu/a		
McNeal[1/]	19	33	18	12	20.6
Kyle	16	25	11	11	15.8
Maier		26	14	11	16.9
Mountrail		26	15	9	16.7
Lebsock			14	9	11.3
Plaza			12	8	10.1
Nursery Mean	17.6	26.8	13.9	9.9	

[1/] McNeal is used as a hard red spring wheat check.

Table 42. Winifred recrop spring durum multi-year yield summary of selected varieties. Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1998	1999	2000	2001	Average
			bu/a		
McNeal[1/]	47	44	33	25	37.3
Kyle	39	33	34	23	32.4
Maier		36	35	23	31.3
Mountrail		34	36	26	31.9
Lebsock			30	24	27.0
Plaza			31	23	26.9
Nursery Mean	38.7	34.3	31.7	24.0	

[1/] McNeal is used as a hard red spring wheat check.

Table 43. Predictive yields of selected durum varieties grown in Central Montana based on previous six years[1/] of variety performance. Central Agricultural Research Center, Moccasin, MT.

	Yield Level (**X**) in bu/a					
	30	**45**	**60**			
Variety	Projected Yields (**Y**) – bu/a			LY[2/]	Predictive Equation	R^2
Belzer	**30.4**	**45.7**	**61.1**	12	Y = 1.023 - 0.3052	0.9894
Ben	**29.4**	**44.3**	**59.1**	17	Y = 0.9918 - 0.3719	0.9844
Crosby	**27.6**	**42.4**	**57.1**	11[3]	Y= 0.9851 - 1.964	0.9659
Kyle	**30.0**	**45.4**	**60.8**	20	Y = 1.0257 - 0.7715	0.9810
Laker	**30.2**	**43.4**	**56.6**	14	Y = 0.8804 + 3.809	0.9390
Lebsock	**30.2**	**45.7**	**61.2**	9[3]	Y = 1.0328 - 0.809	0.9865
Lloyd	**30.3**	**45.1**	**59.9**	11[3]	Y = 0.9841 + 0.804	0.9815
Maier	**30.7**	**46.8**	**62.8**	13	Y = 1.0708 - 1.436	0.9873
McNeal[4/]	**35.7**	**53.0**	**70.2**	19	Y = 1.1511 + 1.149	0.9524
Medora	**28.4**	**42.2**	**56.0**	14	Y = 0.9202 + 0.796	0.9792
Monroe	**29.6**	**45.7**	**61.7**	14	Y = 1.0707 - 2.527	0.9697
Mountrail	**31.1**	**46.8**	**62.6**	13	Y = 1.0487 - 0.366	0.9839
Munich	**29.9**	**46.1**	**62.2**	17	Y = 1.0739 - 2.275	0.9860
Plaza	**29.4**	**45.2**	**61.0**	9[3]	Y = 1.0549 - 2.274	0.9866
Plenty	**29.4**	**45.2**	**61.0**	15	Y = 1.0526 - 2.183	0.9750
Renville	**29.1**	**45.3**	**61.5**	14	Y = 1.0781 - 3.211	0.9828
Sceptre	**29.4**	**43.9**	**58.4**	14	Y = 0.9678 + 0.3528	0.9747
Utopia	**32.8**	**48.7**	**64.6**	6[3/]	Y = 1.0584 + 1.061	0.9628
Vic	**30.2**	**46.3**	**62.4**	14	Y = 1.0725 - 1.949	0.9761
Ward	**27.6**	**40.2**	**52.7**	13	Y = 1.8367 + 2.505	0.9882

1/ Data used to calculate predictive equations is compiled from fallow and no-till, irrigated and dryland environments in Moccasin, Denton, Fort Benton, and Winifred from 1996 – 2001.
2/ LY = Number of Location/Years used to create the predictive equation.
3/ Varieties with fewer than 12 location/years may not be accurate, use equation with caution.
4/ McNeal is used as a hard red spring wheat check.
Data file C:\Regression.xls