THIRTY-SEVENTH ANNUAL REPORT

1985

Northwestern Agricultural Research Center
of the
Agricultural Experiment Station
Montana State University

4570 Montana 35
Kalispell, Montana 59901

Prepared by

Vern R. Stewart
Professor of Agronomy and Superintendent

Leon E. Welty
Associate Professor Agronomy

Todd K. Keener
Ag. Research Specialist I

Louise S. Prestbye
Ag. Research Technician II

ADMINISTRATION 750

The Administration Project (750) at the Northwestern Agricultural Research Center includes expenses for the overall operation of the center, personnel and office equipment purchased. Personnel for 1985 is listed below.

Full - time Staff Members

Vern R. Stewart - Superintendent & Prof. Agronomy began April 1952
Leon E. Welty - Associate Prof. Agronomy began January 1973
Oscar Buller - Farm/Ranch Hand III began January 1984
Jeanette Calbick - Secretary II began September 1963
Gary Haaven - Agricultural Research Technician I began April 1982
Todd Keener - Agricultural Research Specialist I began March 1978
Louise Prestbye - Agricultural Research Technician II began May 1983

Student Employees

Ramona Benz (April 18 thru September 12)
Krisit Carda (June 17 thru September 13)
Craig Fischer (June 17 thru August 29)
Kirk Hanson (June 5 thru August 13)
Wanda Iverson (June 17 thru September 13)
Randy Turnacliff (June 3 thru August 16)
Jeffery Walton (July 16 thru August 29)

Parttime Hourly Employees

Larry Conrad
Sandra Conrad
Mavis Heitman
O'Brien Michnal
Sondra Mockabee
Sherry Savage
Amy Wilcox

Office equipment purchased with G&C funds follows:

IBM-PC	$5126
Gemini 15X Printer	445
Systems Stand	647
Pen Plotter	875
Wheelwriter 5 Typewriter w/printer option	584
Total	$7677

GENERAL FARM 751

The General Farm Project (751) supports all research projects. This includes capital items purchased and used in the total research program. The following were purchased in 1985 using several grant funds.

1.	Ford ½T Pickup		$9774
2.	Portable Air Compressor		870
3.	Sartorius Balance Scale		1168
4.	Seed Cleaner		1675
		Total	$13487

PHYSICAL PLANT 752

The Physical Plant Project (752) pertains to the maintenance of buildings and grounds at the Northwestern Agricultural Research Center.

A 48' x 96' machine storage building was erected on the eastern corner of Field X-1. Now all the vehicles and equipment that had been sitting out can be stored inside out of the elements.

Three Bulk Flow Grain Tanks were purchased in 1984, but were not used until the 1985 season. They are to be used for storage of foundation seed.

Before the new tanks were installed a concrete slab was poured and the four grain bins that were sitting beside the Crops Livestock Bldg. were moved south of the buildings along the creek bank. Then the new tanks were installed beside these on the concrete slab.

VISITORS - 1985

DATE		REPRESENTING	ADDRESS
1/8	Eugene Dolezal	Farmer	Ronan, MT
1/9	Tom Whitley	Communications Systems	Helena, MT
1/15	Greg Bain	Greg Bain & Company	Kalispell, MT
2/11	Floyd LaBrant	Farmer	Kalispell, MT
2/14	Rod & Susan Warner	DuPont	Bozeman, MT
2/19	Durwin Wick	SCS	Kalispell, MT
	Bob Bishop	SCS	Kalispell, MT
	Lee Hirshebur	SCS	Missoula, MT
2/22	Greg Bain	Greg Bain & Company	Kalispell, MT
2/26	Greg Bain	Greg Bain & Company	Kalispell, MT
3/4	Greg Bain	Greg Bain & Company	Kalispell, MT
3/6	Donald Baldridge	Extension Service	Bozeman, MT
	Dan Burkhart	Graduate Student	Bozeman, MT
3/6-7	Jim Story	Western Ag. Res. Cnt.	Corvallis, MT
3/7	Jim Buechle	Farmer	Kalispell, MT
3/12	Donald Casterline	Farmer	Kalispell, MT
3/14	Tom Perkins	Farmer	Kalispell, MT
3/15	Marvin J. Douma	Farmer	Moise, MT
	Dick Kerr	Farmer	Moise, MT
3/21	Greg Bain	Greg Bain & Company	Kalispell, MT
3/25	Andy VanTeylingen	University Services	Bozeman, MT
	Greg Bain	Greg Bain & Company	Kalispell, MT
3/26	Greg Bain	Greg Bain & Company	Kalispell, MT
4/1	Greg Bain	Greg Bain & Company	Kalispell, MT
4/2	Hank Ramsey	MoBay	Yakima, WA
4/3	Ron Pack	Pack & Company	Kalispell, MT
4/4	Ramona Benz	Job Applicant	Kalispell, MT
4/8	Durwin Wick	SCS	Kalispell, MT
	Sonju	Sonju Seamless Raingutters	Kalispell, MT
4/13	Gary Fellows	Graduate Student	Bozeman, MT
	Dan Burkhart	Graduate Student	Bozeman, MT
4/15	John Combs	Big Sky Equipment Co.	Conrad, MT
	Jim Buechle	Farmer	Kalispell, MT
4/16	Darrell Dumke	Job Applicant	Kalispell, MT
4/17	Kevin Fay	Job Applicant	Kalispell, MT
4/25	Oakford Bain	Cyanamid	Boise, ID
4/26	Dan Burkhart	Graduate Student	Bozeman, MT
	Gary Fellows	Graduate Student	Bozeman, MT
	Virginia DeMars	Visitor	Bigfork, MT
4/30	O'Brien Michnal	Job Applicant	Kalispell, MT
5/7-8	Dan Burkhart	Graduate Student	Bozeman, MT
	Gary Fellows	Graduate Student	Bozeman, MT
5/9	Mark Passmore	Farmer	Kalispell, MT
	Jim Adams	Monsanto	Great Falls, MT
	Jim Toth	Monsanto	Clinton, MT

DATE		REPRESENTING	ADDRESS
5/10	Kristi Carda	MSU Student	Bozeman, MT
5/13	Floyd LaBrant	Farmer	Kalispell, MT
5/14	Clyde Pederson	Farmer	Kalispell, MT
6/3	Durwin Wick	SCS	Kalispell, MT
	Bob Bishop	SCS	Kalispell, MT
	Doug Gamma	Farmer	Marion, MT
6/4	Oakford Bain	Cyanamid	Boise, ID
	Art Jenson	Cyanamid	Orinda, CA
6/11-12	Dan Burkhart	Graduate Student	Bozeman, MT
	Gary Fellows	Graduate Student	Great Falls, MT
6/12	Bob Brattain	DuPont	Great Falls, MT
	Andy VanTeylingen	University Services	Bozeman, MT
6/19	Al Luke	Union Carbide	Idaho Falls, ID
6/24	Arne Hovin	Assoc. Director, MAES	Bozeman, MT
6/27-28	Pat Hensleigh	P&SS - MSU	Bozeman, MT
7/1	Jim Christensen	MT Wheat Res. & Marketing	Great Falls, MT
	Maria Rietmann	Western Wheat Assoc.	Portland, OR
	Mr. Li	Visitor to USA	Mainland China
	Mr. Chang	Visitor to USA	Mainland China
7/12	Greg Carson	Carson Bros. C-B Inc.	Kalispell, MT
7/16-18	Arlyn Evans	Photographer	Memphis, TN
7/24	Roger,Gayle,Heidi Stewart	Visitors	Madison, WI
7/25	Andy VanTeylingen	University Services	Bozeman, MT
7/26	Ron Richwine	Farmer	Kalispell, MT
8/6	Jim Nelson	Ext. Weed Specialist	Bozeman, MT
8/8	Pat Branike	Traveler	Oklahoma
8/12	Mark Passmore	Farmer	Kalispell, MT
8/13	Greg Cunniff	Visitor	Helena, MT
8/14	Dan Burkhart	Graduate Student	Bozeman, MT
	Gary Fellows	Graduate Student	Bozeman, MT
	John Lindstrom	Graduate Student	Bozeman, MT
8/19	Janelle Johnson	Cyanamid	Twin Falls, ID
8/20	Mavis Heitman	Job Applicant	Kalispell, MT
8/20-21	Jim Sims	P&SS - MSU	Bozeman, MT
8/21	Tom Pyle	Jacklin Seed Co.	
8/26	Ron Richwine	Farmer	Kalispell, MT
8/29	John Vanisko	Farmer - Adv. Comm. Member	Deer Lodge, MT
	Bill Ambrose	Farmer	Kalispell, MT
	Dan Burkhart	Graduate Student	Bozeman, MT
	Gary Fellows	Graduate Student	Bozeman, MT
	John Lindstrom	Graduate Student	Bozeman, MT
	Emmet Quigley	Cenex	Kalispell, MT
	Bruce Huffine	Cenex	Kalispell, MT
	Bill Dopp	County Weed Control	Kalispell, MT
	Francis VanRinsum	County Weed Control	Kalispell, MT

DATE		REPRESENTING	ADDRESS
9/17	Sondra Mockabee	Job Applicant	Kalispell, MT
9/18	Emmet Quigley	Cenex	Kalispell, MT
	Dewey Anderson	Cenex	Kalispell, MT
9/19	Burton Isch	Farmer	Kalispell, MT
9/24	Tom Mahugh	Mutual of Omaha	Kalispell, MT
	Bruce Hewitt	Gustafson Co.	Moses Lake, WA
	Jim Morgan	Gustafson Co.	Belgrade, MT
10/10	Larry Holzworth	SCS	Bozeman, MT
	Hal Hunter	SCS	Bozeman, MT
	Kit Sutherland	SCS	Missoula, MT
	Tera Comfort	SCS	Missoula, MT
	Jay Norton	SCS	Missoula, MT
	Joe Long	SCS	Missoula, MT
	Peggy Haaglund	SCS	Missoula, MT
11/12	Rod Warner	DuPont	Bozeman, MT
	Lew Toews	Farmer	Kalispell, MT
12/23	Myron Mast	Farmer	Kalispell, MT

ACTIVITIES 1985

T = Talk

DATE	ACTIVITY	STAFF	LOCATION
1/17	N.W. & W. Ag. Res. Cnt. Adv. Comm.	(T) Stewart (T) Welty	Allentown
1/18	Ed. Comm. Meeting, Equity Supply	Stewart Welty	Kalispell
1/19	Montana Weed Control Conference	(T) Stewart	Kalispell
1/24	Montana Weed Control Conference	Stewart	Great Falls
1/28-2/1	Planning Conference	Stewart Welty	Bozeman
2/5	Ext. Ser. Dairy Nutrition Program	Stewart Welty	Somers
2/7-8	WSA Meeting	Stewart	Seattle, WA
2/14	CRD Meeting	Stewart	Kalispell
2/15	Equity Supply annual Meeting	(T) Stewart	Kalispell
2/19	Equity Educational Program	Stewart Welty	Kalispell
2/21	Farm Show	Stewart Welty	Kalispell
2/26	Chamber of Commerce Meeting	Stewart	Kalispell
2/28-3/1	DuPont Academic Seminar	Stewart	Denver, CO
3/6	Crops & Soils Day	(T) Stewart (T) Welty	Creston
3/11-14	West. Soc. Weed Science	(T) Stewart	Phoenix, AZ
3/15	Chamber Commerce Meeting	Stewart	Kalispell
	Union Carbide Meeting (Cerone)	Stewart	Kalispell
3/19	Farmers Meeting	(T) Stewart (T) Welty	Missoula
3/20	Search Committee Meeting	Welty	Bozeman
	Meetings w/AES Staff	Stewart	
3/21	County Agents Up-Dating Meeting	(T) Stewart (T) Welty	Allentown
3/22	Cenex Meeting	(T) Stewart (T) Welty	Kalispell
3/25	WRCC-52 Meeting	Welty	Spokane, WA
3/28	Monsanto Academic Seminar	Stewart	Bozeman
4/9	Mint Growers	(T) Stewart	Kalispell
4/12	Eastside Grange	Stewart	Creston
4/19	Chamber of Commerce	Stewart	Kalispell
4/24	Farmers Meeting	(T) Welty	Eureka
	Farmers Meeting	(T) Welty	Troy
4/25	Farmers Meeting	(T) Welty	Trout Creek
	Farmers Meeting	(T) Welty	Hot Springs
5/1	Ranch Tour	(T) Stewart (T) Welty	Greenough Area
5/2	Budget Meeting	Stewart	Bozeman
5/17	Chamber of Commerce	Stewart	Kalispell
5/23	Advisory Committee Meeting	Stewart	Missoula
5/24	Tour Polson Middle School	(T) Welty	Station
6/13	Inspection of Oat Nurseries	Stewart	Havre
6/14	Weed Fair	(T) Stewart	Culbertson
6/14	Inspection of Oat Nurseries	Stewart	Sidney

ACTIVITIES 1985 (con't)

DATE	ACTIVITY		STAFF	LOCATION
7/1	Don Graham's Retirement Party		Stewart	Corvallis
			Welty	
7/2	Search Committee Meeting		Stewart	Corvallis
7/9	Tour of Western Triangle Res. Cnt.		Stewart	Conrad
7/10	Field Day	(T)	Stewart	Moccasin
7/19	Summer Staff Conference		Stewart	Huntley
			Welty	
7/24	County Agents Tour	(T)	Stewart	Station
		(T)	Welty	
7/26	Chamber of Commerce		Stewart	Kalispell
7/29	Look at plots		Welty	Bozeman
8/15	Tour by Cenex Representatives		Stewart	Station
			Welty	
9/3	Superintendent's Meeting		Stewart	Lewistown
9/13-14	Weed Science Retreat		Stewart	Bozeman
9/26	Extension Advisory Committee		Stewart	Kalispell
10/10	Tour SCS Personnel	(T)	Welty	Station
10/15	Search Committee Meeting		Stewart	Missoula
10/31	Extension Service TV Documentary		Stewart	Kalispell
11/4	Search Committee Meeting		Stewart	Missoula
11/13-14	Search Committee Meeting		Stewart	Corvallis
11/18-21	Assert Seminar		Stewart	San Diego, CA
11/24-25	Search Committee Meeting		Stewart	Corvallis
12/1-4	ASA Meeting	(T)	Stewart	Chicago, IL
12/4	Canola Meeting		Welty	Station
12/10-11	Planning Conference		Stewart	Bozeman
			Welty	
12/12	Variety Recommendation Meeting		Stewart	Bozeman
			Welty	
12/13	Dan Burkhart's Masters Examination		Stewart	Bozeman
12/15-16	Search Committee		Stewart	Corvallis
12/18	Chamber of Commerce		Stewart	Kalispell

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DISTRIBUTION OF THE
1985 NORTHWESTERN AGRICULTURAL RESEARCH CENTER REPORT

Copies	
1	Plant and Soil Science Department
3	Research Staff at Northwestern Agricultural Research Center
11	County Extension Agents in Northwestern Montana

Program Coordinator - Bill Peterson
Deer Lodge - Kimberly Thompkins
Flathead - Darrell Fenner
Granite - Lyle Niederklein
Lake - Wilfred Huot
Lincoln - Robert Wilson
Mineral -
Missoula - Gerald Marks
Powell - David Streufert
Ravalli - G. Robert Johnson
Sanders - Donald Nicholson

1	Agricultural Stabilization and Conservation
1	Farmers Home Administration
1	Flathead Chapter Future Farmers of America
1	Soil Conservation Service
1	Federal Land Bank Association
4	Feed Mills

Co-op Supply Inc. - Ronan
Equity Supply Company - Kalispell
Farmers Union Exchange - Kalispell
Westland Seeds - Ronan

CLIMATOLOGICAL DATA
NORTHWESTERN AGRICULTURAL RESEARCH CENTER
Kalispell, Montana

Since 1949 weather data has been tabulated by personnel of the Northwestern Agricultural Research Center and sent to the National Climatic Center, Ashville, North Carolina. The data is then published in Climatological Data, the official publication of the National Oceanic and Atmospheric Administration. Data collected are the maximum and minimum air temperatures, soil temperatures (4 & 8 inches) and precipitation.

Summary for the 1984-85 Crop Year

In this report the days between September 1, 1984 and August 31, 1985 are included.

For this period we received two inches less precipitation than average. September, October and May were the only months with above average precipitation. January, June and July were below average with a total of 2.55 inches. The average for these three months is 5.81 inches. There have been several years when total precipitation was less than this year, but this was the lowest recorded since 1978-79.

All months had below average temperatures except April, May and July making this one of the coldest years in the history of the station. Only 1949-50, 1951-52 and 1978-79 were colder.

Included in this report are several tables giving the weather for the crop year and also detailed descriptions of the weather since recording first began.

Table 1 - Summary of climatic data by months for 1984-85 crop year and averages for the period 1949-85.
Table 2 - Summary of average temperatures on a crop year basis by month and year.
Table 3 - Summary of maximum temperatures on a crop year basis by month and year.
Table 4 - Summary of minimum temperatures on a crop year basis by month and year.
Table 5 - Total precipitation in inches on a crop year basis by month and year.
Table 6 - Precipitation by day for crop year, September 1, 1984 thru August 31, 1985.
Table 7 - Frost free period from 1950 thru 1985.
Table 8 - Temperature extremes from 1950 thru 1985.
Table 9 - Average temperature by month and year from January 1950 thru December 1985.
Table 10 - Total precipitation (inches) by months and years from January 1950 thru December 1985.

Table 1. Summary of climatic data by months for 1984-85 crop year (September thru August) and averages for the period 1949-85 at the Northwestern Agricultural Research Center, Kalispell, MT.

ITEM	Sept. 1984	Oct. 1984	Nov. 1984	Dec. 1984	Jan. 1985	Feb. 1985	Mar. 1985	Apr. 1985	May 1985	June 1985	July 1985	Aug. 1985	Total or Average
Precipitation (inches) Current Year	2.15	2.25	1.40	1.29	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62	17.56
Avg. 1949 to 1984-85	1.51	1.38	1.43	1.70	1.54	1.19	1.10	1.41	2.23	2.85	1.42	1.63	19.39
Mean Temperature (F) Current Year	49.5	40.0	32.6	20.6	19.2	19.0	30.8	44.8	53.7	57.6	68.3	60.2	41.4
Avg. 1949 to 1984-85	53.6	43.4	32.9	25.9	21.8	28.1	33.5	43.0	51.5	58.2	64.2	63.0	43.3

Last killing frost in spring	
1985	May 13 (26 degrees F)
Avg. 1949-85	May 26
First killing frost in fall	
1985	September 7 (32 degrees F)
Avg. 1949-85	September 14
Frost Free Period	
1985	117 days
Avg. 1949-85	111 days
Maximum summer temperature	94 degrees F on July 9, 11 and 23, 1985
Minimum winter temperature	24 degrees F below zero on January 30, 1985

In this summary 32 degrees is considered a killing frost.

Table 2. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1985.

Average temperature by month and year
Degrees Fahrenheit

YEAR	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	MEAN
1949-50	54.1	41.5	38.5	25.0	4.2	25.6	31.2	41.9	49.7	57.0	64.0	62.5	41.3
1950-51	53.8	45.9	31.5	29.5	20.2	27.7	27.0	42.1	50.0	54.2	64.7	60.4	42.3
1951-52	50.6	40.8	30.8	16.9	18.0	26.6	29.3	45.8	52.4	56.7	61.8	62.8	41.0
1952-53	56.0	45.5	30.4	27.6	36.0	32.9	37.2	41.2	49.5	54.6	64.3	63.1	44.9
1953-54	56.1	46.2	37.0	31.3	21.1	31.2	29.6	40.8	52.5	54.9	63.4	60.1	43.7
1954-55	52.9	41.5	38.8	28.8	25.7	22.1	24.5	39.1	47.7	58.8	62.7	62.2	42.1
1955-56	52.5	44.6	23.5	21.8	23.3	20.9	31.5	44.2	54.0	59.0	64.8	62.0	41.8
1956-57	55.2	44.1	30.9	28.5	10.2	23.4	33.3	43.7	55.6	59.7	65.4	62.4	42.7
1957-58	55.8	41.4	32.1	32.4	29.1	30.4	32.2	43.6	59.6	62.3	65.2	67.9	46.0
1958-59	55.5	44.6	32.8	28.2	24.7	23.1	35.3	45.2	48.1	59.9	64.5	61.0	43.6
1959-60	53.0	43.9	25.5	27.6	19.4	25.2	32.3	44.3	50.6	59.6	68.8	60.6	42.6
1960-61	55.0	45.2	34.4	24.9	27.8	37.0	38.3	42.0	52.6	64.7	66.2	67.8	46.3
1961-62	49.6	42.3	28.2	23.6	17.4	25.7	30.9	47.2	51.5	58.6	62.1	62.1	41.6
1962-63	54.7	44.7	38.0	32.5	11.8	33.1	38.7	43.2	51.4	59.4	63.0	64.9	44.6
1963-64	58.7	47.4	35.8	24.0	28.5	28.3	30.6	42.8	51.1	58.7	64.3	58.9	44.1
1964-65	51.2	43.7	33.7	22.1	30.2	28.7	28.6	45.2	50.6	57.6	64.6	63.6	43.3
1965-66	46.4	47.6	35.0	28.8	26.3	27.7	34.5	42.9	54.3	56.0	64.5	61.7	43.8
1966-67	59.3	43.4	33.4	30.2	31.0	33.2	32.9	40.6	52.2	59.4	66.1	67.2	45.7
1967-68	61.0	45.9	33.8	25.2	23.3	32.8	41.2	42.0	49.8	59.0	64.6	61.3	45.0
1968-69	53.8	42.9	33.4	19.9	13.1	24.0	29.6	47.1	53.9	58.8	62.3	63.6	41.9
1969-70	56.0	40.0	35.2	27.7	21.9	29.9	32.8	40.2	53.2	62.0	64.8	62.6	43.9
1970-71	48.7	40.1	31.3	26.2	23.6	29.9	33.2	43.6	52.5	54.9	61.9	68.2	42.8
1971-72	49.5	40.4	34.1	22.2	17.0	27.3	38.5	40.6	51.9	59.3	61.5	65.9	42.4
1972-73	50.2	40.3	33.7	19.9	20.7	27.8	37.7	42.2	51.5	57.5	65.1	64.5	42.6
1973-74	53.3	44.1	29.3	30.8	21.0	32.3	33.6	42.7	48.0	61.5	64.8	61.6	43.6
1974-75	52.8	43.6	34.8	30.1	21.5	21.5	29.9	37.6	48.6	55.9	69.1	59.8	42.1
1975-76	52.1	42.9	35.4	27.5	27.7	29.9	31.0	43.4	51.9	54.5	63.4	61.3	43.4
1976-77	55.2	42.4	33.1	28.6	20.0	30.9	34.4	45.0	49.7	61.5	62.6	62.8	43.9
1977-78	51.7	42.5	30.4	22.0	21.6	26.1	34.3	43.7	48.1	59.1	63.4	60.3	41.9
1978-79	53.7	43.7	27.2	18.8	4.1	24.9	34.7	42.3	51.5	59.4	65.0	65.4	40.9
1979-80	56.9	46.6	30.7	33.0	16.3	29.0	32.6	47.1	54.8	56.9	63.5	58.6	43.8
1980-81	54.1	45.3	35.8	32.2	30.1	31.3	38.5	44.5	52.5	53.8	62.8	66.4	45.6
1981-82	55.3	43.2	36.0	27.0	21.6	24.5	37.5	39.4	49.8	59.8	61.1	63.0	43.2
1982-83	53.4	41.0	29.1	25.9	30.3	33.8	37.9	42.4	51.9	57.6	59.6	65.4	44.0
1983-84	50.4	42.9	36.6	11.1	27.6	32.4	38.3	42.2	48.7	56.4	65.3	64.6	43.0
1984-85	49.5	40.0	32.6	20.6	19.2	19.0	30.8	44.8	53.7	57.6	68.3	60.2	41.4
MEAN	53.6	43.4	32.9	25.9	21.8	28.1	33.5	43.0	51.5	58.2	64.2	63.0	

Mean temperature for all years = 43.3

Table 3. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1985.

Average maximum temperature by month and year
Degrees Fahrfenheit

YEAR	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	MEAN
1949-50	71.4	52.4	45.7	32.1	14.4	34.6	38.4	52.3	63.1	70.1	78.6	79.5	52.7
1950-51	70.9	55.8	38.2	36.3	28.7	36.6	37.3	57.9	63.2	66.6	82.4	77.0	54.2
1951-52	64.2	47.5	37.2	23.6	25.9	35.7	39.5	61.8	65.7	70.2	79.2	79.5	52.5
1952-53	73.4	62.6	40.6	33.2	41.3	39.1	46.8	51.5	62.5	66.8	83.3	79.5	56.7
1953-54	72.3	61.0	45.6	36.7	29.1	38.4	40.0	51.0	67.2	67.0	80.1	74.4	55.2
1954-55	66.4	53.4	45.9	34.9	31.8	31.2	33.9	48.1	60.5	74.7	76.9	82.4	53.3
1955-56	67.6	55.5	30.8	29.2	30.7	30.1	39.7	57.4	67.5	73.3	81.2	77.8	53.4
1956-57	71.0	53.7	37.6	35.5	19.0	33.2	43.3	55.3	70.2	72.4	82.1	80.0	54.4
1957-58	74.3	50.5	40.1	38.5	33.7	37.9	43.5	54.4	77.5	75.7	80.8	85.5	57.7
1958-59	69.7	57.9	39.6	34.1	31.8	31.9	43.9	57.9	61.5	74.3	83.2	76.3	55.2
1959-60	64.0	53.6	33.9	33.3	27.5	34.1	43.4	56.1	63.0	74.8	88.7	74.1	53.9
1960-61	72.1	57.8	41.1	29.8	35.0	43.1	48.2	51.6	65.3	82.0	83.7	86.3	58.0
1961-62	62.3	53.3	35.1	30.4	26.0	33.4	40.5	60.7	62.7	74.2	79.2	77.5	52.9
1962-63	71.7	54.7	43.8	37.9	19.9	41.4	48.9	55.7	67.1	71.8	79.6	82.5	56.3
1963-64	74.6	59.4	43.4	30.2	35.1	37.7	39.7	53.3	63.5	71.4	80.3	72.9	55.1
1964-65	63.9	55.0	41.0	28.9	35.1	36.9	41.0	57.6	64.3	71.4	80.8	77.1	54.4
1965-66	57.5	61.1	42.6	35.4	31.8	35.3	45.4	54.8	69.8	69.1	81.2	78.4	55.2
1966-67	74.9	55.1	41.1	35.8	36.7	40.9	41.3	52.6	66.0	73.3	84.8	87.2	57.5
1967-68	78.9	55.8	41.3	30.8	31.5	40.8	52.6	54.2	63.4	72.2	82.7	75.7	56.7
1968-69	65.9	53.1	40.6	27.3	20.8	32.5	40.9	59.5	68.7	72.0	78.9	83.0	53.6
1969-70	70.4	49.7	43.0	32.8	28.5	36.2	42.5	49.7	67.9	75.5	79.1	80.9	54.7
1970-71	62.5	52.2	40.0	34.1	30.6	38.6	41.6	56.2	66.4	67.3	78.0	87.5	54.6
1971-72	64.2	53.1	41.2	30.9	27.1	35.9	47.9	51.7	64.7	72.4	76.9	83.3	54.1
1972-73	64.0	51.3	41.4	28.6	30.6	38.5	47.7	53.8	65.8	69.6	83.7	83.2	54.9
1973-74	67.6	56.3	36.8	36.5	28.5	39.6	43.5	53.1	59.2	76.2	80.3	77.6	54.6
1974-75	70.9	61.4	43.2	37.4	32.0	31.5	39.4	48.1	61.2	68.5	85.5	73.0	54.3
1975-76	69.4	52.3	40.4	35.1	36.2	37.6	40.1	54.3	66.2	66.3	79.0	74.4	54.3
1976-77	73.2	57.7	42.1	36.1	28.0	39.1	42.7	60.2	61.9	77.0	76.6	77.4	56.0
1977-78	64.7	55.4	38.5	29.4	28.8	35.5	45.5	54.3	58.1	72.6	77.5	74.2	52.9
1978-79	65.7	59.2	35.9	28.2	13.7	33.2	45.3	52.5	64.3	73.9	81.5	82.8	53.0
1979-80	74.1	59.5	37.8	39.2	25.2	35.9	40.8	60.4	66.9	69.0	77.0	73.2	54.9
1980-81	66.9	59.0	43.9	39.2	34.0	38.9	49.7	54.8	63.3	63.8	78.1	85.0	56.4
1981-82	70.8	54.1	44.9	34.2	29.7	33.3	45.8	50.5	62.5	74.3	75.0	80.6	54.6
1982-83	69.2	53.2	36.9	33.0	36.8	42.2	47.5	55.2	66.4	70.6	73.1	82.9	55.6
1983-84	65.1	56.0	43.7	19.9	34.6	40.8	46.8	54.2	60.4	69.1	82.8	83.3	54.7
1984-85	63.9	52.2	40.4	28.2	25.3	29.1	42.7	56.8	68.7	73.2	88.0	75.0	53.6
MEAN	68.6	55.3	40.4	32.7	29.3	36.4	43.3	54.7	64.9	71.7	80.6	79.5	

Mean temperature for all years = 54.8

Table 4. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1985

Average minimum temperature by month and year
Degrees Fahrenheit

YEAR	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	MEAN
1949-50	36.7	35.0	31.2	17.8	-6.0	16.6	23.9	31.5	36.3	43.9	49.4	45.5	30.2
1959-51	36.6	36.0	24.8	22.6	11.7	18.8	16.6	26.2	36.7	41.7	46.9	43.7	30.2
1951-52	37.0	34.0	24.4	10.1	10.0	17.4	19.1	29.8	39.1	43.1	44.3	46.1	29.5
1952-53	38.6	28.3	20.2	21.9	30.6	26.7	27.5	30.9	36.5	42.3	45.3	46.7	33.0
1953-54	39.8	31.4	28.4	25.9	13.1	24.0	19.2	30.6	37.7	42.8	46.7	45.7	32.1
1954-55	39.3	29.5	31.6	22.7	19.5	13.0	15.0	30.0	34.9	42.8	48.5	42.0	30.7
1955-56	37.3	33.6	16.1	14.4	15.9	11.7	23.3	30.9	40.5	44.7	48.2	46.1	30.2
1956-57	39.4	34.4	24.2	21.5	1.4	13.6	23.2	32.0	40.9	47.0	48.7	44.8	30.9
1957-58	37.2	32.3	24.1	26.2	24.5	22.8	20.9	32.8	41.7	48.8	49.5	50.3	34.3
1958-59	41.2	31.2	26.0	22.2	17.5	14.2	26.6	32.4	34.7	45.4	45.8	45.6	31.9
1959-60	42.0	34.1	17.0	21.8	11.2	16.3	21.1	32.4	38.1	44.3	48.8	47.0	31.2
1960-61	37.9	32.5	27.6	19.9	20.6	30.9	28.4	32.3	39.8	47.4	48.7	49.2	34.6
1961-62	36.8	31.2	21.2	16.8	8.7	17.9	21.2	33.7	40.3	43.0	45.0	46.6	30.2
1962-63	37.6	34.6	32.2	27.1	3.7	24.7	28.4	30.6	35.7	47.0	46.4	46.9	32.9
1963-64	42.7	35.3	28.1	17.7	21.8	18.9	21.4	32.2	38.6	46.0	48.3	44.9	33.0
1964-65	38.4	32.3	26.4	15.3	25.3	20.4	16.2	32.7	36.9	43.8	48.4	50.0	32.2
1965-66	35.2	34.0	27.4	22.1	20.8	20.0	23.6	30.9	38.7	42.8	47.7	45.0	32.4
1966-67	43.6	31.7	25.6	24.6	25.3	25.5	24.5	28.6	38.4	45.4	47.4	47.2	34.0
1967-68	43.1	35.9	26.3	19.4	15.0	24.8	29.7	29.8	36.1	45.7	46.4	46.8	33.3
1968-69	41.7	32.6	26.1	12.5	5.4	15.4	18.2	34.6	39.0	45.5	45.7	43.5	30.0
1969-70	41.6	30.3	27.4	22.6	15.3	23.4	23.0	30.7	38.5	48.2	50.5	44.3	33.0
1970-71	34.9	27.9	22.5	18.3	16.5	21.0	24.8	31.0	38.6	42.3	45.7	48.8	31.0
1971-72	34.7	27.6	26.9	13.5	7.7	18.6	29.0	29.0	39.2	46.3	45.8	48.5	30.6
1972-73	36.4	29.2	25.9	11.1	11.0	17.4	27.8	29.6	36.4	44.4	46.5	45.8	30.1
1973-74	38.9	32.0	21.8	25.2	13.5	25.1	23.6	32.4	36.7	46.9	49.5	45.6	32.6
1974-75	34.7	25.7	26.3	22.9	10.9	11.5	20.4	27.1	36.1	43.3	52.7	46.5	29.8
1975-76	34.7	33.4	30.3	20.0	19.1	22.2	22.0	32.4	37.6	42.6	47.8	48.3	32.5
1976-77	37.2	27.2	24.1	21.1	12.0	22.6	26.1	29.9	37.4	46.0	48.5	48.2	31.7
1977-78	38.6	29.5	22.2	14.6	14.5	16.7	23.2	33.1	38.1	45.6	49.2	46.4	31.0
1978-79	41.7	28.3	18.4	9.3	-5.6	16.5	24.0	32.1	38.7	44.9	48.5	48.0	28.7
1979-80	39.7	33.7	23.6	26.8	7.5	22.1	24.5	33.7	42.7	44.7	50.0	44.0	32.8
1980-81	41.3	31.6	27.7	25.1	26.2	23.8	27.2	34.2	41.7	43.7	47.6	47.8	34.8
1981-82	39.7	32.2	27.0	19.8	13.5	15.7	29.2	28.4	37.2	45.3	47.3	45.4	31.7
1982-83	37.6	28.8	21.4	18.7	23.7	25.3	28.4	29.5	37.5	44.7	46.1	48.0	32.5
1983-84	35.6	29.7	29.5	2.4	20.6	24.0	29.9	30.2	37.1	43.6	47.8	46.0	31.4
1984-85	35.2	27.7	24.7	13.0	13.2	9.0	18.8	32.7	38.7	42.0	48.5	45.5	29.1
MEAN	38.5	31.5	25.2	19.1	14.3	19.7	23.6	31.1	38.1	44.7	47.7	46.4	

Mean temperature for all years = 31.7

Table 5. Summary of precipitation records at the Northwestern Agricultrual Reserch Center on a crop year basis, September 1, 1949 thru August 31, 1985

Total precipitation in inches by month and year

YEAR	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	MEAN
1949-50	1.03	1.05	1.67	0.92	2.62	1.13	2.31	0.84	0.15	3.90	3.12	0.75	19.49
1950-51	0.52	2.30	1.16	2.48	0.94	1.29	0.62	2.32	3.77	2.26	1.03	2.86	21.55
1951-52	1.49	5.62	1.01	3.31	1.03	0.98	0.97	0.17	1.32	3.95	0.56	0.69	21.10
1952-53	0.13	0.05	0.60	0.98	1.84	1.14	0.98	2.07	2.00	3.31	T	1.62	14.72
1953-54	0.71	0.03	0.87	1.30	2.65	0.79	0.83	0.79	1.52	2.98	2.91	3.79	19.17
1954-55	1.09	0.54	1.00	0.43	1.00	1.31	0.44	0.82	1.18	1.86	3.08	0.00	12.75
1955-56	1.64	1.89	1.97	2.38	1.76	1.53	0.87	1.28	1.06	4.20	2.13	3.21	23.92
1956-57	1.16	1.10	0.53	0.96	1.47	1.14	0.75	1.22	1.75	2.51	0.52	0.78	13.89
1957-58	0.10	1.59	0.96	1.76	1.56	2.67	0.97	1.47	2.20	2.56	0.84	0.58	17.26
1958-59	1.99	1.16	2.90	2.77	1.95	1.33	0.75	1.62	4.10	1.75	T	0.91	21.23
1959-60	4.22	3.36	4.32	0.34	1.67	1.10	1.01	1.23	3.27	0.69	0.13	2.43	23.77
1960-61	0.55	1.44	1.72	1.24	0.65	1.46	1.96	2.26	4.02	1.45	0.76	0.64	18.15
1961-62	3.40	1.22	1.77	2.09	1.33	1.15	1.59	0.96	2.59	1.15	0.11	0.72	18.08
1962-63	0.58	1.85	1.31	0.91	1.69	1.21	0.85	1.07	0.57	5.00	1.44	2.10	18.58
1963-64	1.46	0.75	0.95	1.70	1.46	0.41	1.57	0.87	3.33	3.86	3.01	1.64	21.01
1964-65	2.27	0.85	1.62	3.62	2.25	0.64	0.24	2.55	0.81	2.30	1.15	4.74	23.04
1965-66	1.72	0.21	1.31	0.55	1.42	0.67	0.53	0.76	1.18	6.57	2.49	1.64	19.05
1966-67	0.79	1.34	3.33	1.68	1.50	0.62	1.27	0.99	1.30	2.53	0.02	0.01	15.38
1967-68	0.91	1.88	0.62	1.16	0.79	1.15	0.68	0.57	3.92	2.22	1.00	3.42	18.32
1968-69	4.51	2.39	1.59	3.12	3.05	0.75	0.69	1.39	1.19	5.21	0.70	0.09	24.68
1969-70	1.54	1.90	0.31	1.14	3.10	0.89	1.49	0.76	1.97	4.37	3.08	0.44	20.99
1970-71	1.79	1.38	1.75	0.99	1.84	0.77	0.69	0.58	2.45	4.42	1.31	1.11	19.08
1971-72	0.94	0.87	1.70	1.62	1.10	1.65	2.11	0.95	1.48	3.28	1.77	0.98	18.45
1972-73	1.38	1.84	0.80	2.19	0.52	0.56	0.70	0.45	1.13	2.14	0.01	0.63	12.35
1973-74	1.37	1.41	2.95	1.94	1.35	1.32	1.40	3.36	1.82	1.80	1.01	0.62	20.35
1974-75	0.80	0.12	1.10	1.31	1.56	1.08	1.50	1.27	1.50	1.40	1.08	4.26	16.98
1975-76	1.18	2.96	0.85	1.39	0.91	1.12	0.34	1.92	1.90	2.49	1.49	3.42	19.97
1976-77	0.96	0.62	0.73	0.86	0.83	0.71	1.40	0.41	2.90	0.52	3.60	1.50	15.04
1977-78	2.84	0.56	1.62	4.10	2.15	0.99	0.72	2.54	3.56	2.63	3.90	3.34	28.95
1978-79	1.90	0.15	0.96	0.91	1.70	1.45	0.82	2.33	2.67	1.23	0.40	1.79	16.31
1979-80	1.03	1.75	0.50	1.03	1.53	2.03	0.97	1.88	5.48	3.89	1.08	2.45	23.62
1980-81	1.20	0.83	0.78	2.58	1.81	1.85	2.17	1.75	3.86	4.70	1.17	0.96	23.66
1981-82	0.77	0.56	1.49	1.91	2.38	1.48	1.16	1.60	1.25	2.41	2.06	1.17	18.24
1982-83	2.37	0.75	1.39	1.60	0.93	0.85	1.71	2.41	1.20	2.96	3.66	1.16	20.99
1983-84	1.70	1.13	1.96	2.57	0.80	2.19	1.81	1.93	2.91	2.07	0.31	0.55	19.93
1984-85	2.15	2.25	1.40	1.29	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62	17.56
MEAN	1.51	1.38	1.43	1.70	1.54	1.19	1.10	1.41	2.23	2.85	1.42	1.63	

Mean precipitation for all crop years = 19.39

Table 6. Precipitation by day for crop year, September 1, 1984 through August 31, 1985. Northwestern Agricultural Research Center, Kalispell, MT.

DATE	SEPT. 1984	OCT. 1984	NOV. 1984	DEC. 1984	JAN. 1985	FEB. 1985	MAR. 1985	APR. 1985	MAY 1985	JUNE 1985	JULY 1985	AUG. 1985
1	0.56		T	0.05	T	0.02	0.02					0.03
2	0.02		0.09	0.07	T					0.71		0.05
3			0.11	T				0.02	0.02	0.47		0.03
4								0.17		T		
5						0.17	0.05	0.05		0.10		
6	0.07					0.03	0.07			0.07		
7						0.14				0.33		T
8	0.10					0.25			T	0.05		T
9	0.18					0.08				T		0.03
10	0.17		0.02	0.04		0.03				T		0.23
11			0.07					0.10				0.15
12	0.04	0.72	0.07			0.02		T				0.02
13				0.02								0.05
14	0.11		0.17	T								
15		0.02			0.04							T
16		0.02		0.09				0.44		0.04		0.24
17		0.02										
18				0.13							0.03	
19		0.10	T		0.05			0.22				
20	0.04		T		0.12	0.11		0.24				
21	0.47		0.33	0.12		T	0.20			0.12		0.61
22	0.33		0.06			0.26	0.03					0.03
23	0.04			0.25			T					0.02
24		0.10	0.09				0.19	0.03			0.32	
25		0.03				0.17	0.10		0.60			
26	0.02	0.23			T		T					
27		0.67							0.03			
28		0.20	0.23	0.02	0.02		T	0.04	0.11			0.13
29		0.03	0.05	0.13	0.08			T	0.21			
30		0.03	0.11	0.29					1.77			
31		0.08		0.08	T		0.24		0.07			
TOTAL	2.15	2.25	1.40	1.29	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62

Table 7. Frost free period at the Northwestern Agricultural Research Center from 1950 thru 1985.

YEAR	DATE LAST FREEZE	TEMPERATURE DEGREE F	DATE FIRST FREEZE	TEMPERATURE DEGREES F	FROST FREE SEASON
1950	June 10	32	Sept. 11	29	93
1951	june 1	29	Sept. 15	29	106
1952	June 14	32	Sept. 8	29	86
1953	May 23	32	Sept. 16	31	116
1954	May 29	31	Sept. 30	26	124
1955	May 25	28	Sept. 13	31	111
1956	May 3	26	Sept. 2	32	122
1957	May 23	30	Sept. 9	30	109
1958	May 14	31	Sept. 27	31	136
1959	June 11	32	Aug. 30	30	80
1960	June 18	32	Sept. 6	32	80
1961	May 6	32	Sept. 12	29	129
1962	May 30	32	Sept. 3	25	96
1963	May 22	28	Sept. 18	32	119
1964	May 25	26	Sept. 11	28	109
1965	June 7	30	Sept. 6	31	91
1966	May 18	26	Sept. 30	28	135
1967	May 26	28	Sept. 23	32	120
1968	May 20	32	Sept. 21	32	124
1969	June 13	28	Sept. 6	32	85
1970	May 11	32	Sept. 10	31	122
1971	July 7	32	Sept. 14	28	69
1972	May 4	32	Sept. 12	32	131
1973	May 22	31	Sept. 2	31	103
1974	May 18	31	Sept. 2	30	107
1975	May 25	32	Sept. 12	32	110
1976	May 21	30	Sept. 8	30	110
1977	May 16	29	Sept. 27	28	133
1978	May 23	31	Sept. 17	28	116
1979	May 30	31	Oct. 1	32	123
1980	June 4	32	Sept. 24	31	111
1981	May 5	28	Sept. 24	25	142
1982	May 30	31	Sept. 15	23	108
1983	May 15	31	Sept. 6	31	114
1984	June 2	32	Sept. 13	30	103
1985	May 13	26	Sept. 7	32	117
Mean for years	May 26	30	Sept. 14	30	111

Table 8. Temperature extremes at the Northwestern Agricultural Research Center, Kalispell, MT from 1950-1985.

	MINIMUM		MAXIMUM	
YEAR	DATE	TEMPERATURE DEGREES F	DATE	TEMPERATURE DEGREES F
1950	Jan. 30	-40	Aug. 31	88
1951	Jan. 28	-25	Aug. 2	92
1952	Jan. 1	-14	Aug. 31	90
1953	Jan. 6	8	July 12	97
1954	Jan. 20	-32	July 6	90
1955	Mar. 5	-20	June 22	96
1956	Feb. 16	-25	July 22	90
1957	Jan. 26	-34	July 13	91
1958	Jan. 1	2	Aug. 11	94
1959	Nov. 16	-30	July 23	96
1960	Mar. 3	-32	July 19	98
1961	Jan. 2	0	Aug. 4	100
1962	Jan. 21	-32	Aug. 16	92
1963	Jan. 30	-24	Aug. 9	94
1964	Dec. 17	-28	July 8	91
1965	Mar. 24	-10	July 31	89
1966	Mar. 4	- 7	Aug. 2,25	91
1967	Jan. 24	2	Aug. 19	95
1968	Jan. 21	-23	July 7	94
1969	Jan. 25	-13	Aug. 24	97
1970	Jan. 15	-14	Aug. 21,25	92
1971	Jan. 12	- 8	Aug. 6, 9	96
1972	Jan. 28	-24	Aug. 9,10	92
1973	Jan. 11	-22	July 11	97
1974	Jan. 5	-18	June 16,20	93
1975	Jan. 12, Feb. 9	-16	July 12	96
1976	Feb. 5	- 4	July 27	90
1977	Dec. 31	-11	June 7	97
1978	Dec. 31	-31	July 16	91
1979	Jan. 1	-31	July 20	97
1980	Jan. 29	-20	July 23	92
1981	Feb. 21	-21	Aug. 26,27	97
1982	Feb. 9,10	-23	Aug. 8	91
1983	Dec. 25	-29	Aug. 8	97
1984	Jan. 18	-14	July 27	97
1985	Jan. 30	-24	July 9,11,23	94

Table 9. Summary of temperature records at the Northwestern Agricultural Research Center, January 1950 thru December 1985.

AVERAGE TEMPERATURE BY MONTH AND YEAR
DEGREES FAHRENHEIT

DATE	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
1950	4.2	25.6	31.2	41.9	49.7	57.0	64.0	62.5	53.8	45.9	31.5	29.5	41.4
1951	20.2	27.7	27.0	42.1	50.0	54.2	64.7	60.4	50.6	40.8	30.8	16.9	40.5
1952	18.0	26.6	29.3	45.8	52.4	56.7	61.8	62.8	56.0	45.5	30.4	27.6	42.7
1953	36.0	32.9	37.2	41.2	49.5	54.6	64.3	63.1	56.1	46.2	37.0	31.3	45.8
1954	21.1	31.2	29.6	40.8	52.5	54.9	63.4	60.1	52.9	41.5	38.8	28.8	43.0
1955	25.7	22.1	24.5	39.1	47.7	58.8	62.7	62.2	52.5	44.6	23.5	21.8	40.4
1956	23.3	20.9	31.5	44.2	54.0	59.0	64.8	62.0	55.2	44.1	30.9	28.5	43.2
1957	10.2	23.4	33.3	43.7	55.6	59.7	65.4	62.4	55.8	41.4	32.1	32.4	43.0
1958	29.1	30.4	32.2	43.6	59.6	62.3	65.2	67.9	55.5	44.6	32.8	28.2	46.0
1959	24.7	23.1	35.3	45.2	48.1	59.9	64.5	61.0	53.0	43.9	25.5	27.6	42.7
1960	19.4	25.2	32.3	44.3	50.6	59.6	68.8	60.6	55.0	45.2	34.4	24.9	43.4
1961	27.8	37.0	38.2	42.0	52.6	64.7	66.2	67.8	49.6	42.3	28.2	23.6	45.0
1962	17.4	25.7	30.9	47.2	51.5	58.6	62.1	62.1	54.7	44.7	38.0	32.5	43.8
1963	11.8	33.1	38.7	42.3	51.4	59.4	63.0	64.9	58.7	47.4	35.8	24.0	44.2
1964	28.5	28.3	30.6	42.8	51.1	58.7	64.3	58.9	51.2	43.7	33.7	22.1	42.8
1965	30.2	28.7	28.6	45.2	50.6	57.6	64.6	63.6	46.4	47.6	35.0	28.8	43.9
1966	26.3	27.7	34.5	42.9	54.3	56.0	64.5	61.7	59.3	43.4	33.4	30.2	44.5
1967	31.0	33.2	32.9	40.6	52.2	59.4	66.1	67.2	61.0	45.9	33.8	25.1	45.7
1968	23.3	32.8	41.2	42.0	49.8	59.0	64.6	61.3	53.8	42.9	33.4	19.9	43.7
1969	13.1	24.0	29.6	47.1	53.9	58.8	62.3	63.6	56.0	40.0	35.2	27.7	42.6
1970	21.9	29.9	32.8	40.2	53.2	62.0	64.8	62.6	48.7	40.1	31.3	26.2	42.8
1971	23.6	29.9	33.2	43.6	52.5	54.9	61.9	68.2	49.5	40.4	34.1	22.0	42.8
1972	17.0	27.3	38.5	40.6	51.9	59.3	61.5	65.9	50.2	40.3	33.7	19.9	42.2
1973	20.7	27.8	37.7	42.2	51.5	57.5	65.1	64.5	53.3	44.1	29.3	30.8	43.7
1974	21.0	32.3	33.6	42.7	48.0	61.5	64.8	61.6	52.8	43.6	34.8	30.1	43.9
1975	21.5	21.5	29.9	37.6	48.6	55.9	69.1	59.8	52.1	42.9	35.4	27.5	41.8
1976	27.7	29.9	31.0	43.4	51.9	54.5	63.4	61.3	55.2	42.4	33.1	28.6	43.5
1977	20.0	30.9	34.4	45.0	49.7	61.5	62.6	62.8	51.7	42.5	30.4	22.0	42.8
1978	21.6	26.1	34.3	43.7	48.1	59.1	63.4	60.3	53.7	43.7	27.2	18.8	41.7
1979	4.1	24.9	34.7	42.3	51.5	59.4	65.0	65.4	56.9	46.6	30.7	33.0	42.9
1980	16.3	29.0	32.6	47.1	54.8	56.9	63.5	58.6	54.1	45.3	35.8	32.2	43.9
1981	30.1	31.3	38.5	44.5	52.5	53.8	62.8	66.4	55.3	43.2	36.0	27.0	45.1
1982	21.6	24.5	37.5	39.4	49.8	59.8	61.1	63.0	53.4	41.0	29.1	25.9	42.2
1983	30.3	33.8	37.9	42.4	51.9	57.6	59.6	65.4	50.4	42.9	36.6	11.1	43.3
1984	27.6	32.4	38.3	42.2	48.7	56.4	65.3	64.6	49.5	40.0	32.6	20.6	43.2
1985	19.2	19.0	30.8	44.8	53.7	57.6	68.3	60.2	47.8	40.8	18.6	18.3	39.9
Mean	21.8	28.1	33.5	42.9	51.5	58.2	64.2	63.0	53.4	43.4	32.3	25.7	

Mean temperature for all years = 43.2

Table 10. Summary of precipitation records at the Northwestern Agricultural Research Center, Kalispell, MT, January 1950 thru December 1985.

	Total Precipitation (inches) by Months and Years											
DATE	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1950	2.62	1.13	2.31	0.84	0.15	3.90	3.12	0.75	0.52	2.30	1.16	2.48	21.28
1951	0.94	1.29	0.62	2.32	3.77	2.26	1.03	2.86	1.49	5.62	1.01	3.31	26.52
1952	1.03	0.98	0.97	0.17	1.32	3.95	0.56	0.69	0.13	0.05	0.60	0.98	11.43
1953	1.84	1.14	0.98	2.07	2.00	3.31	T	1.62	0.71	0.03	0.87	1.30	15.87
1954	2.65	0.79	0.83	0.79	1.52	2.98	2.91	3.79	1.09	0.54	1.00	0.43	19.32
1955	1.00	1.31	0.44	0.82	1.18	1.86	3.08	--	1.64	1.89	1.97	2.38	17.57
1956	1.76	1.53	0.87	1.28	1.06	4.20	2.13	3.21	1.16	1.10	0.53	0.96	19.79
1957	1.47	1.14	0.75	1.22	1.75	2.51	0.52	0.78	0.10	1.59	0.96	1.76	14.55
1958	1.56	2.67	0.97	1.47	2.20	2.56	0.84	0.58	1.99	1.16	2.90	2.77	21.67
1959	1.95	1.33	0.75	1.62	4.10	1.75	T	0.91	4.22	3.36	4.32	0.34	24.65
1960	1.67	1.10	1.01	1.23	3.27	0.69	0.13	2.43	0.55	1.44	1.72	1.24	16.48
1961	0.65	1.46	1.96	2.26	4.02	1.45	0.76	0.64	3.40	1.22	1.77	2.09	21.68
1962	1.33	1.15	1.59	0.96	2.59	1.15	0.11	0.72	0.58	1.85	1.31	0.91	14.25
1963	1.69	1.21	0.85	1.07	0.57	5.00	1.44	2.10	1.46	0.75	0.95	1.70	18.79
1964	1.46	0.41	1.57	0.87	3.33	3.86	3.01	1.64	2.27	0.85	1.62	3.62	24.51
1965	2.25	0.64	0.24	2.55	0.81	2.30	1.15	4.74	1.72	0.21	1.31	0.55	18.47
1966	1.42	0.67	0.53	0.76	1.18	6.57	2.49	1.64	0.79	1.34	3.33	1.68	22.40
1967	1.50	0.62	1.27	0.99	1.30	2.53	0.02	0.01	0.91	1.88	0.62	1.16	12.81
1968	0.79	1.15	0.68	0.57	3.92	2.22	1.00	3.42	4.51	2.39	1.59	3.12	25.36
1969	3.05	0.75	0.69	1.39	1.19	5.21	0.70	0.09	1.54	1.90	0.31	1.14	17.96
1970	3.10	0.89	1.49	0.76	1.97	4.37	3.08	0.44	1.79	1.38	1.75	0.99	22.01
1971	1.84	0.77	0.69	0.58	2.45	4.42	1.31	1.11	0.94	0.87	1.70	1.62	18.30
1972	1.10	1.65	2.11	0.95	1.48	3.28	1.77	0.98	1.38	1.84	0.80	2.19	19.53
1973	0.52	0.56	0.70	0.45	1.13	2.14	0.01	0.63	1.37	1.41	2.95	1.94	13.81
1974	1.35	1.32	1.40	3.36	1.82	1.80	1.01	0.62	0.80	0.12	1.10	1.31	16.01
1975	1.56	1.08	1.50	1.27	1.50	1.40	1.08	4.26	1.18	2.96	0.85	1.39	20.03
1976	0.91	1.12	0.34	1.92	1.90	2.49	1.49	3.42	0.96	0.62	0.73	0.86	16.76
1977	0.83	0.71	1.40	0.41	2.90	0.52	3.60	1.50	2.84	0.56	1.62	4.10	20.99
1978	2.15	0.99	0.73	2.54	3.56	2.63	3.90	3.34	1.90	0.15	0.96	0.91	23.76
1979	1.70	1.45	0.82	2.33	2.67	1.23	0.40	1.79	1.03	1.75	0.50	1.03	16.70
1980	1.53	2.03	0.97	1.88	5.48	3.89	1.08	2.45	1.20	0.83	0.78	2.58	24.70
1981	1.81	1.85	2.17	1.75	3.86	4.70	1.17	0.96	0.77	0.56	1.49	1.91	23.00
1982	2.38	1.48	1.16	1.60	1.25	2.41	2.06	1.17	2.37	0.75	1.39	1.60	19.62
1983	0.93	0.85	1.71	2.41	1.20	2.96	3.66	1.16	1.70	1.13	1.96	2.57	22.24
1984	0.80	2.19	1.81	1.93	2.91	2.07	0.31	0.55	2.15	2.25	1.40	1.29	19.66
1985	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62	5.35	1.55	1.61	0.51	19.49
Mean	1.54	1.19	1.11	1.41	2.23	2.85	1.42	1.63	1.63	1.39	1.43	1.69	

Mean annual precipitation for 36 years = 19.52

CHEMICALS USED IN HERBICIDE STUDIES 1984-85, NWARC, KALISPELL, MT

Common name	Trade name	Chemical name	Company
AC 222,293	Assert	m- toluic acid, 6-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-methyl ester and p-toluic acid, 2(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-methyl ester	Am. Cyanamide
	AC 263,499	no chemistry available	Am. Cyanamide
AG 1	BAS 044084	no chemistry available	BASF
AG 2	BAS 037014	no chemistry available	BASF
AXF 1309	Brominal 4E	3,5-dibromo-4-hydroxybenzonitrile	Union Carbide
Bentazon	Basagran	3-isopropyl-1H-2,1,3-benzothiadiazin-4-(3H)-one-2,2-dioxide	BASF
Bromoxynil	Brominal /Buctril	3,5-dibromo-4-hydroxybenzonitrile	Union Carbide Rhone Poulenc
Chlorsulfuron	Glean	2-chloro-N[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]benzenesulfonamide	DuPont
Diclofop-m	Hoelon	2-[4-(2,4-dichlorophenoxy)phenoxy propanoic acid	Am. Hoechst
Diuron	Karmex	3-(3,4-dichlorophenyl)-1,1-dimethylurea	DuPont
Haloxyfop-m	Verdict	Methyl 2-(4-((3-chloro-5-(trifluoromethyl)-2-pyridinyl)oxy)phenoxy) propanoate	Dow
Metsulfuron	Ally	Methyl-2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate	DuPont
DPX-Y6202	Assure	2-[4-[(6-chloro-2-quinoxalinyl)oxy]-phenoxyl]-propionic acid ethyl ester	DuPont
DPX-M6316	DPX-M6316	No chemistry available	Dupont
DPX-R 9521	DPX-R 9521	No chemistry available	DuPont
DPX-E 8898	DPX-E 8898	No chemistry available	DuPont
DPX-L 5300	DPX-L 5300	No chemistry available	DuPont
DPX-R 9674	DPX-R 9674	No chemistry available	DuPont
EPTC	Eptam	S-ethyl dipropylthiocarbamate	Stauffer
Fluazifop-b	Fusilade (PP005)	Butyl-2-[4-(5-trifluoromethyl-2-pyridinyl-oxy)phenoxy]propanoate	ICI
Glyphosate	Roundup	N-(phosphonomethyl) glycine	Monsanto
Glyphosate + 2,4-D	Landmaster	N-(phosphonomethyl) glycine + (2,4-dichlorophenoxy)acetic acid	Monsanto
Hexazinone	Velpar	3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4-(1H,3H)-dione	DuPont
Isoxaben	EL 107	N-[3-1-ethyl-1-methylpropyl)- s- isoxazolyl]-2,6 dimethoxybenzamide	Elanco

MCPA	MCPA	[(4-chloro-o-tolyl)oxyl]acetic acid	Union Carb[illegible]
Metribuzin	Sencor or Lexone	4-amino-6-tert-butyl-3-(methylthio)-as triazin-5(4H)one	Mobay DuPont
Pronamide	Kerb	3,5-dichloro(N-1,1-dimethyl-2-propynyl) benzamide	Rohm and Haas
Fluorchloidone	Racer	1-(m-trifluoromethylphenyl)-3-chlor-4-chloromethyl-2-pyrrolidone	Stauffer
Sethoxydim	Poast	2[(1-ethoxyimino)butyl]-5[(2-ethylthio)-propyl]-3-hydroxy-2-cyclohexen-1-one	BASF
	SC 0051	No chemistry available	Stauffer
	SSH 0860	1-amino-3-(2,2-dimethylpropyl)-6-(ethyl-thio)-1,3,5-triazine-2,4(1H,3H)-dione	Mobay
Sulfosate	SC-0224	Trimethylsulfonium carboxymethylamino methylphosphonate	Stauffer
	SC 0574	no chemistry available	Stauffer
	SC 1084	no chemistry available	Stauffer
	SMY 1500	no chemistry available	Mobay
SC 5676/ R - 25788		no chemistry available	Stauffer
Terbacil	Sinbar	3-tert-butyl-5-chloro-6-methyluracil	DuPont
Triallate	Fargo	S-(2,3,3-trichloroallyl)diisopropylthio-carbamate	Stauffer
2,4-D	2,4-D	(2,4-dichlorophenoxy)acetic acid	Cenex
2,4-DB	2,4-DB	4-(2,4-dichlorophenoxy)butyric acid	Union Cabide

PROJECT TITLE: Chlorsulfuron (Glean) for weed control in winter wheat

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell
Ag Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell
Cooperators - Chemical Company Representatives

SUMMARY:

The chlorsulfuron application on winter wheat gave good to excellent broadleaf weed control when applied PES, post and at the tiller stage at .125, .25 and .5 oz ai/A. Yields and test weights were not increased or reduced significantly because rate of treatment or application timing.

RESULTS:

Excellent control of volunteer peas (Pisum sativa), fanweed (Thlaspi arvense), Silene (Silene noctiflora) and gromwell (Lithospermum arvense) was obtained when chlorsulfuron was applied pre emergence surfact (PES), post emergence (3-5 leaf post) and at fully tillered at .125, .25 and .5 oz ai/a. Less effective control was noticed in plots treated with the low rate of chlorsulfuron applied PES. Yields, test weight and height when statistically analyzed were found to be non significant at .05 probability level.

Table 1. Agronomic data from the Chlorsulfuron application study on winter wheat. Northwestern Agricultural Research Center, Kalispell, MT, 1985. Field R-2.

Treatment	Rate oz ai	Appln Type	Yield Bu/A	Test Wt. Lbs/Bu	% Stand	% Weed Control 1/ Peas	Fan	Sil	Grom	Heig. (In)
Chlorsulf.	.125	PES	55.2	53.28	76	65	63	75	63	36.8
Chlorsulf.	.25	PES	60.7	54.07	66	98	100	100	100	35.0
Chlorsulf.	.5	PES	59.4	53.08	66	98	100	100	100	36.4
Chlorsulf. + surf.	.125	3-5lf	57.3	52.78	71	75	100	100	100	35.4
Chlorsulf. + surf	.25	3-5lf	56.5	55.00	70	100	100	100	100	34.8
Chlorsulf. + surf.	.5	3-5lf	56.8	54.35	71	97	100	100	95	35.1
Bromoxynil	.375#	3-5lf	62.1	53.80	74	81	100	100	75	35.7
Chlorsulf. + surf.	.125	tillr	65.1	55.43	66	99	100	100	100	35.7
Chlorsulf. + surf	.25	tillr	60.6	54.08	71	95	100	100	100	35.1
Chlorsulf. + surf.	.5	tillr	62.0	54.27	74	90	100	100	100	36.3
Bromoxynil + MCPA	.375#	tillr	53.0	51.68	68	45	100	100	100	36.4
2,4-D	.375#	tillr	56.0	52.80	73	95	100	100	100	37.0
Check	---	----	56.6	53.80	71	0	0	0	0	36.2
		$\bar{X}$	58.6	53.72	71	84	93	94	91	35.9
		F 2/	.762	.334	.30	2.00	2.49	1.91	1.84	.40
		S.E.X.	.88	1.73	5.91	13.55	10.53	10.84	12.60	2.86
		C.V.	6.64	3.22	8.38	16.20	11.29	11.50	13.85	3.14
		L.S.D.	4.14	4.96	16.96	38.88	30.20	31.09	36.13	3.23

1/ Weed scores are ocular ratings of percent control
Peas = volunteer peas, Fan = fanweed, Sil = silene, Grom = gromwell
2/ F value for treatment comparison

Application data:

Date:	9-24-84	4-15-85	5-1-85
Application:	Pre-surf	3-5 leaf	1-2 tiller
Air temp:	52 F	62 F	69 F
Soil temp:	52 F	60 F	69 F
Wind:	2-3 mph	5-7 mph	0
Relative hum:	27%	10%	13%
Weed stages:	NA	alfalfa 1-2"	2-3"
		gromwell 4-8 lvs	10 lvs
		false flax 6-8 lvs	1-1 1/2 "
		fanweed 6"	7", 3" dia
		wheat 2-3"	6" tall

General data: Volume: 26.86 gpa, pressure 32 psi, tractor speed 2.64 mph plot size 10' x 24', date planted 9-22-84, variety - Winridge harvest date August 8,1985, surfactant .5% v/v.

PROJECT TITLE: Fall and spring application of chlorsulfuron (Glean) for weed control in Newana spring wheat

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Weed control was excellent at equal rates of chlorsulfuron applied either in the fall (preplant) or at the 3 to 5 leaf stage (post in spring) in Newana spring wheat.

RESULTS:

Chlorsulfuron performed equally well in spring wheat applied either in the fall or applied in the spring at rates ranging from .125 oz to .5 oz ai/A. Fanweed (Thlaspi arvense), Silene (Silene noctiflora), and wild buckwheat (Polygonem convolvalus) were all effectively controlled at all rates studied. Yields, test weights and height did not vary and were found to be statistically significant when analyzed. Bromoxynil plus MCPA and fluorchloridone were also tested as comparison treatments. These treatments performed equally well in weed control, yield and test weights.

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Table 2. Fall and spring application study of chlorsulfuron to spring wheat. Northwestern Agricultural Research Center, Kalispell, MT. Field R-9

Date planted: May 3,1985 Date harvested: September 5,1985

Treatment	Rate	Appln.	Yield Bu/A	Test Wt. Lbs./Bu	Height (In)	% Weed Control 1/ Fan	Sil	Buck
Chlorsulf.	.187	Fall	51.7	59.2	24.4	100	100	100
Chlorsulf.	.25	Fall	65.8	59.4	26.7	100	100	100
Chlorsulf.	.5	Fall	62.3	60.0	26.7	100	100	100
Chlorsulf. + surf.	.125	3-5 lf	61.5	59.8	26.1	100	100	86
Chlorsulf. + surf.	.25	3-5 lf	56.9	59.3	27.0	100	100	100
Chlorsulf. + surf.	.5	3-5 lf	63.4	59.6	27.0	100	100	100
Bromoxynil + + MCPA	.375 .375	Post	60.8	59.5	26.1	100	99	100
Flourchlor.	.25	Post	64.9	59.7	26.7	100	100	91
Check	----	----	53.6	59.8	25.5	0	0	0
		$\bar{X}$	60.1	59.59	26.1	100	98.5	97.5
		F 2/	1.78	.940	.791	2.7	1.9	1.8
		S.E.X.	3.71	2.70	2.25	---	2.5	3.7
		C.V.	6.17	.452	3.39	---	2.6	3.8
		L.S.D.	10.8	.787	2.59	---	7.3	10.9

1/ % Weed control determined by ocular ratings
Fan = fanweed, Sil = silene, Buck = wild buckwheat

2/ F value for treatment comparison

Application data:

Date:	11-8-84	5-28-85
Appln.	Fall (Pre)	1-3 lf (Post)
Air temp	39 F	53 F
Soil temp	40 F	62 F
Wind	0 mph	0 mph
Rel Hum	52 %	58 %
Weed stages	None	W. buck : 6-8 lvs, 2-3" Fanweed : seedling to 1 1/2" Silene: 4-8 lvs, 2-3"

General data:

Volume: 26.86 gpa, pressure 32psi, tractor speed 2.64 mph, plot size 10 x 12 feet, date planted May 5,1985, variety - Newana
Surfactant used at .5% v/v.

C>

PROJECT TITLE: Control of bedstraw in Newana spring wheat

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Very light bedstraw stands prevented effective evaluation of the herbicides tested in this experiment. Yield differences and other agronomic observations showed that the majority of these compounds to be safe on spring wheat.

RESULTS:

This study was initiated in an area designated for winter wheat but germination and the resulting stand were so poor that spring wheat was re-seeded the following April. Unfortunately this practice reduced bedstraw weed populations so no accurate evaluations could be made. Several compounds with potential and observed activity against bedstraw were applied which included Fluorchloridone, SC054, Harmony and combinations of bromoxynil, chlorsulfuron and betazon. None of the compounds were detrimental to yield, test weight and height and seemed safe for usage in spring wheat.

Table 3. Agronomic data from the bedstraw herbicide study grown on the Dale Sonstellie farm, Kalispell, MT. in 1985.

Date planted: April 23,1985 Date harvested: Sept. 3,1985

Treatment	Rate # ai/A	Appln.	Yield Bu/A	Test wt. Lbs./Bu	Height (In)
Flourchloridone	.25	PES	82.0	55.4	30.6
Flourchloridone	.375	PES	81.8	56.1	31.2
Flourchloridone	.25	Post	78.4	56.8	29.1
Flourchloridone	.375	Post	90.4	58.6a	30.5
Flourchl. + metribuzin	.25+.25	Post	72.7	58.6a	29.1
Flourchl.+metribuzin	.375+.375	Post	71.1	59.1a	28.0
SC 057	3.0	PES	84.7	55.5	30.1
SC 057	4.0	PES	90.9	55.3	31.0
SC 057	5.0	PES	94.5	55.3	32.0
SC 057	3.0	Post	102.1a	57.6	31.5
SC 057	4.0	Post	99.9	57.3	29.6
SC 057	5.0	Post	89.8	55.6	30.5
DPX - M6316	.25 oz	Post	87.5	56.9	27.7
DPX - M6316	.5 oz	Post	78.6	56.0	27.9
Bromoxynil + MCPA	.375+.375	Post	90.1	56.3	29.4
Chlorsulfuron + surf	.125 oz	Post	87.3	55.8	29.1
Chlorsulf. + bromox + MCPA	.125oz+.375 + .375	Post	72.7	55.0	28.9
Flourchl. + bromox + MCPA	.25 + .25 + .	Post 25	80.6	56.7	29.5
Bentazon + MCPA	.75 + .75	Post	89.7	56.5	30.4
Flourchl. + chlorsulf	.25+.125oz	Post	83.1	57.2	29.2
Check	---	----	83.7	55.9	30.4
		$\bar{X}$	85.3	56.5	29.8
		F 1/	1.80*	3.95*	1.53
		S.E.X.	6.18	.59	2.41
		C.V.	7.24	1.05	3.19
		L.S.D.	17.5	1.67	6.82

Table 3. (cont'd)

1/ F value for treatment comparison
* Indicates statistical significance at the .05 level
a/ Indicates values significantly greater than the check at the .05 level

Application data:

Date:	10-17-84	6-10-85
Air temp:	40 F	70 F
Soil temp:	43 F	68 F
Wind:	0 mph	4-6 mph
Rel hum:	45 %	30 %
Crop:	Pre	7-9 "

Weed stages: all weeds present if any - seedlings

General information:
Volume 26.86, tractor speed 2.64, pressure 32 psi, plot size 10 x 24', surfactant used .5% v/v.

PROJECT TITLE: Combination of broadleaf weed herbicides for control of weeds in grains

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Applications of metsulfuron, DPX-M6316 and combinations of these herbicides with bromoxynil provided excellent control of fanweed, night flowering catchfly, wild buckwheat and lambsquarter in spring barley. The highest yield was recorded in plots treated with .06 oz ai/a of metsulfuron.

RESULTS:

Yields, test weight, height and percent plump recordings did not vary significantly among treatments. Metsulfuron at .06 oz ai/a gave very good weed control as did all broadleaf treatments. The highest yield (120 bu/a) was obtained with metsulfuron at .06 oz ai/a. The combinations of DPX-M6316 and metsulfuron with bromoxynil demonstrated excellent broadleaf weed control as well as showing crop safety to spring barley. AC 222,293 applied alone was weak on night flowering catchfly.

Table 4. Agronomic data from the combination broadleaf herbicide study on spring barley grown on the Northwestern Agricultural Research Center in 1985, Kalispell, MT.

Date seeded: April 30, 1985 Date harvested: September 5, 1985

Treatment	Rate	Yield Bu/A	Test Wt. Lb/Bu	% Plump	Height (In)	% Weed Control 1/ Fan	NFC	Buck	Lamb
Bromoxynil	.19	91.4	49.1	76.8	28.1	100	86	88	85
Bromoxynil	.375	94.2	49.2	82.5	26.3	100	95	100	100
Bromoxynil	.25	101.0	50.0	86.3	27.9	94	84	95	100
Bromoxynil	.5	109.6	50.6	90.3	29.7	97	93	75	96
DPX-M6316	.125 oz	100.4	49.6	81.8	28.2	100	91	93	99
DPX-M6316	.25 oz	104.0	50.2	88.5	27.4	100	88	99	88
DPX-M6316	.50 oz	110.8	50.4	89.3	28.6	100	98	100	100
Metsulfuron	.06 oz	120.4	50.5	89.5	24.4	99	93	98	83
Bromoxynil+ DPX-M6316	.19+ .25 oz	112.6	50.6	92.0	28.5	100	98	96	100
Bromoxynil+ DPX-M6316	.25+ .25 oz	112.3	50.9	91.3	28.2	100	88	94	100
Bromoxynil+ DPX-M6316	.25+ .125 oz	103.9	49.5	84.0	28.4	100	100	87	100
Bromoxynil+ metsulf	.19+ .06 oz	102.1	49.4	84.8	28.2	100	100	100	100
Bromoxynil+ metsulf	.25+ .06 oz	106.3	50.8	92.0	30.2	100	100	100	100
Bromoxynil+ MCPA	.375+ .375	92.5	50.0	88.3	28.2	100	91	91	100
AC 222,293	.45	100.9	49.7	85.5	28.8	100	59	95	85
Check	--	90.2	49.5	81.0	27.4	0	0	0	0
	$\bar{X}$	108.3	50.0	71.7	28.2	93	86	87	89
	F 2/	.825	.999	.806	.601	6.10	2.61	8.79	6.89
	S.E.X.	9.43	.58	4.94	1.20	7.78	11.16	7.2	8.81
	C.V.	9.13	1.16	5.71	4.26	8.36	13.07	8.29	9.94
	L.S.D.	26.87	1.65	14.07	3.43	22.17	31.79	20.62	25.09

1/ % Weed control by ocular observation
Fan = fanweed, NFC = night flowering catchfly, Buck = wild buckwheat, Lamb = lambsquarter

2/ F value for treatment comparison

Table 4 (cont'd)

Application data: date: 5-22-85
type: Post
air temp: 80 F
soil temp: 81 F
wind: 0 mph
rel hum.: 13
weed stages: w. buckwheat 2 true leaves
fanweed 4"
lambquarters 1 1/2", 6 true lvs
night flowering catchfly 6 true leaves

General information:
Volume 26.86 gpa, tractor speed 2.64 mph, pressure 32 psi
plot size 10' x 12'.

PROJECT TITLE: Evaluation of chlorsulfuron analogs or phenoxy compounds for control of broadleaf weeds in Ingrid spring barley

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

In an experimental broadleaf herbicide evaluation in spring barley several chlorsulfuron derivatives provided very good weed control of fanweed, *Silene* sp, buckwheat and lambsquarter when applied post emergence. Other broadleaf experimental compounds (AG1, AG2 and Basagran M) gave good control of most broadleaf weed species evaluated.

RESULTS:

The chlorsulfuron analogs; M6316, L5300, R9674, E8898 and R9521 all gave good control of weed species evaluated. The only area where weed control was weak was with L5300 at .06 oz ai/a on fanweed. The stand and herbicide comparisons of bromoxynil plus MCPA, 2,4-D and the experimental compounds AG1, AG2 and Basagran M demonstrated excellent broadleaf control of the species evaluated. Yields, test weights, percent plump and height from the treated plots were not significantly different from the check.

Table 5. Evaluation of several herbicides for the control of broadleaf weeds in Ingrid spring barley. Northwestern Agricultural Research Center. Field No. R-9. Kalispell, MT 59901.

Date Seeded: April 30, 1985 Date Harvested: September 5, 1985

Treatment	Rate	Application	% Weed Control				Yield	Test Wt	%	Height
			Fanweed	Silene	Buckwheat	Lambsquarter	Bu/A	Lbs/Bu.	Plump	Inches
M6316 + R11	.125oz	Post	99	98	91	100	95.4	48.3	95.8	28.3
M6316 + R11	.25oz	Post	100	99	100	100	124.3	49.1	93.5	33.6
L5300	.06oz	Post	75	94	89	100	108.2	49.3	96.3	30.1
L5300	.125oz	Post	100	99	91	100	97.1	48.5	96.3	28.9
L5300	.25oz	Post	100	98	93	100	112.2	49.2	97.0	29.1
R9674	.10oz	Post	100	100	99	100	97.7	48.3	93.8	27.1
R9674	.20oz	Post	100	100	98	100	100.2	48.8	97.8	25.8
M6316 + L5300	.125oz+.125oz	Post	100	100	94	100	106.2	48.9	96.8	29.3
E8898	.25oz	Post	100	100	98	100	87.9	48.1	95.5	31.4
E8898	.50oz	Post	100	100	98	100	108.4	49.2	97.8	31.4
R9521	.14oz	Post	100	100	100	100	108.7	49.4	97.8	28.3
R9521	.21oz	Post	100	100	100	100	103.1	49.3	98.0	28.9
R9521	.28oz	Post	100	100	100	100	114.9	49.2	96.3	29.1
Ally	.06oz	Post	100	98	84	100	106.7	49.0	97.0	28.7
Bromoxynil + MCPA	.375#+.357#	Post	100	93	95	100	113.9	49.3	96.5	30.2
2,4-D amine	.3#	Tillered	100	94	81	100	116.3	49.7	96.5	30.6
2,4-D amine	.50#	Tillered	100	98	94	98	104.6	49.3	97.0	29.3
MCPA amine	1.0#	Tillered	100	100	95	100	112.7	49.6	97.3	31.4
AG 1 BAS 04408H	1.0#	Tillered	100	100	94	99	111.0	49.6	98.8	29.1
AG 1 BAS 04408H	2.0#	Tillered	100	98	99	100	125.0	49.5	95.0	31.6
AG 2 BAS 03701H	1.25#	Tillered	100	100	94	100	113.1	49.5	97.5	28.9
AG 2 BAS 03701H	2.5#	Tillered	100	98	99	100	114.0	49.3	96.0	31.6
Bromoxynil	.5#	Post	100	94	99	100	116.2	49.0	95.8	30.1
Basagran M	.75#	Tillered	98	96	80	100	130.5	48.6	94.0	32.0
Basagran M+2,4-D A	.5#+.5#	Tillered	100	100	100	100	115.0	49.9	97.3	30.5
Check	0	--	0	0	0	0	112.9	49.1	94.5	31.1
	$\bar{x}$		96.0	94.7	91.7	97.0	110.0	49.1	96.0	29.7
	F 1/		7.4	64.9	5.4	8.9	.95NS	.7NS	1.2NS	.34NS
	S.E.$\bar{x}$		5.6	2.2	6.6	4.9	9.8	.5	1.2	4.0
	C.V.%		5.8	2.3	7.2	5.1	8.9	1.1	1.2	5.3
	L.S.D.		15.8	6.1	18.5	13.9	27.6	1.5	3.4	4.49

1/ F value for treatment comparison

Application Data: Date - 5/28/85 | 6/10/85
Soil Temp. - 62°F | 60°F
Air Temp. - 53°F | 62°F
Wind - 0 mph | 3 mph
Humidity - 58% | 39%

Weed Stages:

Wild Buckwheat	2½"	3"
Lambsquarter	2-3"	3-5"
Silene	2"	2½-3"
Fanweed	2"	3"

General Infro: Volume - 26.86 gpa; Pressure - 32 psi
Tractor Speed - 2.64 mph
Plot Size - 10' x 12'

PROJECT TITLE: Combination wild oat and broadleaf herbicides for weed control in spring barley

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representative

SUMMARY:

A study was initiated in spring barley comparing AC 222,293 or diclofop in combination with bromoxynil, MCPA, 2,4-D, chlorsulfuron, metsulfuron and DPX-M6316. AC 222,293 and diclofop performance varied in accordance with the broadleaf herbicide combination mixture. No significant yield, test weight, percent plump or height difference were a result of any of the herbicide applications.

RESULTS:

Bromoxynil plus diclofop gave slightly better wild oat control than bromoxynil plus AC 222,293 or bromoxynil plus MCPA plus AC 222,293. AC 222,293 or diclofop combined with 2,4-D did not give good wild oat control. The combination of chlorsulfuron plus diclofop gave better control than the combination with AC 222,293 plus chlorsulfuron. AC 222,293 plus DPX-T6376 gave more wild oat control than the DPX-T6376 plus diclofop combination. Slightly improved wild oat control was obtained when combining DPX-M6316 plus AC 222, 293 in comparison to DPX-T6316 plus diclofop. MCPA combinations with AC 222, 293 or diclofop were about equal in wild oat control. After wild oat counts were taken it was found that chlorsulfuron plus AC 222,293 (.125 oz + .45 lb) and DPX-M6316 plus AC 222,293 gave complete control of wild oats. Bromoxynil plus diclofop (.375 lb + 1.0 lb ai/a) gave practically complete control. Broadleaf weed control (fanweed, Silene sp, and buckwheat) was excellent in all treated plots except those treated with 2,4-D and MCPA which had fair to good control.

Yields, test weights, percent plump and height data were found to be statistically non-significant.

Table 6. Agronomic data from the combination broadleaf wild oat herbicide study grown on the Northwestern Agricultural Research Center in Kalispell, MT in 1985. Field R-9

Date planted: April 30,1985 Date harvested: September 5,1985

Treatment	Rate	Wild oat	% Weed	Control 2/		
	ai/A	count 1/	Fan	NFC	Buck	Woat
Bromox + AC 293	.375 + .375	7.0	100	90	100	100
Bromox + AC 293	.375 + .45	4.8	99	99	91	100
Bromox + MCPA + + AC 293	.375 + .375 + .375	1.3	100	91	99	84
Bromox + MCPA + + AC 293	.375 + .375 + .45	4.7	100	94	98	53
Bromox + diclofop	.375 + .75	5.0	100	79	100	93
Bromox + diclfop	.375 + 1.0	.3	98	91	100	99
2,4-D LV + AC 293	.3 +.375	9.5	100	65	68	55
2,4-D LV + AC 293	.3 +.45	1.5	98	81	95	65
2,4-D LV + diclofop	.3 + .75	28.8	88	64	58	34
2,4-D LV + diclofop	.3 + 1.0	10.5	73	55	41	68
Chlorsul+ AC 293	.125 oz +.375	2.8	100	100	95	74
Chlorsul+ AC 293	.125 oz + .45	0	100	100	98	88
Chlorsul+ diclofop	.125 oz+.75	14.8	100	100	99	60
Chlorsul+ diclofop	.125 oz+1.0	3.8	100	100	96	89
DPX-T6376 + AC 293	.06 oz+.375	7.8	100	100	95	68
DPX-T6376 + AC 293	.06 oz+ .45	2.0	100	99	98	84
DPX-T6376 + diclo	.06 oz+ .75	21.8	100	98	84	26
DPX-T6376 + diclo	.06 oz+ 1.0	5.3	99	99	84	88
DPX-M6316 + AC 293	.25 oz+.375	7.7	100	100	98	75
DPX-M6316 + AC 293	.25 oz+ .45	0	100	99	94	98
DPX-M6316 + diclof	.25 oz+ .75	7.0	100	98	96	78
DPX-M6316 + diclof	.25 oz+ 1.0	2.8	100	100	95	93
MCPA + AC 293	.3 + .375	11.3	98	80	81	64
MCPA + AC 293	.3 + .45	6.3	100	79	84	83
MCPA + diclfop	.3 + .75	16.5	90	48	81	73
MCPA + diclfop	.3 + 1.0	2.5	81	78	94	89
CHECK	---	34.3	0	0	0	0

Table 6. (cont'd)

Treatment	Wild oat count 1/	% Weed Control 2/ Fan	NFC	Buck	Woat
$\bar{X}$	8.1	96	86	88	72
F 3/	2.06	3.64	3.75	2.87	2.50
S.E.X.	5.96	5.57	9.20	8.98	12.8
C.V.%	73.3	5.8	10.7	10.2	17.8
L.S.D.	16.8	15.7	25.9	25.3	36.1

1/ Wild oat count = number of wild oat plants per 80 sq. ft.
2/ % Weed Control Fan = fanweed, NFC = night flowering catchfly, Buck = wild buckwheat, Woat = wild oat
Weed scores were made by ocular rating
3/ F value for treatment comparison

Application data : date 5-28-85 Weed stages: Fan 2-3 "
air temp 68 F NFC 2"
soil temp 66 F Buck 2-3 "
wind 0-2 mph w. oat 3-4 lf
Rel hum 55 %

General data: volume 26.86 gpa, ground speed 2.64 mph, plot size 10' x 12'

Table 6. (cont'd)

Treatment	Rate ai/A	Yield Bu/A	Test Wt. Lb/Bu	% Plump	Height (Inch)
Bromox + AC 293	.375 + .375	103.7	48.2	94	28.7
Bromox + AC 293	.375 + .45	108.3	48.4	99	27.4
Bromox + MCPA + + AC 293	.375 + .375 + .375	107.7	48.2	95	30.0
Bromox + MCPA + + AC 293	.375 + .375	98.2	48.1	96	27.1
Bromox + diclofop	.375 + .75	110.3	48.5	96	27.9
Bromox + diclfop	.375 + 1.0	108.9	48.9	96	28.5
2,4-D LV + AC 293	.3 +.375	92.1	47.7	95	26.9
2,4-D LV + AC 293	.3 +.45	107.0	48.8	96	30.1
2,4-D LV + diclofop	.3 + .75	102.3	47.5	93	27.0
2,4-D LV + diclofop	.3 + 1.0	103.9	48.6	80	28.9
Chlorsul+ AC 293	.125 oz +.375	111.7	48.7	95	29.7
Chlorsul+ AC 293	.125 oz + .45	115.5	49.2	96	29.3
Chlorsul+ diclofop	.125 oz+.75	113.8	49.0	95	29.4
Chlorsul+ diclofop	.125 oz+1.0	106.1	48.7	96	28.1
DPX-T6376 + AC 293	.06 oz+.375	107.9	48.9	96	30.3
DPX-T6376 + AC 293	.06 oz+ .45	107.7	48.9	96	28.8
DPX-T6376 + diclo	.06 oz+ .75	104.2	47.9	96	28.7
DPX-T6376 + diclo	.06 oz+ 1.0	95.6	48.0	96	27.0
DPX-M6316 + AC 293	.25 oz+.375	108.2	48.9	97	28.5
DPX-M6316 + AC 293	.25 oz+ .45	108.9	49.4	97	30.0
DPX-M6316 + diclof	.25 oz+ .75	103.6	48.1	96	27.8
DPX-M6316 + diclof	.25 oz+ 1.0	108.2	48.7	96	28.4
MCPA + AC 293	.3 + .375	106.8	48.6	96	29.7
MCPA + AC 293	.3 + .45	111.7	48.5	95	28.8
MCPA + diclfop	.3 + .75	116.3	48.6	96	30.6
MCPA + diclfop	.3 + 1.0	112.2	49.0	96	30.1
CHECK	---	109.8	48.7	94	31.7

Treatment	Yield Bu/A	Test Wt. Lb/Bu	% Plump	Height (Inch)
X	107.1	48.6	94.9	28.9
F 1/	.599	.71	1.15	1.00
S.E.X.	7.2	.53	3.01	1.25
C.V.%	6.6	1.10	3.17	4.33
L.S.D.	20.1	1.50	8.48	8.94

1/ F value for treatment comparison

PROJECT TITLE: The effect of preplant incorporated triallate (Fargo) on ten spring wheat varieties

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

As recorded in previous years different spring wheat varieties vary in their reaction to preplant incorporated (PPI) triallate. Most of the ten varieties tested had negative agronomic responses (yield, head counts, plant counts, percent stand) when exposed to 1.0 and 2.0 lbs ai/a of triallate preplant incorporated.

RESULTS:

All ten spring wheat varieties tested showed a decrease in yield and test weight when treated with 1.0 or 2.0 lbs triallate per acre, preplant incorporated.

In most spring wheat varieties tested there was a decrease in number of heads as the rate of triallate was increased.

Number of plants per foot of row were reduced significantly as the rate of triallate was increased. Fortuna was the least susceptible variety in respect to reduced plant numbers.

Stands were reduced up to 85% in Pondera whereas only a 25% reduction was noted in the varieties Olaf, Westbred and Glennan when 1.0 lb ai/a of triallate was applied PPI. The 2.0 lbs ai/a rate of triallate when applied PPI reduced stands from 35 to 95%. Glennan was the most tolerant variety tested.

Heading dates did not vary more than one day from the check in comparing treated triallate plots to an untreated area.

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Table 7. Agronomic data from the triallate spring wheat study grown on the Northwestern Agricultural Research Center, Kalispell, MT in 1985. Field R-6.

Date planted: April 4, 1985 Date harvested September 15, 1985

Variety	Rate Lb/A	Yield Bu/A	Test Wt Lbs/Bu	Heads per 3ft	Plants per 3 feet 6-4-85	7-2-85	% Stand
NK 751	0	47.0	57.2	27.8	11.6	11.0	90
NK 751	1	39.0	57.5	29.3	13.1	12.8	49
NK 751	2	38.3	55.9	28.9	13.7	9.3	29
Newana	0	52.0	58.1	36.6	11.7	15.0	83
Newana	1	39.7	53.0	33.1	6.6	11.0	34
Newana	2	22.6	50.0	18.6	4.4	3.8	9
Lew	0	48.4	59.5	41.0	14.2	13.0	84
Lew	1	41.5	54.0	27.9	10.3	9.6	34
Lew	2	20.4	46.3	22.5	4.6	5.5	11
Glenman	0	47.5	56.2	39.3	12.9	10.7	84
Glenman	1	49.2	56.4	38.3	11.7	12.3	73
Glenman	2	39.4	53.3	32.3	9.6	9.1	58
Owens	0	54.0	55.8	36.3	12.6	10.9	71
Owens	1	51.5	56.6	31.5	11.7	10.6	46
Owens	2	42.6	51.8	26.5	6.1	6.6	34
Pondera	0	27.7	59.3	31.6	13.1	13.8	78
Pondera	1	34.6	52.1	27.1	9.4	8.3	29
Pondera	2	15.4	47.4	19.4	3.3	4.6	8
Fortuna	0	33.6	58.5	36.9	10.3	12.1	94
Fortuna	1	33.6	57.9	34.9	12.8	12.8	70
Fortuna	2	24.3	53.9	33.9	7.2	8.3	37
Westbred Ch	0	42.1	59.8	32.7	11.5	12.4	86
Westbred Ch	1	43.7	59.4	31.6	12.3	15.0	61
Westbred Ch	2	37.3	56.8	22.9	7.2	8.9	22
Mckay	0	49.2	54.2	29.9	11.0	12.6	78
Mckay	1	45.7	51.9	34.1	10.5	11.1	43
Mckay	2	35.0	47.1	25.4	7.9	6.8	21
Olaf	0	53.4	58.1	42.9	13.6	12.9	94
Olaf	1	45.5	56.7	43.2	12.4	12.7	71
Olaf	2	40.0	53.7	36.2	7.7	9.6	44
	$\bar{X}$	39.92	54.9	31.7	13.5	10.4	54.0

Application data: Date: April 24, 1985 , air temp 42 F, soil temp 42 F, wind 0-2 mph, rel hum 34%, seeded with a research-type double disced seeder, depth of seeding 1 1/2 - 2 " , chemical incorporation by a vibra-shank in two directions, soil moisture was very good , type of application-pre plant incorporated.

PROJECT TITLE: The effects of several chlorsulfuron analogs on five varieties of spring barley

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Three DuPont experimental compounds (M6316, L5300 and R9674) and bromoxynil plus MCPA were found to provide good broadleaf weed control in Menuet, Ingrid, Clark, Piroline and Hector barley. High rates of L5300 and R9674 did cause plant injury to several varieties.

RESULTS:

All chemical treatments provided excellent broadleaf weed control of pigweed, fanweed, lambsquarter and wild buckwheat. The compounds L5300 (.75 oz. ai/a) and R9674 (.375 and 1.0 oz. ai/a) noticeably thinned stands of Menuet, Ingrid, Clark, Piroline and Hector. Head counts were reduced in most barley varieties tested with rates of L5300 (.75 oz. ai/a) and R9674 (.375 and 1.0 oz. ai/a). High rates of L5300 and R9674 (.75 and 1.0 oz ai/a) respectively reduced plant counts in barley with most reduction being observed in Clark. Yields were greatly reduced in Ingrid, Clark and Hector. Test weights and percent plump were not altered significantly by treatment.

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Table 8. Agronomic data from the Chlosufuron analog study grown at the Northwestern Agricultural Research Center, Kalispell, MT in 1985. Field R5

Variety	Treatment oz ai/A	Yield Bu/a	Test Wt. Lb/Bu	% Plump	Head Count 1/	Plant Count 2/
Menuet	M 6316 .5	69.2	49.0	97.5	24.1	7.2
Menuet	M 6326 1.0	62.1	49.8	95.7	22.7	8.2
Menuet	L 5300 .25	68.7	49.6	94.0	26.7	7.8
Menuet	L 5300 1.0	54.6	48.3	93.0	20.2	8.0
Menuet	R 9674 .375	46.0	48.6	93.8	21.4	8.1
Menuet	R 9674 1.0	44.2	49.1	92.5	14.7	7.6
Menuet	Bronate .375#	51.9	49.7	92.5	28.0	6.4
Menuet	Check	53.2	48.7	82.0	20.6	10.0
Ingrid	M 6316 .5	68.8	49.4	92.8	23.1	10.4
Ingrid	M 6316 1.0	78.5	48.8	94.3	29.1	9.9
Ingrid	L 5300 .25	77.3	49.3	93.5	28.5	7.7
Ingrid	L 5300 1.0	61.7	48.9	89.8	20.8	7.2
Ingrid	R 9674 .375	49.4	49.1	87.5	21.6	9.6
Ingrid	R 9674 1.0	50.9	49.0	91.8	20.5	7.2
Ingrid	Bronate .375#	55.5	50.1	90.3	23.6	6.9
Ingrid	Check	53.6	48.9	75.0	28.0	9.2
Clark	M 6316 .5	75.7	49.7	94.0	39.4	8.5
Clark	M 6326 1.0	74.4	49.6	94.0	41.8	10.4
Clark	L 5300 .25	65.6	49.9	93.3	24.0	8.1
Clark	L 5300 1.0	60.6	48.7	89.5	28.1	7.4
Clark	R 9674 .375	46.9	48.9	90.5	19.0	8.9
Clark	R 9674 1.0	58.3	48.9	92.0	22.8	7.7
Clark	Bronate .375#	61.5	49.4	92.5	26.1	7.0
Clark	Check	61.7	49.4	87.0	27.5	7.4
Piroline	M 6316 .5	58.9	49.3	93.3	32.1	10.6
Piroline	M 6326 1.0	60.8	49.1	94.0	31.3	9.1
Piroline	L 5300 .25	59.4	49.3	92.0	27.2	11.2
Piroline	L 5300 1.0	45.6	48.4	85.3	22.0	7.6
Piroline	R 9674 .375	42.6	47.8	90.5	22.1	6.9
Piroline	R 9674 1.0	48.0	48.0	91.8	23.2	8.4
Piroline	Bronate .375#	51.3	49.1	91.8	22.7	8.6
Piroline	Check	48.5	48.6	77.3	21.9	9.8
Hector	M 6316 .5	69.2	48.8	89.3	34.6	10.8
Hector	M 6326 1.0	72.7	48.5	91.0	44.9	9.6
Hector	L 5300 .25	78.1	48.2	90.0	50.4	11.0
Hector	L 5300 1.0	63.3	47.2	85.0	31.2	11.2
Hector	R 9674 .375	52.6	46.8	82.0	24.2	8.8
Hector	R 9674 1.0	56.6	46.6	81.3	27.6	9.7
Hector	Bronate .375#	63.9	47.4	89.5	37.2	11.1
Hector	Check	57.1	46.6	78.8	31.2	11.0
	$\bar{X}$	59.5	48.8	89.8	27.1	8.79

1/ Head counts per 3 feet of linear row
2/ Plant counts per 3 linear feet of row

Table 8. (cont'd)

Variety	Treatment oz ai/A		Height (Inches)	% Stand	-- % Weed Lamb	Control Pig W	Buck	-- 1/ Fan
Menuet	M 6316	.5	22.3	44	100	100	100	100
Menuet	M 6326	1.0	20.7	41	100	100	100	100
Menuet	L 5300	.25	20.5	44	100	100	100	100
Menuet	L 5300	1.0	19.5	33	100	100	75	100
Menuet	R 9674	.375	17.6	26	100	100	100	100
Menuet	R 9674	1.0	16.6	29	100	100	100	100
Menuet	Bronate	.375#	20.8	30	88	98	100	100
Menuet	Check		19.7	40	0	0	0	0
Ingrid	M 6316	.5	25.4	54	100	100	100	100
Ingrid	M 6326	1.0	25.4	53	100	100	100	100
Ingrid	L 5300	.25	24.1	55	100	100	100	100
Ingrid	L 5300	1.0	24.1	41	84	100	100	75
Ingrid	R 9674	.375	22.0	26	100	100	100	100
Ingrid	R 9674	1.0	22.2	28	100	100	100	100
Ingrid	Bronate	.375#	23.3	33	88	98	100	100
Ingrid	Check		24.3	51	0	0	0	0
Clark	M 6316	.5	26.2	58	100	100	100	100
Clark	M 6326	1.0	24.1	54	100	100	100	100
Clark	L 5300	.25	25.4	49	100	100	100	100
Clark	L 5300	1.0	23.1	46	100	100	100	100
Clark	R 9674	.375	21.7	35	100	100	100	100
Clark	R 9674	1.0	24.4	31	100	100	100	100
Clark	Bronate	.375#	22.9	49	88	98	100	100
Clark	Check		25.1	45	0	0	0	0
Piroline	M 6316	.5	24.8	50	100	100	100	100
Piroline	M 6326	1.0	27.1	46	100	100	100	100
Piroline	L 5300	.25	24.7	48	100	100	100	100
Piroline	L 5300	1.0	23.1	32	100	100	100	100
Piroline	R 9674	.375	23.0	25	100	100	100	100
Piroline	R 9674	1.0	24.7	31	100	100	100	100
Piroline	Bronate	.375#	27.2	29	88	98	100	100
Piroline	Check		26.4	48	0	0	0	0
Hector	M 6316	.5	27.8	59	100	100	100	100
Hector	M 6326	1.0	27.1	61	100	100	100	100
Hector	L 5300	.25	28.3	63	100	100	100	100
Hector	L 5300	1.0	25.1	50	100	100	75	100
Hector	R 9674	.375	24.1	40	100	100	100	100
Hector	R 9674	1.0	25.2	41	100	100	100	100
Hector	Bronate	.375#	27.7	53	88	98	100	100
Hector	Check		25.6	59	0	0	0	0
		$\bar{X}$	23.8	43	85.5	87.2	85.6	86.9

1/ Weed control ratings based on ocular ratings
Lamb = lambquarters, Pig W = pigweed, Buck = wild buckwheat
Fan = fanweed

Application Data: Post application, date 5-31-85, air temp 60 F, soil temp 72 F, wind 0-2 mph, Rel. Hum. 33%, crop stage 3-5 leaf.

Weed stages: Lamb - 1-3", pig w - seedlings, Buck - 1-2"
Fan - 1-3".

General: Research type spayer traveling at 2.64 mph, volume 26.86 gpa, plot size 10' x 10.5'.

PROJECT TITLE: Broadleaf weed control in Newana spring wheat

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalsipell

Cooperators - Chemical Company Representatives

SUMMARY:

Two new experimental broadleaf herbicides (E1107 and SC0051) were applied at various rates and varying application timings with relatively good control of fanweed, *Silene* sp and wild buckwheat. Percent stand and height measurements did indicate stand injury from post emergence applications of SC0051.

RESULTS:

Yields, although varying from 65.8 to 88.1 bu/a, were not found to be significantly different from the check which was the highest yield. Lower yields for respective treatments did however indicate that there was some crop injury from treatments, especially post applications of SC0051. Thinning of stands were severe with post applications of SC0051, however plant heights showed that all treatments but the low rates of SC0051 were injurious as both PES and post applications.

Table 9. Agronomic data from the broadleaf herbicide study in Newana spring wheat grown on the Northwestern Agricultural Research Center, Kalispell, MT. in 1985. Field R-9.

Date seeded: May 3, 1985 Date harvested: September 4, 1985

Treatment	Rate ai/A	Appln. Type	% Stand	Yield Bu/A	Test Wt. Lbs/Bu	Ht. In	% Weed Control 1/ Fan	Sil	Buck
EL 107	30 g	PPSA 2/	99	85.6	60.1	28.6	100	85	61
EL 107	60 g	"	98	83.3	60.0	27.2	100	81	81
EL 107	90 g	"	98	80.7	60.3a	27.0	100	93	85
EL 107	30 g	POPI 3/	98	85.3	60.0	27.9	100	80	83
EL 107	60 g	"	100	84.8	60.8a	28.3	100	73	99
EL 107	90 g	"	99	78.8	59.9	28.1	100	95	90
SC 0051	1.0 #	PES 4/	95	77.7	59.9	28.0	100	100	99
SC 0051	1.5 #	"	94	81.2	60.3a	26.2b	100	100	100
SC 0051	2.0 #	"	81b	72.2	59.3	26.2b	100	100	100
SC 0051	1.0 #	POST 5/	65b	72.8	58.4	26.0b	100	100	100
SC 0051	1.5 #	"	55b	65.8	58.3	24.1b	100	95	100
SC 0051	2.0 #	"	57b	73.8	58.8	23.6b	100	94	99
EL 107 + SC 0051	30 g + 1.0 #	PES	93	83.6	60.0	26.7	100	100	100
EL 107 + SC 0051	30 g + 1.5 #	PES	85	75.6	59.5	28.0	100	99	100
EL 107 + SC 0051	30 g + 1.0 #	POST	70b	75.5	58.0b	24.8b	100	88	98
EL 107 + SC 0051	30 g + 1.5#	POST	57b	80.4	58.4	25.3b	100	88	94
CHECK	----	-----	98	88.1	59.3	28.1	0	0	0

	% Stand	Yield	Test Wt.	Ht.
$\bar{X}$	84.7	79.1	59.4	26.7
F 5/	10.58**	1.52	4.66**	5.81**
S.E.X.	5.16	4.80	.351	.64
C.V.	6.09	6.07	.591	2.40
L.S.D.	14.68	13.7	.99	1.83

1/ % Weed control by ocular rating
Fan = fanweed, Sil = silene, Buck = wild buckwheat
2/ PPSA = surface application prior to planting
3/ POPI = post plant application with light incorporation (hand raked)
4/ POST = post to crop 1-3 leaf stage
5/ F value for treatment comparison
a/ Values significantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level
** Indicates statistical significance at the .05 level

Application data:	Date:	5-3-85	5-3-85	5-24-85
	Application:	PPSA	POPI/PES	POST
	Air temp:	74 F	72 F	85 F
	Soil temp:	75 F	73 F	84 F
	Wind:	0-3 mph	5 mph	0-4 mph
	Rel Hum:	8 %	13 %	20 %
Weeds	Fanweed:	not emerged	Not emerged	1 st true lvs
	Silene	"	"	" " " "
	W. Buckwheat	"	"	" " " "
	Crop	pre	post plant	2 1/2 leaf

General info:
Volume 26.86, ground speed 2.64 mph, plot size 10' x 12',

PROJECT TITLE: Evaluation of herbicides for control of weeds in established alfalfa

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Metribuzin applied alone and in combination with selective grass herbicides provided very good control of established and seedling dandelions in established alfalfa. Highest yields were obtained from plots treated with hexazinone at .5 lb ai/a (2.83 T/A) and metribuzin plus haloxyfop at .5 + .4 lb ai/a (2.7 T/A).

RESULTS:

The highest yield of hay per acre was harvested from dormant application treatment of hexazinone at .5 lb ai/a. The highest yield of pure alfalfa also obtained from this treatment application was the only one significantly higher in yield than the check.

The percent alfalfa for the first cutting was significantly greater than the check with dormant application of metribuzin plus DPX-Y6202 or haloxyfop as a post application. The percentage of grass was greater in the pronamide plot (21.5%) for the first cutting.

In the second cutting of hay there were no significant differences in yield of hay or pure alfalfa. Percent alfalfa was significantly less and percent grass significantly greater in the AC 263,499 treatment when compared to the check. The low rate of M6316 also had a higher percentage of grass when compared to the check.

Dandelion bloom counts per square feet were significnatly less in each treatment when compared with the check. Established dandelions (second year plants) were not effectively controlled by any treatment, yet dandelion bloom suppression was very effective in metribuzin and hexazinone treatments Table 3. Several of the metribuzin treatments as well as the hexazinone applications were effective in controlling first year as well as seedling dandelions.

Table 1. Dormant and post herbicide applications to established alfalfa. Northwestern Agricultural Research Center, Kalispell. MT. Field P-2. First Cutting.

Treatment	Rate	Application	Ton Hay per A	Ton Alf per A	% 1/ Alfalfa	% 1/ Broad	% 1/ Grass
Metribuzin	.5	Dorm	1.44	1.41	98.1	.1	1.8
Pronamide	1.0	Dorm	1.42	1.11b	77.9b	.6	21.5a
Hexazinone	.5	Dorm	1.64	1.63a	98.7	.1	1.2
Flurchloridone + SC1084	.25 + 1.0	Dorm	1.44	1.38	96.1	.2	3.7
SMY 1500	1.0	Dorm	1.45	1.36	93.7	.1	6.2
SMY 1500	2.0	Dorm	1.34	1.30	96.3	.1	3.6
Metribuzin + fluazifop	.5 + .4	Dorm	1.42	1.39	97.8	.1	2.1
Metribuzin + sethoxydim	.5 + .4	Dorm	1.30	1.27	97.6	.5	1.9
Metribuzin + haloxyfop	.5 + .4	Dorm	1.57	1.56	99.3	.1	0.6
Metribuzin + DPX Y6202	.5 + .4	Dorm	1.43	1.43	99.6a	.1	0.3
Metribuzin + SC 1084	.5 + 1.0	Dorm	1.43	1.37	95.7	.5	3.8
Metribuzin + fluazifop	.5 + .4	Dorm/Post	1.50	1.50	97.4	.1	0.1
Metribuzin + sethoxydim	.5 + .4	Dorm/Post	1.48	1.45	98.2	.1	1.7
Metribuzin + haloxyfop	.5 + .4	Dorm/Post	1.50	1.50	99.8a	.1	0.1
Metribuzin + DPX-Y6202	.5 + .4	Dorm/Post	1.30	1.28	98.7	.1	1.2
Metribuzin + SC 1084	.5 + 1.0	Dorm/Post	1.37	1.33	97.1	.1	2.8
AC 263,499	.25	Post	1.34	1.32	98.1	.1	1.8
M 6316	.25 oz	Dorm	1.49	1.31	88.0	.4	11.6
M 6316	.5 oz	Dorm	1.46	1.22	84.0	4.9	11.1
Check	0	--	1.51	1.38	91.8	2.8	5.4
	Mean		1.44	1.37	95.2	.5	4.3
	F-value 2/		1.59	1.886**	4.38*	.995NS	3.19*
	S.E.x		.067	.084	2.74	1.19	2.87
	C.V. %		4.71	6.12	2.87	225.6	67.35
	L.S.D.		.194	.240	7.83	3.41	8.22

1/ % composition by species separation,calculated on weight basis.
2/ F value for treatment comparison
Broad = broadleaf weeds (mostly dandelions)
Grass = quackgrass

Table 2. Dormant and post herbicide applications to established alfalfa. Northwestern Agricultural Research Center, Kalispell, MT. Field P-2. Second Cutting.

Treatment	Rate	Application	Ton Hay per A	Ton Alf per A	% 1/ Alfalfa	% 1/ Broad	% 1/ Grass
Metribuzin	.5	Dorm	.94	.93	99.2	.4	.4
Pronamide	1.0	Dorm	.88	.84	95.6	.7	3.7
Hexazinone	.5	Dorm	1.19	1.18	99.4	.1	.5
Flurchloridone + SC 1084	.25 + 1.0	Dorm	.93	.92	98.8	.3	.9
SMY 1500	1.0	Dorm	1.04	1.02	97.9	1.3	.8
SMY 1500	2.0	Dorm	1.06	1.05	98.8	.1	1.1
Metribuzin + fluazifop	.5 + .4	Dorm	1.22	1.16	94.6	2.1	3.3
Metribuzin + sethoxydim	.5 + .4	Dorm	1.09	1.07	98.4	1.2	.4
Metribuzin + haloxyfop	.5 + .4	Dorm	1.09	1.09	99.4	.1	.5
Metribuzin + DPX-Y6202	.5 + .4	Dorm	1.19	1.18	99.1	.5	.4
Metribuzin + SC1084	.5 + 1.0	Dorm	1.01	1.01	99.3	.2	.5
Metribuzin + fluazifop	.5 + .4	Dorm/Post	1.11	1.10	99.7	.3	0
Metribuzin + sethoxydim	.5 + .4	Dorm/Post	1.17	1.16	99.5	.1	.4
Metribuzin + haloxyfop	.5 + .4	Dorm/Post	1.21	1.20	99.3	.7	0
Metribuzin + DPX-Y6202	.5 + .4	Dorm/Post	1.11	1.10	99.6	.1	.3
Metribuzin + SC 1084	.5 + 1.0	Dorm/Post	1.07	1.05	97.9	.4	1.7
AC 263,499	.25	Post	.96	.85	87.6b	1.1	11.3a
M 6316	.25 oz	Dorm	.94	.87	93.1	1.1	5.8a
M 6316	.5 oz	Dorm	.75	.71b	94.3	1.3	4.4
Check	0	--	1.02	.98	96.7	1.6	1.7
		Mean	1.05	1.02	97.4	.7	1.9
		F-value 2/	1.54	2.07*	4.97*	.884	5.570*
		S.E.x	.099	.095	1.37	.648	1.162
		C.V. %	9.42	9.23	1.40	97.65	60.96
		L.S.D.	.28	.27	3.93	1.85	3.33

1/ % composition by species separation, calculations made on weight basis.
2/ F-value for treatment comparison
Broad = broadleaf weeds
Grass = quackgrass

Table 3. Dormant and post herbicide applications to established alfalfa. Northwestern Agricultural Research Center, Kalispell, MT. Field P-2.

Treatment	Rate	Application	Dandelions 1/ Blooms/ft^2 5/16	Dandelions 1/ % Control 7/30	% Weed Control 6/8/85 2/ Quack	% Weed Control 6/8/85 2/ 2 yr Dand	% Weed Control 6/8/85 2/ 1 yr Dand	% Weed Control 6/8/85 2/ Seed Dand
Metribuzin	.5	Dorm	.1b	23	95	5	67	100
Promamide	1.0	Dorm	6.6b	77a	100	0	0	0
Hexazinone	.5	Dorm	0b	92a	75	15	87	100
Flurchloridone + SC 1084	.25 + 1.0	Dorm	2.4b	75a	50	10	55	75
SMY 1500	1.0	Dorm	1.2b	85a	50	0	25	75
SMY 1500	2.0	Dorm	.1b	23a	60	0	40	63
Metribuzin + fluazifop	.5 + .4	Dorm	.2b	90a	99	5	25	60
Metribuzin + sethoxydim	.5 + .4	Dorm	.6b	90a	63	0	60	85
Metribuzin + haloxyfop	.5 + .4	Dorm	.1b	82a	100	5	80	100
Metribuzin + DPX-Y6202	.5 + .4	Dorm	.1b	95a	100	0	30	67
Metribuzin + SC 1084	.5 + .4	Dorm	.2b	100a	100	40	97	100
Metribuzin + fluazifop	.5 + .4	Dorm/Post	.2b	0	83	10	40	90
Metribuzin + sethoxydim	.5 + .4	Dorm/Post	.2b	0	93	3	65	95
Metribuzin + haloxyfop	.5 + .4	Dorm/Post	0b	0	88	10	40	90
Metribuzin + DPX-Y6202	.5 + .4	Dorm/Post	.4b	55a	75	0	75	95
Metribuzin + SC 1084	.5 + 1.0	Dorm/Post	.5b	90a	95	5	63	100
AC 263,499	.25	Post	0b	47a	50	0	0	0
M 6316	.25 oz	Dorm	2.9b	80a	45	0	0	0
M 6316	.5 oz	Dorm	1.7b	85a	50	0	0	35
Check	0	--	8.6	0	0	0	0	0
		Mean	1.31	62.38				
		F-value 3/	18.3**	8.53**				
		S.E.x	.765	16.73				
		C.V. %	41.14	26.82				
		L.S.D.	1.55	33.81				

1/ Dandelion control ratings, 5/16 number of blooms per square foot conunted, 7/30 ocular percent control rating
2/ % weed control ratings (ocular): Quack = quackgrass; 2 yr Dand = second year dandelion growth; 1 yr Dand = 1st year dandelion growth; Seed Dand = seedling dandelion
3/ F-value for treatment comparison

Table 4. Dormant and post herbicide applications to established alfalfa. Northwestern Agricultural Research Center, Kalispell, MT. Field P-2.

Treatment	Rate	Application	Ton/A Hay 1st Cut	Ton/A Hay 2nd Cut	Total Hay/A	Ton/A Alfalfa 1st Cut	Ton/A Alfalfa 2nd Cut	Total Alfalfa
Metribuzin	.5	Dorm	1.44	.94	2.38	1.41	.93	2.34
Pronamide	1.0	Dorm	1.42	.88	2.30	1.11b	.84	1.95
Hexazinone	.5	Dorm	1.64	1.19	2.83	1.63a	1.18	2.81a
Flurchlordone + SC1084	.25 + 1.0	Dorm	1.44	.93	2.37	1.38	.92	2.30
SMY 1500	1.0	Dorm	1.45	1.04	2.49	1.36	1.02	2.38
SMY 1500	2.0	Dorm	1.34	1.06	2.40	1.30	1.05	2.35
Metribuzin + fluazifop	.5 + .4	Dorm	1.42	1.22	2.64	1.39	1.16	2.55
Metribuzin + sethoxydim	.5 + .4	Dorm	1.30	1.09	2.39	1.27	1.07	2.34
Metribuzin + haloxyfop	.5 + .4	Dorm	1.57	1.09	2.66	1.56	1.09	2.65
Metribuzin + DPX-Y6202	.5 + .4	Dorm	1.43	1.19	2.62	1.43	1.18	2.61
Metribuzin + SC1084	.5 + 1.0	Dorm	1.43	1.01	2.44	1.37	1.01	2.38
Metribuzin + fluazifop	.5 + .4	Dorm/Post	1.38	1.11	2.49	1.35	1.10	2.45
Metribuzin + sethoxydim	.5 + .4	Dorm/Post	1.48	1.17	2.65	1.45	1.16	2.61
Metribuzin + haloxyfop	.5 + .4	Dorm/Post	1.50	1.21	2.71	1.50	1.20	2.70
Metribuzin + DPX-Y6202	.5 + .4	Dorm/Post	1.30	1.11	2.41	1.28	1.10	2.38
Metribuzin + SC1084	.5 + 1.0	Dorm/Post	1.37	1.07	2.44	1.33	1.05	2.38
AC 263,499	.25	Post	1.34	.96	2.30	1.32	.85	2.17
M 6316	.25 oz	Dorm	1.49	.94	2.43	1.31	.87	2.18
M 6316	.5 oz	Dorm	1.46	.75	2.21	1.22	.71b	1.93
Check	0	--	1.51	1.02	2.53	1.38	.98	2.36
		Mean	1.44	1.05	2.47	1.37	1.02	2.39
		F-value 1/	1.59NS	1.54NS	1.15NS	1.886*	2.07*	2.16*
		S.E.x	.069	.099	1.47	.084	.095	.154
		C.V. %	4.71	9.42	5.89	6.12	9.23	6.43
		L.S.D.	1.94	.28	.420	.240	.270	.440

1/ F-value for treatment comparison

Application Data:

Application -	Dorm	Post
Date -	4/9/85	5/2/85
Air Temperature -	58 degrees F	80 degrees F
Soil Temperature -	60 degrees F	73 degrees F
Wind -	4-5 mph	3-5 mph
Humidity -	19%	23%

Weed Stage:	Dorm	Post
Quack -	2-3"	4-5"
Dandelion-	Seedlings to 1-3"	Seedlings to 6"

PROJECT TITLE: Herbicide evaluations to a new seeding of alfalfa

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Several herbicides and combination of herbicides were tested in a new seeding of alfalfa and found to be effective in controlling broadleaf weeds in alfalfa. All herbicides tested resulted in significantly greater alfalfa percentages than the check.

RESULTS:

Early injury ratings on new seeded alfalfa showed that SC5676/R25788 (30# ai/a) and all rates of M6316 (.125 to .5 oz ai/a) caused considerable injury to the crop. Height notes taken prior to harvest showed some recovery from this phytotoxicity yet all those plots were still noticeably less in height.

Good to excellent broadleaf control was observed with all treatments except those including 2,4-DB formulations.

M6316 reduced yields the first harvest. Highest forage yields were obtained from the SC1084 treatments, however the forage contained a high percentage of broadleaf weeds. Excellent alfafla quality (percent alfafla composition) was obtained with the use of SC5676/R25788. Even with plant injury M6316 treatments produced good yields of high quality alfalfa.

Table 12. Agronomic data from the evaluation of herbicides on a new seedling of alfalfa grown on the Northwestern Agricultural Research Center in 1985. Field Y-5

Date planted: May 13, 1985 Date harvested: Aug 17,1985

Treatment	Rate # ai/A	Appln.1/ type	% composition 2/ Alf	Grass	Brdlf	Yield Tons/A Hay	Alfalfa
SC 1084	.25	1-6 lf	79.0	1.1	19.8b	1.6	1.2
SC 1084	.5	1-6 lf	94.0a	4.3	1.7b	1.1	1.1
SC 1084	1.0	POES	85.3a	.3	14.4b	1.6	1.3
SC 5676/R25788	1.5	Pre Em	99.7a	0	.3b	1.2	1.2
SC 5676/R25788	3.0	Pre Em	99.9a	0	.1b	1.0	1.0
Bromoxynil	.25	Post	94.3a	1.8	3.9b	1.1	1.0
Bromoxynil	.375	Post	88.8a	4.3	6.9b	1.3	1.2
Bromoxynil	.5	Post	91.3a	2.1	6.6b	1.3	1.2
AXF 1309	.5	Post	88.6a	3.0	8.4b	1.2	1.0
Bromoxynil + 2,4-DB ester	.25 + .5	Post	93.9a	2.1	3.9b	1.2	1.2
AXF 1309 + 2,4-DB	.25 + .5	Post	88.6a	4.8	6.6b	1.2	1.1
2,4-DB ester	.5	Post	89.0a	1.2	9.8b	1.2	1.1
2,4-DB ester	.75	Post	94.3a	2.0	3.6b	1.2	1.1
2,4-DB amine	.5	Post	91.1a	1.7	7.2b	1.3	1.2
2,4-DB amine	.75	Post	89.4a	5.0	5.6b	1.4	1.3
M 6316 + surf 3/	.125 oz	Post	96.6a	3.1	.3b	1.1	1.1
M 6316 + surf	.25 oz	Post	97.0a	2.3	.7b	1.2	1.1
M 6316 + surf	.5 oz	Post	94.0a	4.3	1.7b	1.1	1.1
M 6316 + DPX Y6202 + surf	.25 oz + 1.0	Post	97.6a	2.4	.03b	1.3	1.2
M 6316 + DPX Y6202 + surf	.25 oz + 2.0	Post	92.1a	5.4	2.5b	1.2	1.1
M 6316 + DPX Y6202 + surf	.5 oz + 1.0	Post	97.1a	2.9	0b	1.1	1.1
M 6316 + DPX Y6202 + surf	.5 oz + 2.0	Post	96.6a	2.9	.5b	1.0	1.0
2,4-DB + sethoxydim	1.0 + .4	Post	88.6a	3.0	8.4b	1.1	1.0
Check	----	----	66.0	1.1	32.9	1.2	.8

Table 12. (cont'd)

Treatment 1/		% composition 2/ Alf	Grass	Brdlf	Yield Tons/A Hay	Alfalfa
	$\bar{X}$	90.9	2.4	6.7	1.2	1.1
	F 4/	2.60**	1.6	3.0**	1.1	.68
	S.E.X.	4.64	1.23	4.4	.12	.13
	C.V.%	5.11	51.4	67.1	10.5	12.3
	L.S.D.	13.23	3.52	12.8	.367	.388

1/ Appln. type 1-6 lf = 1-6 leaf stage of grass
POES = post emmergence surface
Post = post emmergence to crop and weeds

2/ % composition determined by hand separation of yield subsample into separate species components

3/ Surf = surfactant used R-11 at .25 % v/v

4/ F value for treatment comparison

** Indicates statistical significance at the .01 level

Table 12. (cont'd)

Treatment	Rate # ai/A	Appln.1/ type	Height 6-27	Height 7-29	Stand %	Injury 2/	% Weed Control 3/ FW	AB	SP	SIL
SC 1084	.25	1-6 lf	7.3	27.3	88	.7	7	52	33	33
SC 1084	.5	1-6 lf	7.3	27.3	90	.5	10	17	0	10
SC 1084	1.0	POES	7.7	27.8	85	.3	33	33	33	33
SC 5676/R25788	1.5	Pre Em	4.3b	23.7	25b	6.0a	100	100	100	100
SC 5676/R25788	3.0	Pre Em	2.3b	20.9b	6b	9.2a	100	100	100	100
Bromoxynil	.25	Post	5.7	24.2	71b	2.2a	67	83	100	0
Bromoxynil	.375	Post	5.7	25.6	56b	3.7a	93	100	100	0
Bromoxynil	.5	Post	5.7	25.9	61b	3.5a	92	75	100	0
AXF 1309	.5	Post	5.7	23.1	65b	2.2a	56	100	100	0
Bromoxynil + 2,4-DB ester	.25 + .5	Post	5.7	25.9	63b	4.0a	70	83	100	0
AXF 1309 + 2,4-DB	.25 + .5	Post	5.0b	22.6	48b	4.5a	93	100	100	0
2,4-DB ester	.5	Post	7.0	27.0	83	1.3	60	83	100	17
2,4-DB ester	.75	Post	6.3	26.8	73b	2.3a	100	100	100	0
2,4-DB amine	.5	Post	6.7	26.0	83	1.8	83	100	100	0
2,4-DB amine	.75	Post	6.3	27.2	75b	1.7	63	83	100	33
M 6316 + surf 4/	.125 oz	Post	2.7b	21.2	27b	7.3a	100	100	100	0
M 6316 + surf	.25 oz	Post	3.0b	23.9	23b	7.5a	100	100	92	0
M 6316 + surf	.5 oz	Post	1.7b	21.9	22b	8.1a	100	100	100	20
M 6316 + DPX Y6202 + surf	.25 oz + 1.0	Post	2.7b	23.5	35b	6.2a	100	100	100	40
M 6316 + DPX Y6202 + surf	.25 oz + 2.0	Post	2.0b	23.6	25b	7.7a	100	100	100	0
M 6316 + DPX Y6202 + surf	.5 oz + 1.0	Post	2.3b	22.7	33b	7.0a	100	100	100	10
M 6316 + DPX Y6202 surf	.5 oz + 2.0	Post	2.0b	20.0	17b	9.0a	100	100	100	0
2,4-DB + sethoxydim	1.0 + .4	Post	6.0	24.0	80	1.5	93	100	100	17
Check	----	----	6.7	25.1	97	0	0	0	0	0

Treatment	Height 6-27	Height 7-29	Stand %	Injury 2/
X̄	4.9	24.5	55.6	4.2
F 5/	23.1**	2.5**	18.2**	19.8**
S.E.X.	.72	2.5	11.3	1.2
C.V.%	8.5	5.8	11.7	16.7
L.S.D.	1.2	4.0	18.6	1.99

1/ Appln. type 1-6 lf = 1-6 leaf stage of grass
POES = post emmergence surface
Post = post emmergence to crop and weeds

2/ Injury, 0-10 scale 0= dead plants, 10 = healthy plants

3/ % weed control FW = fanweed, AB = annual bluegrass, SP = sheperdspurse SIL = silene

4/ Surf = surfactant used was R-11 at .25% v/v

5/ f value for treatment comparison

** Indicates statistical significance at the .01 level

Application data:

Date: 5-17-85	6-5-85	6-17-85
Appln: PES	POES	POST
air temp: 72	52	80
soil temp: 63	50	88
wind: 0 mph	4 mph	0-2 mph
Rel Hum: 7%	69 %	12%
Weeds: none	An bluegrass 1/2"	1 "
Crop: 10% emmerges	fanweed 1"	3-5"
	Alfalfa: 1st trifoliate	Silene 1-3"
		Shep prs 2"
		Alfalfa: 3rd trifoliate

General data: volume 26.86 gpa, plot size 10'x24', ground speed 6.24 mph, PSI 32,

Alfafa variety Maxim, planted May 13, 1985

PROJECT TITLE: Evaluation of grass herbicides for control of grass in established stands of alfalfa

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Excellent quackgrass suppression and good control was achieved in applying several differing rates of fluazifop to established alfalfa. The first cutting of hay was at least 90% pure alfalfa.

RESULTS:

Slight plant injury was noted in actively growing alfalfa when treated with higher rates of fluazifop (.188 to .25 lb ai/a), haloxyfop (.20 lb ai/a) and DPX-Y6202 (.20 lb ai/a).

Quackgrass suppression was good in all treatments of fluazifop, sethoxydim, haloxyfop, DPX-Y6202 and SC1084. Quackgrass control was very good when actively growing plants were treated with haloxyfop (.20 lb ai/a) and held the weeds in check throughout the growing season.

First harvest yields were not 'significnatly different when analyzed statistically. Excellent grass control from grass herbicides listed above, except sethoxydim which showed fair to good control was observed in this experiment. All treated plots had greater than 90% pure alfalfa. Fluazifop at the three higher rates, haloxyfop and DPX-Y6202 had better than 90% pure alfalfa at the second cutting.

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Table 13. Agronomic data from the post herbicide application study on established alfalfa. NWARC Kalispell, MT. in 1985 Field P-2.

Treatment	Rate # ai/A	Alf 2/ Vigor	Quackgrass Suppres.	Control 5-22	7-25
Fluazifop 1/	.063	9.6	100	73	68
Fluazifop	.094	10	100	75	85
Fluazifop	.125	10	100	57	30
Fluazifop	.156	9.7	100	67	86
Fluazifop	.188	10	100	70	77
Fluazifop	.25	10	100	72	63
Sethoxydim + 1 qt/A coc	.20	10	73	50	45
Haloxyfop +.5% v/v surf	.20	9.3	100	80	70
DPX-Y6202 +.5% v/v surf	.20	9.9	100	82	95
SC 1084 +.5% v/v surf	.20	9.7	100	73	52
Check	---	10	0	0	0

1/ Fluazifop formulation used was Fusilade 2000 surfactant ATPLUS 411 1 qt/A
2/ Alfalfa vigor 0-10 rating: 10 = normal healthy plants, 0 = dead plants

Table 13 (cont'd)

Treatment	Rate # ai/A	1 st cut % comp 1/ Alf	Grs	Brdlf	2nd cut % comp 1/ Alf	Grs	Brdlf
Fluazifop 1/	.063	91.8	.1b	8.1	82.3	12.8	4.9
Fluazifop	.094	94.4	.1b	5.5	85.5	4.8	9.6
Fluazifop	.125	98.4	.1b	1.5	86.7	11.0	2.3
Fluazifop	.156	93.4	.1b	6.5	93.5	2.6	3.9
Fluazifop	.188	97.8	.3b	1.9	92.2	5.1	2.7
Fluazifop	.25	95.4	.2b	4.3	94.4	4.0	1.6
Sethoxydim + 1 qt/A coc	.20	92.1	4.8b	3.1	86.5	11.5	2.0
Haloxyfop +.5% v/v surf	.20	98.8	.3b	.9	95.6	3.1	1.3
DPX-Y6202 +.5% v/v surf	.20	95.1	.2b	4.8	96.9	.8	2.3
SC 1084 +.5% v/v surf	.20	90.4	.2b	9.4	85.0	13.8	1.2
Check	---	85.3	13.3	1.4	88.6	9.3	2.2
	$\bar{X}$	93.6	1.8	4.3	89.7	7.2	3.1
	F 2/	1.4	8.5**	.9	2.31	1.61	2.30
	S.E.X.	3.4	1.4	3.1	3.25	3.62	1.61
	C.V. %	3.6	77.5	71.0	3.61	50.5	52.0
	L.S.D.	10.0	4.1	9.0	9.59	10.68	4.73

1/ % composition determined by hand separarion of green subsample into separate species catagories

2/ F value for treatment comparison

Table 13. (cont'd)

Treatment	Rate # ai/A	Yield (Hay) 1/ 1 st	2 cd	Total	Yield (Alfalfa) 2/ 1 st	2 cd	Total
Fluazifop 1/	.063	1.3	1.5	2.8	1.2	1.2	2.4
Fluazifop	.094	1.4	1.4	2.8	1.3	1.2	2.5
Fluazifop	.125	1.2	1.7	2.9	1.2	1.5	2.7
Fluazifop	.156	1.3	1.7	3.0	1.2	1.6	2.8
Fluazifop	.188	1.2	1.6	2.8	1.2	1.4	2.6
Fluazifop	.25	1.2	1.5	2.7	1.2	1.4	2.6
Sethoxydim + 1 qt/A coc	.20	1.6	1.6	3.2	1.4	1.4	2.8
Haloxyfop +.5% v/v surf	.20	1.4	1.4	2.8	1.4	1.4	2.8
DPX-Y6202 +.5% v/v surf	.20	1.4	1.7	3.1	1.3	1.6	2.9
SC 1084 +.5% v/v surf	.20	1.4	1.3	2.7	1.3	1.1	3.4
Check	---	1.5	1.5	3.0	1.3	1.3	2.6
	$\bar{X}$	1.4	1.5	2.9	1.3	1.4	2.7
	F 3/	1.94	.49	.82	.80	.80	.91
	S.E.X.	.07	.18	.17	.09	.18	.19
	C.V. %	5.89	12.03	5.91	7.20	13.19	7.13
	L.S.D.	.23	.54	.50	.27	.53	.56

1/ Hay - consists of forage with weed components included
2/ Pure alfalfa alone
3/ F value for variety comparison

Application data: Date 5-6-85, air temp 71 F, soil temp 72 F, wind 0-2 mph, Rel Hum 6%, volume 26.86 gpa, pressure 32 psi, ground speed of spray tractor 2.64 mph,

Crop and weed stages: Quackgrass 3-5 ", Dandelions 5-8 ", Clover 5-7 ", Bluegrass 3", Orchardgrass 4", alfalfa 5-8".

Alfalfa variety: Thor Planted May 1981

Harvest dates: 1st cut 6-12-85 2cd cut 7-24-85

PROJECT TITLE: Evaluation of Landmaster (glyphosate + 2,4-D) for no-till alfafla seeding

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators - Chemical Company Representatives

SUMMARY:

Early spring observations of fall applied Landmaster showed excellent control of broadleaf and grassy weeds in an area that had been no-till seeded to alfalfa. In comparing fall to spring applications the fall treatments performed best throughout the season in broadleaf and grass control as well as being more beneficial in establishing the new seeding of alfalfa.

RESULTS:

Early spring observations (May 2) of fall applied Landmaster showed excellent control of all braodleaf and grass species that existed in the check (see weed list below).

Early summer visual observations of fall and spring applications of Landmaster showed that fall treatments gave better weed control which was advantages for the establishment of the newly seeded alfalfa.

Late summer observations of fall and spring Landmaster treatments indicated that fall applied treatments gave the best broadleaf and grass weed control and was more beneficial in the establishment of the newly seeded alfalfa.

Yields of alfalfa from fall applied Landmaster plots were higher than the spring applied plots.

Percent alfalfa composition was greater and percent broadleaf composition less in the fall applied Landmaster plots in comparison to the spring applied treatment.

Table 14. Agronomic data from the Landmaster herbicide study in No-till alfalfa grown on the Northwestern Agricultural Research Center, Kalispell, MT. in 1985.

Date planted: May 25,1985   Harvest date: July 26,1985

Treatment	Rate oz form	Appln. time	% composition 1/ Alf	Grass	Brdlvs	Yield Hay	Tons/A Alfalfa
Landmaster	40	Fall	81.7	5.4	12.9	.8	.8
Landmaster	54	Fall	96.2	.5	3.3	1.0	1.0
Landmaster	108	Fall	72.1	5.6	22.3	1.0	.7
Check	---	Fall	64.7	9.6	25.7	.6	.4b
Landmaster	40	Spring	56.6	6.0	37.4	.7	.4b
Landmaster	54	Spring	62.9	3.7	33.3	1.0	.6
Landmaster	108	Spring	85.5	2.1	12.4	1.0	.8
Check	---	Spring	50.4	12.2	37.4	.4b	.2b
	$\bar{X}$		71.3	5.6	23.1	.8	.6
	F 2/		1.89	.96	1.39	5.37**	7.29**
	S.E.X.		11.34	3.88	10.79	.10	.09
	C.V. %		15.90	68.81	46.72	12.11	16.01
	L.S.D.		34.39	11.76	32.72	.31	.30

1/ % composition determined by hand separation of yield subsample into separate species.

Table 15. Ocular ratings on percent ground cover for the Landmaster herbicide study grown on the Northwestern Agricultural Research Center in Kalispell, MT. in 1985

First reading May 5,1985

Treatment	Rate	Appln.	Bare ground	Grs %	Brdlf %	Alf %
Landmaster	40	Fall	99	0	1	seedling
Landmaster	54	Fall	99	1	0	"
Landmaster	108	Fall	99	0	1	"
Check	--	Fall	57	15	28	"

Second rating June 5, 1985

Treatment	Rate oz	Appln.	Bare ground	Grs %	Brdlf %	Alf stand
Landmaster	40	Fall	90	5	5	good
Landmaster	54	Fall	92	7	1	good
Landmaster	108	Fall	97	0	3	fair-good
Check	--	Fall	20	47	33	fair-good
Landmaster	40	Spring	85	6	9	good
Landmaster	54	Spring	98	1	1	good
Landmaster	108	Spring	99	1	0	fair
Check	---	Spring	40	25	15	fair-good

Third rating July 25, 1985

Treatment	Rate oz	Appln.	Bare ground	Grs %	Brdlf %	Alf %
Landmaster	40	Fall	25	4	4	67
Landmaster	54	Fall	23	8	6	63
Landmaster	108	Fall	24	2	11	63
Check	--	Fall	43	47	7	3
Landmaster	40	Spring	31	14	17	38
Landmaster	54	Spring	31	11	20	38
Landmaster	108	Spring	31	8	29	32
Check	---	Spring	54	15	25	6

Application data:		Fall	Spring
	Type:	Fall	Spring
	Date:	10-3-84	5-10-84
	Air temp:	60 F	53 F
	Soils temp:	64 F	56 F
	Wind:	2-3 mph	3 mph
	Rel Hum:	23%	26 %
Weed stages:	Quack:	2-4 " tall	5-7 " tall
	Dandelions	3" dia	5-6 " dia
	Thistles	2-3 "	3-4 "
	alfalfa		5-6 "
	henbit		6"

General: Volume 26.86 gpa, tractor sprayer 2.64 mph, 32 psi, plot demensions 15' X 200 ', seeding accomplished with a John Deere No-till drill.

PROJECT TITLE: Long term herbicide evaluation in alfalfa

YEAR/PROJECT: 1985/754 Weed Control in Farm Crops

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell

Ag. Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell

Cooperators: Chemical Company Representatives

SUMMARY:

Excellent first year broadleaf and quackgrass control was obtained when hexazinone, metribuzin or sethoxydim plus metribuzin were applied to alfalfa. No one treatment in this first year of harvest stood out as significantly better in weed control or yield.

RESULTS:

This alfafla stand was established in the spring of 1984 using current alfalfa seeding practices, techniques and herbicides (EPTC + 2,4-DB). The first fall treatments (hexazinone and metribuzin) were applied in the fall of 1984 with subsequent spring applications (sethoxydim) being applied in April of 1985. Table 1 lists treatments that have been applied to date. Table 2 and 3 list all plots with future applications included to give a plan and perspective of the long term evaluation.

Weed populations were not higher in the first year in this experiment. However, evaluations were obtained for quackgrass and existing broadleaf weeds.

Yields for the first season treatments including all three harvests were not significantly different. There was a significant difference in percent alfalfa composition for the first harvest only with the check having the lowest level in comparison to treatments.

Table 1. Effects of certain herbicides on the total forage and alfalfa yields from the long range alfalfa production study. Northwestern Agricultural Research Center, Kalispell, MT. Field P-2.

Treatment	Rate	% Alfalfa			Total Forage - T/A				Alfalfa Yield - T/A			
	ai/A	H-1	H-2	H-3	H-1	H-2	H-3	Total	H-1	H-2	H-3	Total
Hexazinone	1.0	97	100	100	1.47	1.31	1.00	3.78	1.37	1.31	1.00	3.67
Metribuzin	.5	92	97	98	1.53	1.40	.99	3.92	1.40	1.37	.97	3.73
Sethoxydim	.4	100	96	98	1.44	1.47	1.02	3.92	1.43	1.41	1.00	3.84
Metribuzin + Sethoxydim	.5 .4	100	97	98	1.41	1.37	1.03	3.80	1.40	1.33	1.01	3.73
None 1/	---	91	96	98	1.51	1.42	.96	3.89	1.37	1.37	.95	3.68
LSD (.05)		7	3!	2!	.10!	.16!	.08!	.20!	.15!	.15!	.08!	.24!
CS (S/mean) %		5	2	1	4.3	7.5	5.2	3.4	7.0	7.2	5.4	4.1

1/ Mean of all plots not treated in 1984/85

! Not significant at P = 0.05

Harvest dates: H-1: 6/18/85 H-2: 7/29/85 H-3: 10/3/85

Table 2. Effect of certain herbicides on total forage and alfalfa yields the first year after application in a long range alfalfa production study. Northwestern Agricultural Research Center, Kalispell, MT. in 1985 Field P-2.

Treatment		Forage Yield - Ton/A				Alfalfa Yield - Ton/A			
		Har 1	Har 2	Har 3	Total	Har 1	Har 2	Har 3	Total
Hexaz	84/86/88	1.43	1.32	1.01	3.76	1.36	1.32	1.01	3.69
Hexaz	84/86	1.44	1.31	.98	3.72	1.39	1.30	.98	3.67
Hexaz	84	1.55	1.33	1.00	3.87	1.49	1.32	.99	3.80
Hexaz	86	1.67	1.50	.87	4.04	1.60	1.44	.85	3.89
Check		1.52	1.50	1.01	4.03	1.32	1.46	.98	3.76
Metri	84/86/88	1.45	1.57	.92	3.94	1.29	1.56	.90	3.76
Metri	84/86	1.52	1.32	1.03	3.86	1.44	1.28	1.02	3.74
Metri	84	1.61	1.31	1.02	3.94	1.44	1.24	.99	3.68
Metri	86	1.35	1.42	.93	3.70	1.24	1.40	.92	3.56
Check		1.56	1.42	.98	3.97	1.40	1.35	.96	3.72
Seth	84/86/88	1.42	1.43	.94	3.78	1.41	1.39	.92	3.72
Seth	84/86	1.49	1.36	1.05	3.89	1.49	1.29	1.04	3.81
Seth	84	1.40	1.61	1.07	4.09	1.40	1.56	1.05	4.02
Seth	86	1.61	1.39	.96	3.96	1.43	1.30	.93	3.66
Check		1.45	1.46	.98	3.89	1.36	1.44	.96	3.77
Metri+ Seth	84/86/88	1.45	1.43	1.06	3.94	1.45	1.40	1.04	3.89
Metri+ Seth	84/86	1.42	1.24	1.01	3.66	1.41	1.21	.99	3.61
Metri+ Seth	84	1.34	1.44	1.02	3.80	1.34	1.35	.99	3.67
Metri+ Seth	86	1.50	1.37	.98	3.85	1.35	1.32	.95	3.62
Check		1.40	1.33	1.01	3.74	1.25	1.27	.99	3.51

Table 3. Effect of certain herbicides on percent botanical composition for three harvest obtained the first year after application in a long range alfalfa production study. Northwestern Agricultural Research Center, Kalispell, MT. in 1985. Field P-2.

Treatment		Harvest 1 % Alfalfa	6/18/85 % Grass	Harvest 2 % Alfalfa	7/29/85 % Grass	Harvest 3 % Alfalfa	10/3/85 % Grass
Hexaz	84/86/88	95	5	100	0	100	0
Hexaz	84/86	97	3	100	0	100	0
Hexaz	84	97	3	99	1	100	0
Hexaz	86	96	4	96	4	98	2
Check		86	14	97	3	98	2
Metri	84/86/88	90	10	99	1	98	2
Metri	84/86	96	4	97	3	100	0
Metri	84	90	10	95	5	97	3
Metri	86	92	8	98	2	99	1
Check		89	11	96	4	98	2
Seth	84/86/88	100	0	97	3	98	2
Seth	84/86	100	0	94	6	99	1
Seth	84	100	0	97	3	99	1
Seth	86	89	11	94	6	97	3
Check		94	6	99	1	99	1
Metri+ Seth	84/86/88	100	0	98	2	99	1
Metri+ Seth	84/86	100	0	98	2	98	2
Metri+ Seth	84	100	0	94	6	97	3
Metri+ Seth	86	91	9	97	3	98	2
Check		89	11	95	5	98	2

Species composition determined by hand separation of yield subsample
Broadleaf weeds present in trace amounts only

Table 4. Effect of certain herbicides on the control of grassy and broadleaf weeds in a long range alfalfa study. Northwestern Agricultural Research Center, Kalispell, MT. in 1985. Field P-2

Treatment		Broadleaf Control 5-23	Broadleaf Control 7-30	Quackgrass Control 5-23	Quackgrass Control 7-30
Hexaz	84/86/88	100	100	91	100
Hexaz	84/86	100	100	84	94
Hexaz	84	100	100	78	91
Hexaz	86	75	100	15	63
Check		0	0	0	0
Metri	84/86/88	100	100	33	83
Metri	84/86	100	100	68	70
Metri	84	100	100	58	69
Metri	86	100	100	74	88
Check		0	0	0	0
Seth	84/86/88	100	100	100	89
Seth	84/86	100	100	100	59
Seth	84	100	100	100	73
Seth	86	100	95	46	70
Check		0	0	0	0
Metri+ Seth	84/86/88	100	100	95	79
Metri+ Seth	84/86	100	100	94	68
Metri+ Seth	84	100	100	98	60
Metri+ Seth	86	100	100	25	61
Check		0	0	0	0

Broadleaf weed species included dandelion, plantain, chickweed, and sheperdspurse.
All weed scores were made by ocular ratings.

PROJECT TITLE: Spring barley variety evaluation

YEAR/PROJECT: 1985/756 Small Grain Production

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell
Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell
Cooperators - Gene Hockett, USDA-ARS, Bozeman
Tom Blake, MSU, Bozeman
Montana State University, MT Agric. Experiment Stn.

SUMMARY:

To determine the adaptability of new and introduced spring barley varieties to northwestern Montana, variety trials are grown at the Northwestern Agricultural Research Center and on off station locations. It is these data, collected over many years, that aid in recommending barley varieties for northwestern Motnana.

Three spring barley nurseries were grown this year at Kalispell and included the Intrastate Spring Barley, the Betzes 2-6 Row near Isogenic and an off station nursery. The Betzes 2-6 row near Isogenic was a cooperative trial involving similar varietal crosses and will be reported by Dr. Gene Hockett.

Favorable spring moisture and long hot growing season contributed to excellent barley yields despite the dry summer. May moisture was up 47% while June and July were down 34 and 75%, repsectively.

RESULTS:

Intrastate Spring Barley

Yields were very good this year for the Intrastate spring barley nursery which was grown on a dryland location on the research center. The high yield (135 bu/a - MT 81865) was 30 bushels greater than last year. The average yield was 96.2 bu/a which was almost 6 bu/a more than last year. MT 81865 was the only variety yielding significnatly higher than the check variety, Ingrid.

Test weights had been effected by the dry conditions during the summer. The mean weight was 46.3 lbs/bu which is about 2 lbs/bu light from normal years. Twenty-seven varieties had test weights less than Ingrid which were significantly different whereas the varieties Nova and MT 81143 were significantly higher.

Lower than normal percent plumps were recorded this year, also relating to the extreme growing conditions experienced this season. Any plump over 83% was significantly higher than the check variety, Ingrid (69.3%).

Heading dates and height varied according to variety. Table 1.

Information for the Betzes 2-6 row Near Isogenic is given in Table 2.

Off Station Nursery

The off station spring barley nursery was grown on the Bill Strange farm this year. Yields ranged from 65 bu/a (Bowman) to 125 bu/a for Gallatin. Clark was used as a check variety for comparison yet no varieties were found to be significantly different after analysis. Gallatin had a test weight which stood out above all other varieites at 50.6 lbs/bu. Percent plumps were normal for this area and ran from 90 to 97%. Height varied according to variety.

Table 1. Agronomic data from the Intrastate Spring Barley Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT in 1985. Field Y-5.

Date seeded: May 5, 1985 Date Harvested: August 5, 1985

	VARIETY	YIELD BU\A	TEST WT LB/BU	% PLUMP	HEAD DATE	HEIGHT INCHES	LODG PREVAL	LODG SEVER
MT 81665	MT547255/TR206	135.38a	48.30	85.67a	170.33b	29.40	.00	.00
PI483237	BOWMAN	112.31	49.30	87.33a	165.67b	30.18	5.00	.67
CI 15229	STEPTOE	110.56	42.23b	70.33	167.00b	27.95	.00	.00
NA 8	LINDY	109.79	42.40b	73.00	165.00b	26.90	.00	.00
MT 755	CORNEL	104.94	47.20	68.33	172.33b	27.95	.00	.00
MT [illegible]	KIMBERLY/MT547263	103.[illegible]	47.30	70.33	170.33b	29.13	.00	.00
MT [illegible]	GALLATIN	103.25	45.33	68.00	169.67b	30.84	.00	.00
MT 82949	MELODY/CLARK	103.25	47.33	70.67	169.67b	29.00	.00	.00
[illegible] 5	PIROUETTE	103.17	47.17	60.67	173.00b	28.61	.00	.00
SK 76333	KLAGES/872114 (TR 441	102.65	45.47b	75.00	170.67b	29.27	.00	.00
NA 12	NA 12	102.42	46.83	69.67	167.33b	29.66	.00	.00
VD 23878	SPIRIT	102.15	47.63	61.33	172.00b	30.45	.00	.00
MT 81143	HECTOR/KLAGES//KLAGES	101.52	50.03a	81.33	169.67b	30.84	.00	.00
MT140523	HECTOR/KLAGES	100.92	46.67	70.33	169.67b	30.45	.00	.00
CI 9558	PIROLINE	100.92	49.17	60.33	168.00b	33.07	.00	.00
CI 15865	AZURE	99.90	42.80b	59.33	167.67b	32.15	33.33a	2.33a
CI 15856	LEWIS	99.88	48.40	81.67	170.33b	31.63	.00	.00
PI483238	HAZEN	99.00	44.07b	61.33	168.00b	33.99	30.00a	1.67
VD 22872	PISTON	98.92	46.33b	66.33	171.67b	31.23	.00	.00
CI 13827	SHABET	98.75	46.83	58.33	172.67b	33.73	.00	.00
VD 3	MENUET	98.08	48.43	64.00	171.00b	29.66	.00	.00
MT 82512	MT41279/ID765988	97.69	44.03b	56.67	169.00b	25.85	.00	.00
VD 02401	VANDERHAVE 024-01	97.60	46.37	44.67b	173.00b	27.82	.00	.00
VD 30101	VANDERHAVE 301-01	97.46	48.33	87.00a	171.00b	27.43	.00	.00
MT138500	HECTOR/KLAGES	97.33	48.50	66.33	168.67b	30.71	.00	.00
MT 8226	CLARK/MT41279	97.10	46.90	68.33	171.33b	30.97	.00	.00
CI 10083	INGRID ✓	97.02	47.93	69.33	176.00	29.27	.00	.00
FM 1	TRIUMPH	96.98	46.03b	62.00	175.33	26.25	.00	.00
WA877178	KLAGES*2/8537-68	96.83	46.83	65.33	171.00b	28.61	.00	.00
MT 8229	CLARK/MT41279	96.35	47.07	63.00	170.33b	30.45	.00	.00
CI 15514	HECTOR	96.15	48.17	74.00	170.67b	22.18	.00	.00
CI 10421	UNITAN	95.92	43.20b	60.00	168.00b	33.60	23.33a	1.00
CB 2	BOLLONA	95.52	45.70b	74.00	173.33b	27.69	.00	.00
ID910719	73AB2199/KARLA	95.35	43.57b	51.33	167.33b	27.17	.00	.00
MT 41918	FAIRFIELD//HECTOR/KLA	95.12	46.87	75.33	171.33b	28.61	.00	.00
CI 15857	CLARK	94.98	46.93	65.33	170.67b	33.99	.00	.00
NA 18	PREMIER	94.69	46.67	77.00	173.67b	29.13	.00	.00
CI 16181	PURCELL	94.58	45.80b	51.33b	169.33b	31.50	.00	.00
ID789009	KARLA/ND1265	94.38	45.23b	71.00	166.00b	28.22	.00	.00
CI 15722	ERSHABET	93.81	49.00	68.33	161.67b	28.35	31.67a	.67
CI 15860	KARLA	93.81	44.33b	58.67	169.67b	30.84	.00	.00
IDB10099	60AB1810-53/HECTOR	93.46	47.93	85.67a	170.67b	32.02	.00	.00
MT 81502	CLARK/WA895375	93.29	46.13b	64.00	170.67b	29.79	.00	.00
CI 15687	KIMBERLY	93.23	46.60	67.67	176.67	30.45	.00	.00
MT138575	HECTOR/KLAGES	92.88	45.70b	78.00	168.67b	29.53	.00	.00

	VARIETY	YIELD BU\A	TEST WT LB/BU	% PLUMP	HEAD DATE	HEIGHT INCHES	LODG PREVAL	LODG SEVER
MT 41279	KIMBERLY//HECTOR/KLAG	92.81	47.57	73.67	169.00b	29.79	.00	.00
MT 81161	MT547123/MT31952	92.69	47.03	75.33	171.33b	29.40	.00	.00
MT 729	SUMMIT	92.17	48.33	61.00	172.33b	29.27	.00	.00
VD403582	VANDERHAVE 4035-82	92.17	45.13b	51.67b	170.00b	24.80	.00	.00
MT 81192	HECTOR/KLAGES//KLAGES	92.17	48.63	87.67a	175.33	30.24	.00	.00
MT 81614	TR440/CLARK	92.0[illegible]	45.[illegible]	58.3[illegible]	171.00b	28.7[illegible]	.00	.00
CE 1	APEX	91.42	44.97b	55.00	171.67b	27.17	.00	.00
BA814038	BUSCH AG 2881-4038	91.38	44.27b	69.33	172.00b	29.79	.00	.00
WA890678	KLAGES*2/8537-68	90.46	47.27	72.33	171.00b	28.87	.00	.00
WE 5	NOVA	89.96	49.47a	69.67	164.00b	27.69	.00	.00
MT 81616	TR440/CLARK	89.13	43.90b	71.00	173.67b	30.45	.00	.00
MN 36	ROBUST	87.71	46.27b	74.67b	168.33b	33.46	10.00	1.00
CI 15773	MOREX	87.25	45.67b	52.67b	167.33b	36.35	58.33a	3.33a
CI 15478	KLAGES	86.40	45.37b	51.00b	175.33	29.79	.00	.00
NF 1	FLEET	84.67	46.17b	39.67b	175.67	21.78	.00	.00
OR 8408	SB741204/SHORT WOCUS	83.25	41.07b	72.67	179.00	28.08	.00	.00
BA 80529	2680-529	81.44	45.80b	69.33	175.00	30.45	6.67	.67
CO 3	MORAVIAN 3	80.17	48.33	73.67	170.33b	29.53	.00	.00
OR 8406	WV/CI1237//ROBAR	77.00	37.97b	33.33b	170.67b	26.51	.00	.00
EXPERIMENTAL MEANS		96.21	46.34	66.87	170.60	29.52	3.10	.18
F TEST FOR VAR. 3/		1.50*	16.18**	4.41**	31.66**	2.65**	1.85**	2.30**
STANDARD ERROR OF THE MEAN		6.84	.55	5.24	.55	1.56	7.48	.38
C.V. 2: (S OF MEAN/MEAN)*100		7.11	1.18	7.84	.32	5.28	241.27	213.42
LSD (0.05)		19.16	1.53	14.67	1.54	4.37	20.93	1.06

1/ Check variety
2/ Lodging: prevalence = % plot lodged,' severity = angle of lodging 0 = none
9 = lodged to ground
3/ F value for variety comparison
* Indicates statistical significance at the .05 level
** Indicates statistical significance at the .01 level
a/ Values siginificantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level

Table 2. Agronomic data from the Betzes 2-6 Row Near Isogenic Nursery. Northwestern Agricultural Research Center, Kalispell, MT. 1985 Field Y-5.

Date seeded: May 11, 1985 Date harvested: August 5, 1985

VARIETY	YIELD BU/A	TEST WT LB/BU	% PLUMP	HEAD DATE	HEIGHT INCHES
CI 16645 BETZES BEEBE PLUMP	88.15	49.73	90.00	182.00	28.35
CI 16636 BETZES CLUB HEAD DER	117.50	50.07	83.67	182.00	36.22
CI 16649 BETZES LARGE SEED	138.81	50.50	83.33	169.33	33.86
MT824963 HISEBET	117.79	49.80	83.00	177.67	38.19
CI 16637 Bz*7/FAN,INTERMEDIATE,LAT	114.44	48.77	80.33	181.67	35.30
MT824981 HISEBET DERIVED	111.44	49.97	80.00	179.33	38.32
CI 16646 BETZES BEEBE PLUMP DER.	121.75	50.30	79.67	180.67	36.75
CI 16650 BETZES LARGE SEED DER	142.83	49.80	79.00	181.00	38.06
CI 16652 BETZES SHORT HAIR ROCHILL	123.12	50.27	78.33	178.33	35.30
PI467884 MOBET	125.19	50.27	78.33	180.33	39.37
CI 16648 BETZES PLUMP NORMAL DER	120.29	50.03	77.67	180.33	38.19
CI 16647 BETZES PLUMP NORMAL	127.58	49.73	77.00	178.33	38.32
CI 16640 BETZES HIGH DP DER	126.56	49.90	76.33	181.00	35.17
CI 16638 Bz*7/FAN,INTERMEDIATE,EAR	121.73	48.93	76.00	172.00	29.00
CI 16639 BETZES HIGH DP	129.42	49.67	74.00	179.67	37.40
CI 16651 BETZES SHORT HAIR ROCHILL	127.42	49.97	73.33	178.00	37.93
CI 6398 BETZES	128.67	49.97	73.00	180.00	35.04
MT 9472 BETZES SHORT DER	124.56	49.77	71.67	176.33	37.66
CI 16635 BETZES CLUB HEAD	129.56	48.47	71.67	182.00	32.81
CI 16644 BETZES LOW NO SEED/HEAD D	143.25	49.60	70.67	179.00	35.43
CI 16643 BETZES LOW NO SEED/HEAD	130.87	49.47	68.67	168.67	31.36
MT 94735 BETZES SHORT	135.77	49.57	66.33	179.33	35.96
EXPERIMENTAL MEANS	124.85	49.75	76.91	178.50	35.64
LSD (0.05)	22.51	.46	4.66	2.69	4.05

Table 3. Agronomic data from the irrigated Offstation Spring Barley Nursery grown on the Bill Strange farm, Stephensville, MT in 1985.

ID #	Variety	Yield	Test Wt.	% Plump	Height
MN 36	Robust	91.19	47.97	95.67	29.97
CI 15478	Klages	96.94	48.47	91.00	27.69
CI 15514	Hector	100.75	50.37	90.33	29.26
CI 15860	Karla	103.44	45.30b	93.67	23.62
NA 18	Premier	69.13	47.77	92.00	21.39
CI 15773	Morex	83.38	46.93b	93.00	26.90
MT 13104	Gallatin	125.31	50.57a	94.00	27.30
WA979175	Andre	93.50	48.17	91.33	24.28
PI483238	Hazen	74.50	44.97b	95.33	21.92
CI 15229	Steptoe	102.56	44.50b	96.67	23.10
CI 15687	Kimberly	106.50	48.40	92.67	28.22
PI483237	Bowman	65.06	49.27	97.00	24.41
CI 15857	Clark 1/	94.75	48.77	92.67	22.31
CI 9558	Piroline	116.75	49.77	96.00	26.25
CI 15856	Lewis	116.38	50.33	93.00	28.87
SK 76333	Harington	94.63	48.13	92.00	24.67
	$\bar{X}$	95.94	48.10	93.52	25.62
	F value 2/	1.445	9.711**	1.406	1.796
	S.E.X.	224.6	.6039	1.745	5.230
	C.V.	14.63	1.255	1.866	8.036
	L.S.D.	40.54	1.744	5.040	15.11

1/ Check variety
2/ F value for variety comparison
a/ Values significantly less than Clark at the .05 significance level
b/ Values significantly greater than Clark at the .05 significance level

RECOMMENDED SPRING BARLEY VARIETIES

FOR WESTERN MONTANA

Six Row type

1. Horsford - dryland
2. Stepford - dryland and irrigated
3. Karla - irrigated or high moisture

Two Row type

4. Piroline - dryland and irrigated
5. Purcell - dryland
6. Summit - dryland and irrrigated
7. Georgie - irrigated and high rainfall
8. Ingrid - irrigated
9. Lud - irrigated
10. Ershabet - dryland and irrigated
11. Menuet - high rainfall and irrigated
12. Ridawn - dryland or irrigated
13. Clark - dryland feed barley with malting potential under irrigation
14. Bridger 82 - irrigated or high moisture
15. Lewis - dryland feed barley with malting potential under irrigation
16. Gallatin - dryland or irrigated
17. Piston - irrigated
18. Cornel - dryland
19. Bellona - irrigated
20. Premier - irrigated
21. Bowman - dryland and irrigated

CHARACTERISTICS OF RECOMMENDED VARIETIES

1. Horsford

   a. Six row
   b. Low grain yielding ability - primarily used for hay
   c. Good lodging resistance
   d. Early maturity
   e. Dryland
   f. Medium kernal size
   g. Moderate test weight

2. Stepford

a. Adapted for hay production
b. Hooded six row
c. Large kernal size
d. Susceptible to stem rust

3. Karla

a. Six row type
b. High yielding ability
c. Very good lodging resistance
d. Early maturity
e. dryland or irrigated
f. Good shattering resistance
g. Moderate test weight

4. Piroline

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Mid season maturity
e. Dryland or irrigated
f. Good kernal size
g. Good test weight

5. Purcell

a. Two row
b. High yielding
c. Good lodging resistance
d. Mid season maturity
e. Dryland
f. Large kernal size
g. Good test weight

6. Summit

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Mid season maturity
e. Dryland or irrigated
f. Large kernal size
g. Good test weight

7. Georgie

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Late maturity
e. Irrigated
f. Large kernal size
g. Good test wieght

8. Ingrid

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Late maturity
e. Irrigated
f. Large kernal size
g. Good test weight

9. Lud

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Late maturity
e. Irrigated
f. Large kernal size
g. Good test weight

10. Ershabet

a. Two Row
b. High yielding ability
c. Fair lodging resistance
d. Mid season maturity
e. Irrigated or dryland
f. Good test weight

11. Menuet

a. Two row
b. High yielding ability
c. Good lodging resistance
d. Late maturity
e. High rainfall or irrigated
f. Medium kernal size
g. Good test weight
h. Susceptible to leaf rust and scald

12. Ridawn

a. Two row
b. Adapted for hay production
c. Good yielding ability
d. Dryland or irrigated

13. Clark

a. Two row
b. Dryland feed barley with malting potential under irrigation
c. High yielding potential
d. Moderate resistance to leaf spot and net blotch
e. Mid season maturity
f. Good lodging resistance
g. Mid size kernal

14. Bridger 82

a. Two row type
b. High yielding ability
c. Good lodging resistance
d. Mid season maturity
e. High moisture or irrigated
f. Good test weight

15. Lewis

a. Two row type
b. Dryland feed barley
c. High yielding potential
d. Excellant straw strength
e. Mid season maturity
f. Good lodging resistance
g. Good test weight

16. Gallatin

a. Two row type
b. Feed barley potential
c. High yielding ability
d. Excellant strength
e. Early to mid season maturity
f. Good lodging resistance

17. Piston

a. Two row type
b. High yielding ability
c. Good test weight
d. Mid season maturity
e. Good lodging resistance
f. Susceptible to leaf scald

18. Cornel

a. Two row type
b. High yielding ability
c. Moderate lodging resistance
d. Mid season maturity
e. Irrigated or dryland
f. Large kernal size
g. Good test weight

19. Bellona

a. Two row feed barley
b. Average height
c. Good yield
d. Mid-season maturity
e. Good test weight
f. Average percent plump

20. Premier

a. Two row malting barley
b. Rough awn, white aleurone, long rachilla hairs
c. Resistant to Helminthosporium
d. Good yield
e. Average test weight

21. Bowman

a. 2 row barley
b. Smooth awns
c. Mid height
d. Good yields
e. Good test weights

PROJECT TITLE: Montana Oat Variety Performance Trial

YEAR/PROJECT: 1985/756 Small Grain Production

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell
Ag Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell
Cooperator - Darrell Wesenberg, USDA-ARS

SUMMARY:

To determine the adaptability of new and introduced oat varieties to Montana the Northwestern Uniform Oat Nursery is grown at Kalispell. These data are used in recommending varieties for northwestern Montana.

Even though extreme climatic conditions were experienced this season in the form of a long dry summer there were excellent yields from the oat nursery in Kalispell. Yields were above the high yields obtained last year and are some of the highest on record at the Northwestern Agricultural Research Center. The long hot summer coupled with ample ground water supplies were contributing factors to such high yields in the Northwestern Oat Nursery this year.

RESULTS:

The high yield for this nursery was 228.6 bu/a from the variety Calibre. The mean for nursery was 203 bu/a. The high range of yields varied from 189 to 228.6 bu/a, with no variety varying significantly from the check variety, Otana.

Test weights were affected by the extremely dry growing season with the average being 31.0 lbs/bu. Eight varieties had test weights significantly less than Otana, which was 32.4 lbs/bu.

Heading dates and height varied according to variety. Lodging was minimal in the nursery this year.

Table 1. Agronomic data from the Uniform Northwestern Oat Nursery grown at the Northwestern Agricultural Research Center, Kalispell, MT in 1985. Field Y-5.

Date seeded: April 11,1985 Date harvested: August 12,1985

VARIETY	Yield Bu/a	test wt lbs/bu	head date	height inches	lodg 2/ angle	lodg2/ %
W 78286 DUMONT	213.13	32.23	178.00	45.28	1.67	6.67
OT 308 CALIBRE (S 7886)	228.61	31.27b	178.00	46.19	1.00	1.67
ID751170 MONIDA	208.62	28.97	175.33	43.96	1.00	3.33
CI 6611 PARK	189.33	32.77	180.33b	45.54	.00	.00
ID 75661 CAYUSE/OTANA	221.07	29.63b	180.67a	37.80b	.00	.00
CI 9401 OGLE	198.21	31.87	172.33b	38.19b	.00	.00
ID766843 K71299/3/OTANA/2/COK	216.95	32.33	175.67b	36.19b	.00	.00
ND 1001 STEELE	197.34	31.37	174.00b	45.41	.00	.00
CI467882 BORDER	205.67	31.00	179.00	38.71b	.00	.00
WA 6394 MINN.II-22-220/CAYUS	206.86	29.70b	180.67a	37.80b	.00	.00
ID742608 CAYUSE/OTANA	212.94	28.40b	180.33a	37.80b	.00	.00
OT 726 CASCADE	190.38	30.77	178.33	47.77	.00	.00
CI 9297 APPALOOSA	200.53	26.67b	178.33	36.48b	.00	.00
CI 9081 RANDOM	171.21	30.30	174.67b	39.24b	.00	.00
ID 80988 74AB1952/74AB2608	191.38	28.30b	177.00	31.50b	.00	.00
CI 8263 CAYUSE	204.73	30.03	177.33	38.32b	.00	.00
ID805807 74AB2608/CAYUSE	214.07	29.60b	179.67	39.50b	.00	.00
CI 9252 OTANA 1/	209.93	32.43	178.33	46.72	.00	.00
ND 1002 RL 3057/OTNAN (W 80	213.00	33.63	177.00	46.59	.00	.00
ND810917 FROKER/RL 3038/2/HUD	199.84	31.47	177.33b	41.86	.00	.00
PA706766 EGDOLON 26/NOBLE	192.20	33.00	176.33b	34.51b	.00	.00
ID815792 74AB2608/CAYUSE	204.98	33.37	175.33b	36.75b	.00	.00
ID804725 CAYUSE/74AB1956	203.23	31.97	176.67b	30.05b	.00	.00
IL753402 COKER 227/3/CI5068/C	196.21	34.93	172.00b	36.48b	.00	.00
ID783965 AURORA NYCRR COMPOSI	208.81	29.80	177.00	38.06b	.00	.00
CI 9412 PORTER (P 70408E)	197.65	33.17	178.33	43.83	.00	.00
CI 9409 NY A-11 (NY COMPOSI	190.32	29.00b	176.67b	36.75b	.00	.00
EXPERIMENTAL MEANS	203.23	31.04	177.32	39.97	.14	.43
F TEST FOR VAR. 3/	1.71	4.32**	18.61**	16.44**	.94	.97
STANDARD ERROR OF THE MEAN	9.07	.93	.53	1.17	.42	1.46
C.V. 2: (S OF MEAN/MEAN)*100	4.46	2.99	.30	2.93	308.93	337.04
LSD (0.05)	25.74	2.63	1.50	3.32	1.19	4.13

1/ Check variety

2/ Lodging: angle 0=no lodging, 9=lodged to ground, % = percent of plot lodged

3/ F value for variety comparison

** Indicates statistical significance at the .01 level

a/ Values significantly greater than the check at the .05 level.

b/ Values significantly less than the check at the .05 level.

SPRING OAT VARIETIES

RECOMMENDED FOR WESTERN MONTANA

1. Cayuse - irrigated or dryland
2. Otana - irrigated or high moisture conditions
3. Border - irrigated
4. Monida - irrigated and dryland

CHARACTERISTICS OF RECOMMENDED VARIETES

1. Cayuse

   a. Pale plant green color, yellow kernals at maturity, developed in New York
   b. High yielding ability
   c. Low test wieght
   d. Maturity - early to mid-season
   e. Very good straw strength
   f. Resistant to Victoria blight and Helminthosporium blight
   g. Tolerant to " Red Leaf " disease of oats

2. Otana

   a. Kernal white and plump
   b. Dark blue-green foliage
   c. High yielding
   d. Excellant test weight
   e. Medium to strong straw
   f. Maturity mid season
   g. Resistant to Victoria blight

3. Border

   a. Kernal white and plump
   b. High yielding ability
   c. Good straw strength
   d. Good test weight
   e. Mid season maturity
   f. Protein levels equal to cayuse
   g. Susceptible to red leaf

4. Monida

   a. Kernal white and plump
   b. High yielding ability
   c. Good straw strength
   d. Good test weight
   e. Mid season maturity
   f. Good protein levels

PROJECT TITLE: Spring Wheat Variety Evaluations

YEAR/PROJECT: 1985/756 Small Grain Production

PROJECT PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Research Center, Kalispell
Ag Research Specialist I - Todd K. Keener
N. W. Agric. Research Center, Kalispell
Cooperators - Larry Alexander, USDA-ARS, Bozeman
Mike Wilson, USDA-ARS, Bozeman
R. E. Allan, USDA-ARS, Pullman, WA
Wheat Research & Marketing Committee
Mont. Ag. Exp. Stn., Mont. State University

SUMMARY:

The spring wheat variety nurseries are used to evaluate and test new lines for production in western Montana.

Three nurseries were grown this year. The two on station trials (Advanced Yield and Western Regional) had extremely good yields with low disease incidence. One off station nursery was grown in Frenchtown this year, but late harvest and extreme weed problems resulted in unreliable data.

RESULTS:

Advanced Yield Nursery

Extremely good yields were taken from the Advanced Yield nursery this year. A record yield of 140.6 bu/a was harvested from plot of the variety Lloyd and 132 bu/a from the variety Owens. Newana was used as a check variety (124.7 bu/a) and in comparison eight varieties had significantly lower yields (Table 1). Test weights were a little light but are a reflection of the dry growing season. The higher test weights that were significantly different from Newana were above 58.7 lbs/bu. Nine varieties were less than Newana and significantly different also.

Practically no disease was observed throughout this nursery and any infection that was noted was insignificant.

Western Regional Nursery

High yields were also taken from the Western Regional Spring Wheat nursery. It is thought that in spite of the drought conditions experienced this summer that ample subsoil moisture contributed to such good yields. The average yield for this nursery was 129.8 bu/a, nearly 21 bu/a higher than the Regional Nursery of 1984. Owens, the check variety, yielded the highest at 151.5 bu/a and ten varieties were significantly lower in yield (Table 2). Test weights were a little lower than previous years, even in comparison to last years data which was also effected by a hot dry season. The average test weight was 56.7 lbs/bu and Owens recorded a test weight of 56.9 lbs/bu. Heading dates and height notes varied by variety.

Off station Spring Wheat Nursery

Due to unusual harvest conditions and severe weed pressure the data acquired from this nursery is not reliable and therefore not released at this time.

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Table 1. Agronomic data from the Advanced Spring Wheat Nursery grown on Northwestern Agricultural Research Center, Kalispell, MT in 1985. Field Y-5.

Date seeded: April 11, 1985   Date harvested: September 10, 1985

VARIETY	YIELD BU/A	TEST WT LBS/BU	HEIGHT INCHES	HEADING DATE
PI476211 LLOYD	140.55	57.63	32.15	178.00b
HY000000 HY320	138.02	56.67	33.33	174.67b
CI 17904 OWENS	131.90	55.47	36.58a	177.33b
MT 8353 PM 23/ MT7448	131.18	57.70	37.80	177.00b
MT 8419 MT7031/MT7336	131.00	55.47	37.53	176.00b
MT 8330 MEXSEL 2315/MT74	128.78	57.73	36.48	176.67b
MT 8319 S1103/MT7448	128.00	57.00	37.80	176.33b
MT 8428 MT 7031/MT 7336	126.57	56.20	37.40	176.00b
MT 8282 PI 345931/MT7440	125.98	54.17b	35.70	175.67b
SUCC0000 SUCCESS	124.88	56.43	37.14	177.67
CI 17430 NEWANA 1/	124.73	57.37	34.91	179.00
CI 17828 PONDERA	122.80	57.47	36.75	176.00b
NK000000 NK 751	122.72	55.90	33.20	174.33b
MT 8447 SU73/MT7336	122.43	58.37	44.23a	176.67b
WRC 80-8 WRC 80-8	122.25	57.13	35.56	173.00b
MT 8423 CI 15838/MT7418	121.43	56.63	36.61	175.33b
MT 8446 MT7336/SHORTANA	119.47	58.30	33.46	174.67b
MT 8421 MT7336/NORANA	119.35	57.23	37.53	175.67b
MT 7819 GLENMAN	118.45	55.77b	37.53	176.33b
MT 8321 PM 23/MT7448	117.72	57.07	37.14	176.33b
DT 433 MEDORA	117.68	58.33	49.74a	175.67b
ND 582 STOA	117.63	56.47	43.31a	176.33b
MT 8434 MT7421/NEWANA	117.40	57.80	37.93	176.00b
MT 8218 CI5838/MARBERG	116.10	55.10	35.43	176.67b
MT 7926 ND 681/MT 6830	115.87	57.97	45.14a	178.67
MT 8457 MT7031/MARBERG	115.03	55.40b	36.48	173.33b
MT 8402 MT7336/SHORTANA	114.20	58.13	35.83	174.00b
MT 8363 MT7448/MT7031	114.18	55.80b	38.98a	176.00b
MT 8436 MT7031/MARBERG	113.17	54.60b	35.30	174.33b
CI 17910 ALEX	113.13	57.43	45.01a	177.33b
MT 8336 PM 23/ MT7448	112.62	58.70a	36.09	177.67
MT 8325 MT7448/MT7031	112.20	55.70b	41.21a	172.33b
MT 8320 PM 23/ MT7448	111.85	57.57	35.96	177.00b
MT 8456 SU73/MT7336	110.72	58.13	44.09a	176.00b
MT 8407 SU73/MT7336	110.23	57.67	45.01a	176.67b
MT 8304 S1103/MT7448	109.37	55.47b	37.01	172.67b
DT000000 MONROE	109.30	57.87	42.78a	172.33b
MT 8401 MT7421/NEWANA	109.22	58.13	40.29a	176.67b
CI 17282 CROSBY	108.65	58.90a	45.01a	175.67b
MT 8328 PM23/MT7448	108.30	58.13	36.88	175.67b
MT 8435 CI 15838/MT7418//PONDERA	107.60	57.07	35.43	175.33b
MT 8441 MT7421/FORTUNA	103.83b	57.07	39.50a	177.67

VARIETY	YIELD BU/A	TEST WT LBS/BU	HEIGHT INCHES	HEADING DATE
CANADA LEADER	103.88b	55.43b	44.49a	177.00b
CI 17429 LEW	102.23b	57.00	46.33a	180.33
MT 8455 MT7421/MT7336	101.58b	57.80	35.70	173.33b
CI 15892 WARD (DURUM)	101.05b	57.70	50.79	176.00b
CI 13596 FORTUNA	99.82b	57.00	45.41a	177.33b
MT 8327 N2211/MT7448	98.40b	56.63	34.65	175.67b
CI 10003 THATCHER	96.62b	55.67b	46.98a	177.00b
EXPERIMENTAL MEANS	116.12	56.95	39.13	175.99
F TEST FOR VAR.	2.67**	5.88**	14.73**	8.91**
STANDARD ERROR OF THE MEAN	6.27	.47	1.20	.56
C.V. 2: (S OF MEAN/MEAN)*100	5.40	.82	3.06	.32
LSD (0.05)	17.59	1.32	3.36	1.58

1/ Check variety
2/ F value for variety comparison
a/ Indicates values significantly greater than the check at the .05 level
b/ Indicates values significantly less than the check at the .05 level
** Indicates statistical significance at the .05 level

Table 2. Agronomic data from the Western Regional Spring Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT. in 1985. Field Y-5.

Date planted: April 11, 1985 Date harvested: September 10, 1985

VARIETY	YIELD BU/A	TEST WT LBS/BU	HEAD DATE	HEIGHT INCHES
CI 17904 OWENS 1/	151.47	56.90	179.67	37.01
ID000249 ABERDEEN SELECTION	148.90	56.53	181.00	36.75
ID000266 ABERDEEN SELECTION	147.80	57.43	179.00	37.93
ID018151 ABERDEEN SEL. A71531	143.43	57.90	181.00	33.60b
UT251303 W498-165/WA6158	141.00	57.77	181.33a	35.17
ID000286 ABERDEEN SELECTION	140.70	56.17	181.00	36.61
CI 17903 MCKAY	140.08	58.20	179.00	33.46b
UT001787 WYNNE/FMN	139.87	56.77	178.33	37.66
WA006831 POTAM70/FIELDER	139.80	55.13b	180.33	34.51
ID000291 BORAH//BORAH/BB"S" R	138.72	56.53	175.33b	35.30
ID000232 ABERDEEN SELECTION	137.63	54.43b	181.00	34.65
WA007182 K74153/K74093,K80009	137.62	57.20	177.67b	37.80
UT001643 WYNNE/FMN	135.90	57.20	178.00b	35.04
ID000285 ABERDEEN SELECTION	133.82	58.00	174.67b	36.09
ORS08425 JUP/BJY"S"	133.42	57.83	174.33b	30.58b
WA006920 POTAM70/FIELDER(PENA	130.67	56.33	180.00	35.56
ORS08418 TV18A-CM067/HORK"S"	130.57	58.03	173.67b	34.25
ORS08417 AU/KAL-BB/BON	128.80	56.43	178.00b	33.20b
UT001415 WYNNE/PWL	128.17	56.60	181.33a	36.88
WA007181 K73772/BORAH,K790074	127.97	57.83	178.67	37.01
WA007075 K73579/BORAH	127.03	57.23	177.33b	35.70
ID000287 A71372S-15-3/A71388S	125.32	58.23	175.33b	35.70
UT001515 WYNNE/FMN	125.05	57.23	178.33	36.09
WA006916 POTAM70/FIELDER	124.00	56.13	177.67b	36.88
ID000263 ABERDEEN SELECTION	123.63b	58.23	179.33	42.52a
ORS08413 HORK/YMH/KA//BB,ORS7	122.65b	55.77	178.00b	32.41b
ORS08415 MINIVET SIB	121.32b	57.43	177.00b	33.86b
ID000290 MRN/TBR66//ID0107/3/	120.80b	57.33	181.00	36.61
ID000271 ABERDEEN SELECTION	118.25b	57.00	178.00b	35.43
CI 4734 FEDERATION	118.12b	54.47b	177.33b	45.41a
CI 17911 WAVERLY	117.77b	54.73b	178.67	33.07b
ID000273 ID0134//ID0064/ID004	115.27b	53.37b	178.67	33.86b
UT302956 WYNNE/UT72S4-303	99.05b	55.37b	177.33b	34.25
WA007183 K78504/K79129-33//K7	97.17b	56.43	179.67	34.65
EXPERIMENTAL MEANS	129.76	56.71	178.44	35.75
F TEST FOR VAR.	1.62	5.50	18.73	7.05
STANDARD ERROR OF THE MEAN	9.81	.52	.48	1.01
C.V. 2: (S OF MEAN/MEAN)*100	7.56	.92	.27	2.83
LSD (0.05)	27.69	1.47	1.35	2.86

1/ Check variety
2/ F value for variety comparison
a/ Values significantly greater than the check at the .05 level.
b/ Values significantly less than the check at the .05 level.
* Indicates statistical significance at the .05 level
** Indicates statistical significance at the .01 level

SPRING WHEAT VARIETIES

RECOMMENDED FOR WESTERN MONTANA

Hard Red Varieties

1. Fortuna
2. Newana
3. Pondera
4. Marberg

Soft White Variety

5. Owens

CHARACTERISTICS OF RECOMMENDED VARIETIES

Hard Red Varieties

1. Fortuna

   a. Bearded variety
   b. Good yielding variety
   c. Medium to tall height
   d. Medium maturity
   e. High test weight
   f. Poor to fair lodging
   g. Somewhat susceptible to leaf rust
   h. Resistant to most common races of leaf rust
   i. Resistant to most common races of stem rust
   j. Fair to good milling and baking quality

2. Newana

   a. High yielding ability
   b. Semi-dwarf variety
   c. High test weight
   d. High lodging resistance
   e. Good shattering resistance
   f. Resistance to stem rust
   g. Moderately susceptible to leaf rust

3. Pondera

   a. High yielding ability
   b. Semi-dwarf variety
   c. High test weight
   d. Mid season maturity
   e. Resistance to stem and stripe rust
   f. Moderately resistant to leaf rust

4. Marberg

a. Good yielding ability
b. Semi-dwarf variety
c. Good test weight
d. Mid season maturity
e. Resistant to stem rust
f. Moderate resistance to stripe rust

Soft White Varieties

5. Owens

a. Bearded variety from Idaho
b. Very high yielding ability
c. Semi-dwarf type
d. Medium maturity
e. Fair test weight
f. Good straw strength
g. Good shattering resistance
h. Resistant to stem and stripe rust

PROJECT TITLE: Small Grains Production

PERSONNEL:

Leader - Vern R. Stewart, N. W. Agric. Res. Center, Kalispell
Research Specialist I - Todd K. Keener
N. W. Agric. Res. Center, Kalispell
Cooperators - Oscar Buller - Stillwater Location
Vergeront Farm - Lake County
Ross McIntyre - Ravalli County

SUMMARY:

To determine the adaptability of new and introduced winter wheat varieties to Montana the Western Regional Winter Wheat nurseries are grown at the Kalispell and Stillwater locations. The outstanding cultivars from these trials are then tested under varying growing conditions of western Montana through off station nursery evaluations. These data are used in making recommendations to the Montana producer.

An open winter with less than normal continuous snow cover contributed to high incidence of winter kill especially at the Stillwater location. TCK smut was present in all Regional nurseries yet fairly light in comparison to previous years. Fair growing season conditions resulted in minimal lodging and disease.

RESULTS:

Western Regional Hard Red Wheat

Although the average yield this year (73.0 bu/a) was just slightly less than last year the high yield for 1985 (89.5 bu.) was much less than 1984 (110 bu/a). The narrow range in variety yields could be a reflection of low moisture levels during the growing season. Two varieties yielded significantly higher than the check variety Winridge (UT132434 and WA7171) and three varieties were significantly less in yield (ORCR8320, MT 8003 and ID 284).

Test weights were slightly lower than normal this year in comparison to others and twenty-eight varieties had higher test weights significnatly different from Winridge.

The less winterhardy varieties have stand reductions exceeding 50%

TCK smut was observed in nineteen varieties with the average level being around 5% of the varieties showing infection.

Lodging was not drastic yet did appear more severe in the Utah Hansel/Arbon crosses.

Western Regional Hard Red Winter Wheat Nursery - Stillwater

Yields were considerably lower than long term averages at the Stillwater location because of low rainfall. The highest yield was 50 bu/a in the nursery with the Utah Hansel/Arbon crosses producing the two top yields.

Test weights are generally lower than average at 52.7 lbs/bu average. Eighteen varieties had significantly higher test weights than Winridge.

Stand losses exceeded 90% in several varieties. WA6820 had the best stand of lines tested at 62.5%.

TCK smut was light at Stillwater although twenty-one entries had smut levels ranging from .25 to 3.75%.

Lodging in this nursery was almost nonexistant.

Western Regional Soft White Winter Wheat Nursery - Kalispell

The dry growing season in 1985 resulted in reduced yield at Kalispell. This year the average yield was 74.5 bu/a, some 20 bushels less than last years average. Seven varieties yielded significantly higher and three varieties were significantly lower than the check variety, Stephens.

Test weights were much lower this year also. The average of 53 lb/bu is seven pounds below the standard weight for wheat.

OI754022 was the only variety significantly different from the check for percent stand. Stands were generally quite uniform.

TCK smut level means were about 6%. Only two varieties, WA7129 and WA7217 were smut free. OI754989 was very susceptible (28.8%).

Western Regional Soft White Wheat Nursery - Stillwater

Yields were greatly reduced in this experiment when compared to last year and long term averages. Yields ranged from 21.2 to 40.2 bu/a with eight varieties having yields significantly less than Stephens.

Test weights were lower than previous years with the average being 47.8 lb/bu.

The stand mean was 44%. Some entries had less than 25% stand.

TCK smut was observed in all but four entries, however level of infection was very low, with a mean for the experiment of 2%.

Off Station Winter Wheat Nurseries

The 1985 off station winter wheat nurseries were grown on the Ross McIntyre farm (Ravalli County) and the Vergeront Farm (Lake County). Comparing the two location averages it was found that the top three yielding varieties were Lewjain (white), Tyee (white) and Weston (red type wheat). Yields were very low in Ravalli County due to drought throughout the growing season.

The two high test weights from the combined location data were from Hawk and Weston (53.5 and 53.9 lbs/bu respectively). Height varied according to variety and location.

Table 1. Agronomic data from the Western Regional Hard Red Winter Wheat Nursery grown on the Northwestern Agricultural Research Center at Kalispell, MT in 1985. Random block design, four replications. Field E-2.

Date seeded: September 17, 1984 Date harvested: August 6, 1985

VARIETY	YIELD BU/A	TEST WT LBS/BU	HEAD DATE	% SURV	HEIGHT INCHES	% 2/ SMUT	LODG PREV	LODG 3/ %
UT146122 Hansel/Arbon	83.84	56.50a	163.50b	95.50	39.07b	.00	6.00	63.75
ID 0281 HGL//CI 14106/DLM//	73.29	57.90a	163.50b	87.00	44.09	.00	5.50	72.50
UT146111 Hansel/Arbon	71.41	55.43a	163.00b	95.50	40.35b	1.25	5.25	63.50
UT146120 Hansel/Arbon	72.41	56.13a	163.00b	96.00	38.58b	.00	4.50	53.75
CI 17902 WINRIDGE 1/	75.26	53.13	165.00	95.25	43.11	.00	4.00	78.50
ID 299 Snowmold tolerant Bu	72.81	57.85a	163.00b	80.50b	40.85	.00	3.25	47.50b
CI 1442 KHARKOF	62.33	56.43a	166.00	89.50	48.82	8.00a	2.50	82.25
ID 0259 Jeff/E/II-60-155/CI	79.41	59.63a	161.75b	78.00b	44.98	.00	2.25	46.25
ID 0282 HGL/ID5006/3/CI14106	83.14	58.28a	162.50b	82.75	36.71b	.00	1.75b	16.25b
ID 0280 II-60-155/2*CI14107/	71.59	57.68a	161.75b	85.75	40.94	.00	1.25b	37.50b
ID 0283 ATL50/4/R/R//2*CNN/3	80.03	55.53a	160.75b	91.50	42.22	.25	1.00b	27.50b
ID 297 A68203W-E-1-3-3/A682	76.78	56.75a	165.75	79.75	37.40b	.00	.75b	23.75b
ID 302 Arbon/3/DM/CLM//Burt	66.80	55.70a	162.50b	53.75b	33.96b	.00	.50b	18.75b
ID 298 2IT65 or 2CNN or 2MC	73.29	59.05a	164.50	80.00b	40.35b	.00	.50b	2.50b
WA1 W1 5514/Itana//CercII	85.21	56.80a	165.25	80.00b	40.94	.25	.50b	6.25b
ORCR8320 Marne Desprez/Colota	42.91b	54.73a	159.75b	43.75b	27.36b	2.25	.00b	.00b
WA2 REA Sel.62/ID 92	70.93	54.98a	164.50	85.75b	37.80b	3.50	.00b	.00b
WA 6816 ID5012/WA5866	65.30	53.20	164.50	70.75b	33.96b	7.25a	.00b	.00b
MT 8003 REDWIN SEL.	56.83b	58.03a	162.75b	93.50	40.06b	2.75	.00b	.00b
ID 300 Arbon/3/DM/CLM//Burt	62.82	54.98a	161.25b	52.50b	36.02b	.00	.00b	.00b
UT132434 WRR/CI13837//PI	88.76a	55.40a	163.75	92.50	39.67b	.00	.00b	.00b
WA 6820 GWB127/GWB236-7/Stur	82.04	56.33a	158.50b	90.75	28.64b	.25	.00b	.00b
ID 0261 Burt/CI12929//DLM/4/	70.68	56.23a	165.75	79.75b	30.02b	1.50	.00b	.00b
WA 7172 CI13438/Burt//SM7437	89.50a	57.50a	161.50b	92.50	35.63b	2.25	.00b	.00b
ID 284 2IT65 or 2CNN or 2MC	59.13b	53.90	164.00	56.25b	31.69b	.00	.00b	.00b
OI730875 7C/Kavkaz//Nord	82.54	55.45a	163.50b	75.75b	35.14b	2.25	.00b	.00b
CI 13844 WANSER	71.44	58.08a	162.50b	80.50b	40.16b	6.25	.00b	.00b
MT 7877 NORWIN	75.73	57.90a	163.00b	88.25	27.26b	19.25a	.00b	.00b
OI602137 OR-ID Sel. F60213-76	81.21	54.20	162.00b	68.75b	26.28b	2.50	.00b	.00b
ORCR8313 Probstorfer-Extrem/T	69.29	57.48a	160.00b	70.50b	33.17b	8.75a	.00b	.00b
ORCR8107 ALBA/GNS//FN/SONORA6	76.59	58.00a	161.25b	73.75b	43.70	5.75a	.00b	.00b
ID 301 HGL/ID5006/4/II-60-1	70.88	55.45a	164.25	57.50b	31.99b	1.00	.00b	.00b
WA 7171 CI13438/Burt//SM7437/3	65.16	53.75	163.75	73.75b	33.46b	4.25	.00b	.00b
EXPERIMENTAL MEANS	73.01	56.31	162.98	79.32	37.10	2.41	1.20	19.41
F TEST FOR VAR. 4/	4.37**	11.05**	13.22**	15.82**	32.88**	5.25**	6.47**	7.03**
STANDARD ERROR OF THE MEAN	4.65	.51	.49	3.50	.97	1.74	.73	10.44
C.V. 2: (S OF MEAN/MEAN)*100	6.37	.90	.30	4.42	2.62	72.21	61.32	53.77
LSD (0.05)	13.06	1.42	1.38	9.83	2.73	4.88	2.06	29.30

1/ Check Variety

2/ Ocular rating of % TCK smut

3/ Lodging ratings: prevalence rated on 0-9 scale, 0 = no lodging 9 = lodged to ground

4/ F value for variety comparison

** Indicates statistical significance at the .01 level

a/ signifies values significantly greater than the check variety at the .05 level

b/ signifies values significantly less than the check variety at the .05 level

Table 2. Agronomic data from the Western Regional Hard Red Winter wheat Nursery grown on the Oscar Buller farm, Kalispell, MT. in 1985. Random block design, four replications.

Date planted: September 18, 1984 Date harvested: August 7, 1985

VARIETY		YIELD BU/A	TEST WT LBS/BU	HEIGHT INCHES	% SURV	% 2/ SMUT	LODG PREV	LODG 3/ %
ID 299	Snowmold tolerant Bu	34.55b	52.80a	31.20b	13.75	.00	2.50a	88.75a
ID 0281	HNL///CI 14106/CLM//	39.48	50.60	36.22	37.50b	.25	.50a	12.50a
WA 6816	ID5012/WA5866	41.19	48.45	28.94b	36.25b	.50	.50a	7.50a
CI 17902	WINRIDGE 1/	41.85	50.32	35.24	50.00	.75	.00	.00
ID 297	A68103W-E-1-3-2/A681	35.18	50.92	34.74	16.75b	.00	.00	.00
ID 298	2IT65 or 2CNN or 2MC	37.15	51.95	28.94b	8.75b	.00	.00	.00
MT 8003	REDWIN SEL.	38.10	56.00a	33.56	40.00	1.00	.00	.00
UT146122	Hansel/Arbon	54.32a	55.38a	32.09b	45.00	.00	.00	.00
UT132434	WRR/CI13837//PI	38.59	50.32	32.97	46.25	.25	.00	.00
ID 302	Arbon/3/DM/CLM//Burt	41.60	52.55a	29.13b	15.00b	.25	.00	.00
WA2	REA Sel.62/ID 92	41.04	52.00	34.94	40.00	.75	.00	.00
MT 7877	NORWIN	38.89	55.03a	22.54b	38.75b	3.75	.00	.00
UT146120	Hansel/Arbon	46.76	53.13a	35.14	48.75	.00	.00	.00
ORCR8320	Marne Desprez/Colota	28.34b	55.18a	24.61b	20.00b	.25	.00	.00
ID 301	HGL/ID5006/4/II-60-1	34.28b	51.10	28.84b	10.00b	.00	.00	.00
WA1	WA 5514/Itana//Cerco	36.80	54.93a	37.50	42.50	.00	.00	.00
ID 0280	II-60-155/2*CI14107/	33.08b	51.90	35.53	42.50	.00	.00	.00
UT146111	Hansel/Arbon	50.45a	52.63a	32.87	56.25	.00	.00	.00
ID 0261	Burt/CI12929//DLM/4/	42.75	50.40	26.38b	31.25b	1.00	.00	.00
ID 300	Arbon/3/DM/CLM//Burt	32.94b	53.45a	30.41b	12.50b	.00	.00	.00
ID 284	2IT65 or 2CNN or 2MC	30.43b	49.80	26.57b	15.00b	.00	.00	.00
WA 6820	GWB127/GWB236-7/Stur	48.49	52.53a	25.39b	62.50a	3.00	.00	.00
CI 13844	WANSER	45.99	55.58a	35.93	38.75b	.75	.00	.00
ID 0259	Jeff/E/II-60-155/CI	42.33	54.25a	38.29a	47.50	.25	.00	.00
OI602137	OR-ID Sel. FG0213-76	36.59	51.65	23.92	40.00	.50	.00	.00
ID 0283	ATL50/4/R/R//2*CNN/3	42.80	51.80	35.63	55.00	.25	.00	.00
ORCR8313	Probstorfer-Extrem/T	46.24	55.45a	28.05b	41.25	1.75	.00	.00
CI 1442	KHARKOF	36.44	53.18a	39.37	40.00	1.25	.00	.00
ORCR8107	ALBA/GNS//FN/SONORA6	47.83	54.23a	38.39a	37.50b	2.75	.00	.00
OI730875	7C/Kavkaz//Nord	47.76	50.53	31.00b	42.50	1.75	.00	.00
ID 0282	HGL/ID5006/3/CI14106	48.39	55.43a	31.59b	42.50	.00	.00	.00
WA 7172	CI13438/Burt//SM7437	47.01	55.03a	31.69b	45.00	2.00	.00	.00
WA 7171	CI13438/Burt//SM7437/3	39.89	51.93	29.63b	47.50	1.75	.00	.00
EXPERIMENTAL MEANS		40.83	52.74	31.73	36.63	.75	.11	3.30
F TEST FOR VAR.		6.27**	7.60**	17.64**	13.22**	1.49	11.80**	35.21
STANDARD ERROR OF THE MEAN		2.46	.73	1.06	3.94	.81	.13	2.62
C.V. %		6.03	1.39	3.35	10.75	108.11	122.53	79.49
L.S.D. (.05)		6.91	2.06	2.99	11.05	2.28	.36	7.35

1/ Check variety
2/ Ocular rating of TCK smut per plot
3/ Lodging ratings: prevalence rated on 0-9 scale, 0= no lodging 9 = lodged to ground
4/ F value for variety comparison
** Indicates statistical significance at the .01 level
a/ Values significantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level

C>

Table 3. Agronomic data from the Western Regional White Winter Wheat Nursery grown on th Northwestern Agricultural Research Center, Kalispell, MT in 1985. Random block design. Field E4.

Date planted: September 17, 1984 Date Harvested: August 6, 1985

CI Number	Variety	Yield Bu/A	Test Wt. Lbs/Bu	Heading Date	% Surv	% 1/ Smut	Height Inches
WA 7215	76/W5052/Daws,Vh	91.0	56.53a	163.2a	88.25	4.750	33.5
OR 7996	SPN/63189-66-71/	89.7a	51.65	165.5a	84.50	2.625	32.0
WA 7168	CERCO/RAEDER,VCO	89.6a	52.17a	164.6a	79.50	.500	30.5
WA 6912	BVR/CI15923/NGS,	87.3a	51.30	166.3a	82.75	3.000	29.8
CI 17917	TRES (WA 6698)	86.5a	56.05a	164.2a	90.50	.750	33.6
WA 7163	VPM/MOS951/2*OR	82.5a	52.32a	165.7a	85.50	1.500	32.1
WA 7166	VPM/MOS421/2*TY	82.1a	50.45	164.0a	85.75	1.500	30.8
ORCW 8314	7C/CNO/CAL/3/YM	81.0	51.23	161.2	76.25	2.250	30.6
ORCW 8113	SPN/63189-66-71	79.5	50.67	162.0	83.00	4.500	30.3
WA 7129	MORO/CI13645/2*	79.5	55.83a	163.5a	84.50	.0000	29.6
OI 765784	ROMANIA FONDEA/	79.5	57.78a	161.5	77.25	9.500	28.7
WA 7216	V77254,OASIS/WA	77.8	52.60a	168.0a	79.50	1.750	29.6
CI 13740	MORO	77.0	53.60a	163.5a	89.75	.6250	38.7a
OR 836	STEPHENS/PI1734	76.9	49.80	163.5a	82.50	2.000	34.9
WA 7217	VPM/MOS951/2*BRB	76.3	55.40a	166.0	90.75	.0000	31.6
ORCW 8423	ND/P101/BB/GLL	75.9	57.25a	161.0	85.00	8.000a	31.8
CI 13968	NUGAINES	75.0	54.98a	163.5a	78.75	7.250	28.9
ORCW 8318	1523/DC DWF/RFS	72.1	50.53	165.7a	70.00	3.500	32.1
WA 7169	VH7340,CI14484/	72.0	49.30	164.5a	78.75	16.00	31.2
CI 17596	STEPHENS 2/	71.6	50.23	161.2	79.25	2.750	29.6
WA 7165	VPM/MOS421/2*RE	71.0	52.43	163.5a	80.00	.2500	27.1
OR 8270	MCD/ROMANIAN/OR	66.0	50.23	163.5a	80.25	5.750	28.6

CI Number	Variety	Yield Bu/A	Test Wt. Lbs/Bu	Heading Date	% Surv	% 1/ Smut	Height Inches
ORCW 8421	PJB841/1543/YMH	66.0	51.08	165.5a	77.75	5.000	32.5
WA 7218	VPM/MOS421/RDR	64.3	50.18	166.5a	79.25	.7500	31.5
CI 17962	PHOENIX,WW33	63.2	57.18a	156.5b	64.25b	8.750a	26.5
CI 1442	KHARKOF	62.5	54.98a	166.5a	87.75	17.50a	41.4a
OI 754989	MNIM/KAL/BB	58.3b	56.48a	162.5a	76.25	28.75a	30.1
OI 754022	RDL/SU92/KALIA	54.7b	52.68a	161.0	60.00b	10.50a	26.7
CI 11755	ELGIN	54.2b	52.70a	166.3a	75.50	18.75a	37.6a
OVERALL MEAN		74.5	53.02	163.8	80.45	5.819	31.5
F-RATIO TRTS		9.232**	25.00**	29.35**	4.061**	16.95**	17.1**
SE TRT MEANS		3.41	.5247	.4373	3.520	1.659	2.065
CV (SE/MEAN)		4.576	.9896	.2669	4.375	28.52	2.583
LSD (0.05)		9.59	1.476	1.230	9.899	4.667	2.290

1/ % Smut based on ocular rating per four plots
2/ F value for variety comparison
** Indicates statistical significance at the .01 level
a/ Values significantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level

Table 4. Agronomic data from the Western Regional White Winter Wheat Nursery grown on the Oscar Buller farm, Kalispell, MT. in 1985. Random block design.

Date planted: September 18,1984 Date harvested: August 7, 1985

CI Number	Variety	Yield Bu/A	Test Lb/Bu	% Surv	% 2/ Smut	Height Inches
WA 6912	BVR/CI15923/NGS,V	40.2	47.50	38.75	.1250	25.6
WA 7215	76/W5052/DAWS.VHO	39.6	49.05	53.75	.7500	29.0
OR 7996	HYS/YAYLA/WA4995/	37.4	48.08	60.00	.2500	28.7
CI 17596	STEPHENS 1/	36.9	47.23	50.00	.6250	26.2
CI 17917	TRES (WA 6698)	36.1	50.95a	42.50	.5000	27.6
WA 7163	VPM/MOS951/2* OR68	35.8	46.40	50.00	.0000	26.5
ORCW 8314	7C/CNO/CAL/3/3/YMH	35.7	46.35	50.00	1.875	28.1
OI 765784	ROMANIA FONDEA 12-	34.2	54.35	35.00b	4.250	24.1
ORCW 8113	SPN/63189-66-71/BZ	33.0	45.38b	55.00	1.750	25.8
WA 7165	VPM/MOS421/2*RAEDR	32.7	48.90	42.50	.0000	22.0
ORCW 8423	ND/P101/BB/GLL	31.3	48.93	46.25	1.000	26.7
WA 7166	VPM/MOS421/2*TYEE	31.2	47.55	41.25	.6250	23.7
WA 7217	VPM/MOS921/2*BRB	30.7	47.75	52.50	.1250	25.9
WA 7816	CERCO/RAEDER,VJ08,	30.4	45.85	55.00	.2500	24.7
OR 836	STEPHENS/PI173438	30.3	45.98	37.50	5.375	25.7
CI 13968	NUGAINES	30.3	49.48a	47.50	2.250	25.2
OR 8270	MCD/ROMANIAN/OR 71	29.6	45.45b	38.75	.5000	25.3
OI 754022	RDL/SU92/KALIAN/BB	28.8	48.60	28.75b	3.000	24.9
WA 7218	VPM/MOS 421/RDR	28.6	47.80	41.25	.0000	25.5
ORCW 8318	1523/DC DWF/RBS,F1	28.5	45.03b	47.50	.5000	27.9
OI 754989	MNIM/KAL/BB	28.2b	49.45a	36.25b	3.750	25.7
ORCW 8421	PJB 841/1543/YMH/6	27.5b	46.93	40.00	.6250	25.3
WA 7219	MORO/CI13645/2*CH/	25.9b	44.05b	32.50b	.1250	25.4

CI Number		Variety	Yield Bu/A	Test Lb/Bu	% Surv	% Smut 2/	Height Inches
CI	13740	MORO	25.6b	44.98b	55.00	.2500	30.0
CI	1442	KHARKOF	25.1b	49.90a	52.50	8.000a	38.1a
WA	7216	V77254,OASIS/WA63	24.8b	48.60	47.50	.0000	25.3
CI	17962	PHOENIX,WW33	22.9b	52.50a	25.00b	1.750	24.1
WA	7169	VH74340,CI14484/66	22.5b	44.75b	38.75	6.750	23.5
CI	11755	ELGIN	21.2b	46.90	42.50	13.88	31.8
OVERALL MEAN			30.5	47.75	44.27	2.030	26.40
F-RATIO TRTS 3/			2.81**	17.94**	3.629**	1.988**	11.94 **
SE TRT MEANS			3.02	.5534	4.476	2.207	.888
CV (SE/MEAN)			9.908	1.159	10.11	108.7	3.312
LSD (0.05)			8.50	1.557	12.59	6.206	2.47

1/ Check variety
2/ % TCK smut rating by ocular observation
3/ F value for variety comparison
** Indicates statistical significance at the .01 level
a/ Values significantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level

Table 5. Agronomic data from the offstation winter wheat nurseries grown in Lake and Rivalli Counties in 1985.

Date planted : Lake Sept. 23, 1984 Rivalli Oct. 1, 1984
Date harvested: Lake August 1,1985 Rivalli July 31, 1985

CI Number	Variety	Type 1/	....Yield ... Rivl	Lake	$\bar{X}$	....Test Wt... Rivl	Lake	$\bar{X}$	....Height.... Rivl	Lake	$\bar{X}$
OR 792	Triumph/Lancer	R	13.2	40.1	26.7	50.3	51.2	50.8	21.5	30.9	26.2
CI 17909	Lewjain	W	15.6	47.1	31.4	41.6	46.8	44.2	17.6	25.9	21.8
CI 17772	Tyee	W	13.2	48.4	31.0	37.4	45.9	41.6	16.5	25.3	20.9
WA 7045	Lind Sel. B	R	10.9	45.9	28.4	42.4	51.2	46.8	17.0	24.9	21.0
OR 68007	Hill 81	W	10.0	48.7	29.4	42.1	50.2	46.2	18.2	26.8	22.5
CI 17902	Winridge	R	10.8	39.7	25.3	46.6	53.3	50.0	18.2	28.5	23.4
CI 14586	Luke	W	10.8	44.7	27.8	42.1	47.8	45.0	18.5	24.6	21.6
CI 11727	Weston	R	14.0	52.2	33.1	50.6	56.4	53.5	23.8	29.5	26.7
ID 3518	WA 4765/3/BEZ//BU	R	10.8	48.4	29.6	44.7	47.0	45.9	17.8	25.8	21.8
CI 17596	Stephens	W	15.5	35.7	25.6	46.7	46.5	46.6	19.6	26.6	23.1
WA 6820	GWB/127/GWB 236	R	17.1	44.6	30.9	46.7	53.3	50.0	18.2	24.6	21.4
ORC 8113	SPN//63189-66-71/	W	8.8	36.8	22.8	39.2	46.1	42.7	19.3	25.8	22.6
CI 17950	Faro	W	8.2	44.8	26.5	37.4	46.2	41.8	16.4	23.9	20.2
CI 17149	Daws	W	7.9	41.0	24.5	39.9	50.3	45.1	16.8	24.3	20.6
WA 6696	Daws/WA 5829 VHO	W	10.9	41.3	26.1	43.3	52.4	47.9	14.3	24.4	19.4
NA 234	Hawk	R	11.6	38.2	24.9	54.4	53.3	53.9	17.9	22.1	20.0
		X	11.8	43.5		44.0	49.9		18.4	25.9	
		F 2/	1.95**	2.73**		1.00	23.7**		4.95**	5.77**	
		SEX	1.90	2.90		.49	.69		2.19	.685	
		C.V.	16.5	6.65		11.0	1.38		4.67	3.57	
		LSD	5.54	28.6		3.43	1.95		2.45	2.63	

1/ Type wheat : R = Red, W = White
2/ F value for variety comparison

WINTER WHEAT VARIETIES

RECOMMENDED FOR WESTERN MONTANA

Hard Red Varieties

1. Winalta - dryland
2. Cheyenne - dryland
3. Winridge - dryland

Soft White Varieties

4. Luke - dryland or irrigated
5. Lewjain - dryland and irrigated

CHARACTERISTICS OF RECOMMENDED VARIETIES

1. Winalta

   a. Bearded variety
   b. Fair yielding
   c. Tall type
   d. Maturity - early to mid season
   e. Good test weight
   f. Weak straw strength
   g. Good shattering resistance
   h. Susceptible to dwarf smut and sawfly infestations
   i. Resistant to stripe rust
   j. Moderate resistance to stem rust

2. Cheyenne

   a. Bearded variety
   b. Good yielding
   c. Tall type
   d. Maturity - early to mid season
   e. Good test weight
   f. Weak straw strength
   g. Susceptible to shattering
   h. Moderate resistance to stripe rust and sawfly
   i. Susceptible to dwarf smut, stem rust, and sawfly infestation
   j. Good milling and baking qualities

3. Winridge

   a. High yielding ability
   b. Tall type
   c. Good test weight
   d. Resistant to shattering
   e. Resistant to lodging
   f. Resistant to dwarf smut, stripe rust and Cephalosporium stripe
   g. Winter hardy
   h. Acceptable protein, milling and baking qualities

SOFT WHITE VARIETY

4. Luke

a. Bearded variety
b. Good yielding
c. Semi-dwarf type
d. Maturity - mid season
e. Fair test weight
f. Poor to fair straw strength
g. Resistant to shatering
h. Resistant to dwarf smut and stripe rust
i. Foot rot tolerant
j. Good baking and milling quality for cake flours

5. Lewjain

a. Awned variety
b. White chaffed with common head
c. Semi-dwarf
d. Good yield
e. Good test weight
f. Mid season maturity
g. Resistant to some races of common bunt and dwarf bunt
h. Somewhat resistant to stripe rust and Cephalosporium.
i. Susceptible to leaf rust and stem rust

PROJECT TITLE: Dwarf Bunt Tillage Study (TCK)

PROJECT/YEAR: 756/1985

PROJECT LEADER: Vern R. Stewart, Northwestern Agricultural Research Center, Montana Agricultural Experiment Station, Kalispell, MT.

PROJECT PERSONNEL: Jim Hoffman (USDA), Todd K. Keener - Research Specialist Don Mathre, Plant Pathology Dept., Allen Taylor, Plant and Soil Science Department, MSU, Bozeman, MT.

SUMMARY:

Dwarf bunt (Tilletia controversa kuhn) continues to be one of the major problems in the production of winter wheat in Northwestern Montana. Varietal resistance, seed treatment with fungicides, and cultural practices have been used as tools in controlling this disease.

Several tillage methods are being evaluated in an area where there is a high level of dwarf smut. Research plots were seeded after fall seedbed preparation was completed. The first year's yields (and other agronomic data) from this test were obtained in August of 1984. The second year measurements were made in August of 1985.

1984 RESULTS:

Smut levels (% smut and number of smut heads/ 3 ft of row) were highest from plots where the Claridge Technique was used. Yields were significantly differently in plots where tillage was used in comparison to the No-Till plots. The highest yield, test weight, and number of heads per three feet of row were recorded in the Conventional Tillage I plots). Table 2.

1985 RESULTS:

Smut levels were very low in 1985. In the No-till treatment no smut was found. The highest level of smut was found in the Claridge technique treatment. Table 2.

Yields were significantly reduced in the minimum and No-till plots due to severe weed infestation (irregardless of herbicide maintenance sprays) and poor seedling establishment.

The greatest number of heads per foot of row was seen in the Claridge tillage plots followed closely by the Conventional II tillage plots. Table 2.

FUTURE PLANS:

The third year of tillage practices was completed this fall and winter wheat seeded into the various tillage plots. A continuation of tillage practices is planned to observe the long range effects on dwarf bunt frequency in relation to cultural techniques.

Table 1. Description of tillage techniques

1. Conventional Tillage I

Fall plow (after harvest)
Disc, rod weed, and harrow during the fallow season
Prepare seedbed for fall seeding

2. Conventional Tillage II

Spring plow
Disk, rod weed, harrow during fallow period
Prepare seedbed for fall seeding

3. Minimum Tillage

Disc in fall, use herbicides to control weeds during season
Disc, harrow, and seed in fall (two discings total)

4. Claridge Technique

Use one-way (shallow discing apparatus)
Disc following one-way. Keep black during summer
Rod weed to finish seedbed

5. No-Till

Control weeds using herbicides as needed during fallow period
Seed with Melrow drill (minimum tillage drill)

Table 2. Agronomic data from the TCK Tillage study grown on the Oscar Buller farm in 1984 and 1985, Kalispell, MT.

Tillage tech.	Yield Bu/A 1984	Yield Bu/A 1985	Test Wt. lbs./ Bu	# Heads/ 3ft 1985	# Heads/ 3ft 1985	# Smut/ 3ft 1984	# Smut/ 3ft 1985	% Smut 1/ 84	% Smut 1/ 85
Conventional I	40.0a	42.1b	58.3	49.5a	40.8a	2.3	1.4	4.6	3.4ab
Conventional II	29.7a	47.7a	56.8	42.8ab	49.2a	3.2	3.3	7.5	6.8a
Minimum Tillage	26.9a	21.6c	56.7	26.8c	29.0c	1.6	.3	6.0	1.1b
Claridge Tech.	29.8a	41.4b	55.6	34.2bc	52.1a	6.7	2.3	19.6	4.5ab
No - Till	11.1b	25.2c	54.3	19.6c	38.5ab	1.4	0	7.1	0b
X	27.5	35.6	56.3	34.57	41.9	3.03	--	8.96	3.15
F 2/	4.33*	49.6**	1.32	6.89*	3.24*	2.40	--	2.46	3.55*
S.E.X.	5.03	1.63	1.31	4.57	5.10	1.39	--	4.34	1.44
C.V.	18.28	4.58	2.33	13.23	12.17	46.09	--	48.5	45.5
L.S.D.	18.07	5.32	NS	18.94	16.63	NS	--	NS	4.68

1/ % smut determined by dividing number of smut heads/ 3 ft by the number of heads per 3 ft of row.
2/ F value for technique comparison

Means within a column followed by a common letter are not significantly different at the 5% probability level according to the Multiple Range Test.

In 1984 plots were seeded October 13, 1983 with Wanser at 70 # seed per acre
In 1985 plots were seeded September 19,1984 with Wanser at 70 # seed per acre