

THIRTY-NINTH ANNUAL REPORT

1987

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

4570 Montana 35
Kalispell, Montana 59901

Prepared by
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Professor of Agronomy and Superintendent

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Agric. Research Specialist I

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Agric. Research Specialist I

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consent of the research workers involved.

ADMINISTRATION 750

The Administration Project at the Northwestern Agricultural Research Center includes expenses for the overall operation of the center, personnel and office equipment purchased.

Full-time Staff Members:

	<u>Years in Service</u>
Vern R. Stewart - Supt. & Prof. Agronomy (Began April 1952)	35
Leon E. Welty - Assoc. Prof. Agronomy (Began January 1973)	14
Oscar Buller - Farm/Ranch Hand III (Began January 1984)	3
Jeanette Calbick - Secretary II (Began September 1963)	24
Gary Haaven - Ag Research Specialist I (Began April 1982)	5
Todd Keener - Ag Research Specialist I (Began March 1978)	9
Louise Prestbye - Ag Research Specialist I (Began May 1983)	4

Student Employees:

Ramona Benz (June 15 thru September 25)
Kevin Hillard (June 18 thru September 15)
Randy Turnacliff (May 18 thru August 18)
Amy Wilcox (June 15 thru September 16)

Parttime Hourly Employees:

Vincent Kaluza
Sondra Mockabee
Vicky Rogers

Office Equipment Purchased:

Zenith Computer	\$2036
Word Perfect Software	125
Lotus 123 Upgrade Software	150
Quick Basic Program	60

GENERAL FARM 751

The General Farm Project (751) supports all research projects. This includes items purchased and used in the total research program. The following were purchased in 1987:

Grain Bin (Wheatline #705)	\$1310.00	(416)
Cement Foundation for Grain Bins	236.00	(416)
Foam Marker	685.00	(751)
Shop Vacuum Cleaner	299.95	(751)
Vice	42.67	(751)
Circular Saw	39.99	(751)
Tables for Grain Cleaning	<u>175.00</u>	(751)
Total	\$2788.61	

PHYSICAL PLANT 752

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

Carpet was laid in two bedrooms of Residence II	\$497
All fence on the research center was repaired.	
The cost of new fence posts -	\$184.93

ACTIVITIES 1987

<u>DATE</u>	<u>ACTIVITY</u>		<u>PLACE</u>
1/6	Hay Meeting	Stewart	Kalispell
		Welty	
1/7	Hay Meeting	Welty	Ronan
1/7	Advisory Comm. Planning Meeting	Stewart	Kalispell
1/8	Hay Meeting	Welty	Eureka
1/9	Soil Conservation Meeting	Stewart	Great Falls
1/16	Chamber of Commerce - Ag. Committee	Stewart	Kalispell
1/22	N.W. & W. Ag. Res. Center Advisory Comm.	Stewart	Allentown
		Welty	
1/26	Variety Recommendation Comm. Meeting	Stewart	Bozeman
		Welty	
1/27-29	Planning Conference	Stewart	Bozeman
		Welty	
1/27	Research Center Superintendent's Meeting	Stewart	Bozeman
1/27	Weed Meeting	Stewart	Bozeman
1/27	Foundation Seed Meeting	Stewart	Bozeman
1/28	Feed Crops Meeting	Stewart	Bozeman
		Welty	
1/28	Variety Recommendation Meeting	Stewart	Bozeman
		Welty	
1/29	Wheat Commodity Group	Stewart	Bozeman
1/29	Forage Crop Meeting	Stewart	Bozeman
		Welty	
2/3	Hay Meeting	Stewart	Kalispell
		Welty	
2/11-13	Union Carbide Academic Seminar	Stewart	Banff, Canada
2/16	Chamber of Commerce, Ag. Committee	Stewart	Kalispell
2/17	Hay Promotion Program	Stewart	Kalispell
		Welty	
2/21	Equity Dinner and Annual Meeting	Stewart	Kalispell
2/25-26	Flathead Farm Show	Welty	Kalispell
3/4	Forage Management Meeting	Welty	Thompson Falls
3/5	Crops and Soils Day	Stewart	Kalispell
		Welty	
3/6	Customer Appreciation Days	Stewart	Ronan
3/9-12	Western Society Weed Science	Stewart	Boise, ID
3/17	Equity Supply Chemical Meeting	Stewart	Kalispell
		Welty	
3/18	Producer Meeting	Welty	Hamilton
3/20	Interview and Evaluation Meeting	Stewart	Bozeman
3/23	County Agents Up-dating Meeting	Stewart	Ronan
		Welty	
3/27	Chamber of Commerce, Ag. Committee	Stewart	Kalispell
3/27	Eastside Grange Meeting	Stewart	Creston
4/1	CRD Meeting	Stewart	Kalispell
4/16	Dedication Service for Plant Growth Center	Stewart	Bozeman
4/17	Chamber of Commerce, Ag. Committee	Stewart	Kalispell

Activities (con't)

<u>DATE</u>	<u>ACTIVITY</u>		<u>PLACE</u>
5/6	Flathead Extension Adv. Committee	Stewart	Kalispell
5/8	Tour - MSU Students	Stewart	Creston
		Welty	
5/15	Chamber of Commerce, Ag. Committee	Stewart	Kalispell
5/29	Tour - Marion School	Welty	Creston
6/4	Flathead Extension Advisory Comm.	Stewart	Kalispell
6/11	FFA Advisory Council Meeting	Stewart	Kalispell
6/19	Chamber of Commerce Ag. Committee	Stewart	Kalispell
6/20-26	Western Society of Crop Science	Welty	Laramie, WY
6/26	Martin Burris's Retirement Party	Stewart	Bozeman
6/30	Variety Recommendation Meeting	Stewart	Moccasin
7/1	Summer Staff Conference	Stewart	Moccasin
		Welty	
7/8	Northern Ag. Res. Center Field Day	Stewart	Havre
7/10-11	Weed Fair	Stewart	Kalispell
7/14	Eastern Ag. Res. Center Field Day	Stewart	Sidney
7/16	Experiment Station Field Staff Meeting	Stewart	Missoula
		Welty	
7/23	Tour - Group from Chicago, IL	Stewart	Creston
		Welty	
7/24-26	Mansfield Center Seminar	Stewart	Whitefish
7/29	Tour - ICI Americas Representatives	Stewart	Creston
7/30	Western Ag. Res. Center Field Day	Stewart	Corvallis
		Welty	
7/30	County Agents Day	Stewart	Corvallis
		Welty	
8/3	Tour - Director's Dept. of Agriculture	Stewart	Creston
		Welty	
9/3	Rotary Meeting	Stewart	Kalispell
9/9	Superintendent's Retreat	Stewart	Lewistown
9/21	Assoc. Director Candidate Interview	Stewart	Bozeman
9/30	Assoc. Director Candidate Interview	Stewart	Bozeman
10/1	Assoc. Director Candidate Interview	Stewart	Bozeman
11/2	FFA Advisory Council Meeting	Stewart	Kalispell
11/15-18	Extension & Experiment Station Conference	Stewart	Bozeman
		Welty	
11/29-12/3	ASA Meetings	Stewart	Atlanta, GA
		Welty	
12/8	Budget Meeting	Stewart	Bozeman
12/9	Research Center Faculty Meeting	Stewart	Bozeman
12/10	Variety Recommendation Meeting	Stewart	Bozeman
		Welty	
12/18	Chamber of Commerce, Ag. Committee	Stewart	Kalispell

VISITORS 1987

<u>DATE</u>		<u>REPRESENTING</u>	<u>ADDRESS</u>
1/7	Malvern Westcott	Western Agric. Res. Center	Corvallis
1/8	Gerry Thorstad	Farmers Union	Kalispell
1/13	Brian Dougherty	SCS Office	Kalispell
2/2	Carter Fritz	Farmer	Kalispell
2/17-18	Rod Warner	DuPont	Bozeman
2/18	Doug Ryerson	Monsanto	Great Falls
3/4	Daniel Rovero & Son	Farmers	Seelye Lake
3/5	Ray Ditterline	Plant and Soils, MSU	Bozeman
3/16	Jim Helfrich	Farmer	McGregor Lk
3/17	Sandy Berry	Nurse	Kalispell
3/24	Sandy Berry	Nurse	Kalispell
3/25	Bill Ambrose	Farmer	Kalispell
3/27	John Orr	ICI Americas	Boise, ID
4/15	Kevin Copsey	Dow Chemical	
4/15	Chris Berg	Dow Chemical	Conrad
4/21	Donna Shelton	Job Applicant	Whitefish
4/24	Vincent Kaluza	Job Applicant	Kalispell
5/1	Harold Small	Farmer	Kalispell
5/4	Lloyd Fagerland	Farmer	Kalispell
5/5	Myron Mast	Farmer	Kalispell
5/5	Clyde & Jeanne Pederson	Farmers	Kalispell
5/6	Harold Small	Farmer	Kalispell
5/7	Chris Berg	Dow Chemical	Conrad
5/7	John Roberson	Neighbor	Creston
5/8	Dick Pohl	Plant and Soils, MSU	Bozeman
5/8	George Evans	Plant and Soils, MSU	Bozeman
5/8	Jarvis Brown	Plant and Soils, MSU	Bozeman
5/8	Bernie Shaw	Plant and Soils, MSU	Bozeman
5/8	Group of MSU Students	MSU	Bozeman
5/13	Malvern Westcott & Crew	Western Agric. Res. Center	Corvallis
5/19	Hector Speckert & son	Farmers	Polson
5/28	Don Casterline	Farmer	Columbia Falls
6/5	Forest Farris	Farmer	Kalispell
6/10	Larry Murphy	Potash Phosphorus Institute	Manhattan, KS
6/10	Malvern Westcott	Western Agric. Res. Center	Corvallis
6/11	Earl Skogley	Plant and Soils, MSU	Bozeman
6/11	Stuart Georgitis	Plant and Soils, MSU	Bozeman
6/12	Dave Mumby	Neighbor	Creston
6/16	Kevin Hillard	Job Applicant	Kalispell
6/24	David Helmer	Janssen Pharmaceutica	Piscataway, NJ
6/24	Deimna Heiken	AGSCO	Fort Benton
6/24	Rod Warner	DuPont	Bozeman
6/29	Tom Blake	Plant and Soils, MSU	Bozeman

Visitors (con't)

<u>DATE</u>		<u>REPRESENTING</u>	<u>ADDRESS</u>
7/2	Mr. Davison	Farmer	Highwood
7/10	Malvern & Anna Westcott	Western Agric. Res. Center	Corvallis
7/11	John Markie		
7/15	Gary Gingery	Dept. of Agriculture	Helena
7/15	Roy Bjornsom	Dept. of Agriculture	Helena
7/15	Kirk Volker	ICI Americas	Yakima, WA
7/23	Jack Otta	Rhone-Poulenc	Volga, SD
7/24	Dan Toya	Stauffer	Warden, WA
7/24	Al & Maxine Jarvi	Cargill	Ft Collins, CO
7/28	Doug Cooper	Student U of M	Missoula
7/28	Mark Wilson	Student and Visitor	England
7/29	Peter J. Froggatt	ICI Representative	Survey, England
7/29	Robert R. Robinson	ICI Representative	Scottsdale, AZ
7/29	James Anderdon	ICI Representative	Brookshire, England
7/29	Steven D. Watkins	ICI Representative	Yuma, AZ
7/29	Larry Hillhouse	ICI Representative	Goldsboro, NC
8/3	James R. Welsh	Dean & Director, MAES, MSU	Bozeman
8/3	Mark Welsh	Student	Bozeman
8/3	Geraldine Sutton	Fiscal Officer, MAES, MSU	Bozeman
8/11	John Airy	Rapeseed Consultant	
8/18	Ivan Tyler	Farmer	Kalispell
8/28	Ric Roche	MSU	Bozeman
9/3	Mel Carnahan	John Deere	Spokane, WA
9/4	Mr. & Mrs. Bos	Visitors	Holland
9/16	Vicky Rinck	Neighbor	Kalispell
9/25	Jim Morgan	Gustafson Seed Co.	Bozeman
9/25	Mark & Kathy Gordon		Kalispell
10/8	Dewey Anderson	Cenex	Billings
10/8	Glen Christiansen	Cenex	Minneapolis, MN
10/15	Gene Thomas	Thomas Electric	Kalispell
10/28	Chuck & Edith Rohde	Retired Agronomist	Pendelton, OR
11/6	Jerry Bergman & family	Eastern Agric. Res. Center	Sidney
11/11	Andy VanTylingen	MSU	Bozeman
11/11	Don Doornbos	Northern Agric. Res. Center	Havre
12/29	Mark Passmore	Farmer	Kalispell

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DISTRIBUTION OF THE
1987 NORTHWESTERN AGRICULTURAL RESEARCH CENTER REPORT

Copies

1	Plant and Soil Science Department																						
3	Research Center Staff, N. W. Agricultural Research Center																						
11	County Extension Agents in Northwestern Montana																						
	<table border="0" style="margin-left: 40px;"> <tbody> <tr> <td>Program Coordinator</td> <td>- Bill Peterson</td> </tr> <tr> <td>Deer Lodge</td> <td>- Cheryl Beatty</td> </tr> <tr> <td>Flathead</td> <td>- Bruce McCallum</td> </tr> <tr> <td>Granite</td> <td>- John Bryant</td> </tr> <tr> <td>Lake</td> <td>- Wilfred Huot</td> </tr> <tr> <td>Lincoln</td> <td>-</td> </tr> <tr> <td>Mineral</td> <td>- Juanita Cutler</td> </tr> <tr> <td>Missoula</td> <td>- Gerald Marks</td> </tr> <tr> <td>Powell</td> <td>- Dave Streufert</td> </tr> <tr> <td>Ravalli</td> <td>- G. Robert Johnson</td> </tr> <tr> <td>Sanders</td> <td>- Donald J. Nicholson</td> </tr> </tbody> </table>	Program Coordinator	- Bill Peterson	Deer Lodge	- Cheryl Beatty	Flathead	- Bruce McCallum	Granite	- John Bryant	Lake	- Wilfred Huot	Lincoln	-	Mineral	- Juanita Cutler	Missoula	- Gerald Marks	Powell	- Dave Streufert	Ravalli	- G. Robert Johnson	Sanders	- Donald J. Nicholson
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1	Agricultural Stabilization and Conservation																						
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1	Soil Conservation Service																						
4	Feed Mills																						
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CLIMATOLOGICAL DATA
NORTHWESTERN AGRICULTURAL RESEARCH CENTER
Kalispell, MT

The climatological data for the Northwestern Agricultural Research Center (Creston area) has been collected since 1949. The data collected is as follows: daily minimum and maximum air temperatures, soil temperatures at 4 and 8 inches, and precipitation. This information is compiled each month and sent to the National Oceanic and Atmospheric Administration for publication in their official publication Climatological Data.

Precipitation for the crop year (September 1986 through August 1987) was almost 2 1/2 inches above normal. September 1986, March and July 1987 precipitation contributed to this. Each of these months had more than 2 inches above normal precipitation. December 1986, January and February 1987, were very dry with little snow or moisture recorded for these months.

The mean temperature for the crop year was the same as the long time (1949 through 1987) average. There were 117 frost free days. This is a little higher than average. Our coldest day was November 10, 1986 with 10° below zero and the warmest day was 95° on July 27, 1987.

Following is a list of tables giving a more complete description of the weather for the crop year (September 1986 through August 1987) and the fiscal year 1987:

- Table 1. Summary of climatic data by months for 1986-87 crop year (September thru August) and averages for the period 1949-87 at the Northwestern Agricultural Research Center, Kalispell, MT.
- Table 2. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 through August 31, 1987. (Average)
- Table 3. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 through August 31, 1987. (Maximum)
- Table 4. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 through August 31, 1987. (Minimum)
- Table 5. Summary of precipitation records at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 through August 31, 1987.
- Table 6. Precipitation by day for crop year September 1, 1986 through August 31, 1987, Northwestern Agricultural Research Center, Kalispell, MT.

Table 7. Frost free period at the Northwestern Agricultural Research Center from 1950 through 1987.

Table 8. Temperature extremes at the Northwestern Agricultural Research Center, Kalispell, MT from 1950-1987.

Table 9. Summary of temperature records at the Northwestern Agricultural Research Center, January 1950 through December 1987.

Table 10. Summary of precipitation records at the Northwestern Agricultural Research Center, Kalispell, MT, January 1950 through December 1987.

Table 1. Summary of climatic data by months for 1986-87 crop year (September thru August) and averages for the period 1949-87 at the Northwestern Agricultural Research Center, Kalispell, MT.

ITEM	Sept. 1986	Oct. 1986	Nov. 1986	Dec. 1986	Jan. 1987	Feb. 1987	Mar. 1987	Apr. 1987	May 1987	June 1987	July 1987	Aug. 1987	Total or Average
Precipitation (inches)													
Current Year	3.63	0.80	1.78	0.63	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98	21.97
Avg. 1949 to 1986-87	1.66	1.37	1.44	1.64	1.53	1.20	1.15	1.40	2.24	2.80	1.53	1.59	19.55
Mean Temperature (F)													
Current Year	50.2	43.0	30.3	24.9	22.2	27.9	35.0	47.8	55.6	61.6	62.9	59.8	43.4
Avg. 1949 to 1986-87	53.3	43.3	32.4	25.7	21.9	28.0	33.7	43.1	51.7	58.5	64.0	63.0	43.2
Last killing frost in spring													
1987													
Avg. 1949-87													
First killing frost in fall													
1987													
Avg. 1949-87													
Frost Free Period													
1987													
Avg. 1949-87													
Maximum summer temperature													
Minimum winter temperature													

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, 1987..

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
1985-86	47.8	40.8	18.6	18.3	25.4	25.6	40.6	43.8	53.7	63.9	59.9	66.1	42.0
1986-87	50.2	43.0	30.3	24.9	22.2	27.9	35.0	47.8	55.6	61.6	62.9	59.8	43.4
MEAN	53.3	43.3	32.4	25.7	21.9	28.0	33.7	43.1	51.7	58.5	64.0	63.0	

Mean temperature for all years = 43.2

Table 3. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1987.

Average maximum temperature by month and year Degrees Fahrenheit													
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
1985-86	60.4	51.3	26.7	25.2	34.0	36.6	51.6	55.1	66.1	78.5	73.0	84.1	53.6
1986-87	59.9	54.3	38.0	30.9	29.5	34.2	43.4	61.3	67.9	75.7	76.5	74.9	53.9
MEAN	68.2	55.2	40.0	32.4	29.4	36.4	43.5	54.9	65.0	72.0	80.2	79.5	

Mean temperature for all years = 54.7

Table 4. Summary of temperature data at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1987.

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
1950-51	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
1985-86	35.2	30.2	10.6	11.4	16.9	14.5	29.6	32.5	41.3	49.3	46.8	48.1	30.5
1986-87	40.5	31.6	22.6	18.8	14.9	21.6	26.6	34.2	43.3	47.4	49.4	44.7	33.0
MEAN	38.4	31.5	24.8	18.9	14.4	19.6	23.8	31.3	38.4	44.9	47.7	46.4	

Mean temperature for all years = 31.7

Table 5. Summary of precipitation records at the Northwestern Agricultural Research Center on a crop year basis, September 1, 1949 thru August 31, 1987.

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
1985-86	5.35	1.55	1.61	0.51	2.39	2.33	0.50	1.34	2.92	1.83	2.09	0.81	23.23
1986-87	3.63	0.80	1.78	0.63	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98	21.97
MEAN	1.66	1.37	1.44	1.64	1.53	1.20	1.15	1.40	2.24	2.80	1.53	1.59	

Mean precipitation for all crop years = 19.55

Table 6. Precipitation by day for crop year, September 1, 1986 through August 31, 1987. Northwestern Agricultural Research Center, Kalispell, MT.

DATE	SEPT. 1986	OCT. 1986	NOV. 1986	DEC. 1986	JAN. 1987	FEB. 1987	MAR. 1987	APR. 1987	MAY 1987	JUNE 1987	JULY 1987	AUG. 1987
1	0.02	0.26				0.12	0.03		0.30	0.08		
2	0.19	0.12			0.08	0.03			0.02			
3			T		0.01	0.02			0.01			
4						0.09						
5	0.02		0.39	0.23							0.37	
6			0.02	0.13				0.10		0.05	0.07	
7			0.06				0.31				0.09	
8	0.07		0.12				0.02			0.03	0.13	
9	1.14		0.03		T			0.08	0.08	0.52		
10	0.32	0.04				0.25				0.02		
11	0.11		0.30			0.17	0.19					
12			0.09		T	0.03	0.03					0.02
13			T	0.02		0.04		0.10				0.09
14	0.10		0.17	0.18		0.09	0.72					0.63
15	0.04			T		0.02		0.04	0.01			0.19
16	0.20		0.07			0.03			0.35			
17	0.02		0.01			T			0.10	0.12		
18	0.03				0.01		0.70	0.03		0.04		
19	0.05		0.07				0.80		0.42	0.99		
20	0.22						0.03			0.10		
21	0.02	0.02					T		0.15	0.01		
22	0.09					0.09			0.22	1.55		
23			0.01	0.04		0.11		0.02		1.38		
24	0.36		0.02				0.01					
25	0.13				0.07							0.05
26	0.02				0.05		0.08		0.05			
27			0.04		0.16		0.79		0.17			
28	0.14	0.04	T			T	0.08		0.47			
29	0.08	0.23	0.38					T	0.11			
30	0.26							0.02				
31		0.09		0.03					0.49			
TOTAL	3.63	0.80	1.78	0.63	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98

Table 7. Frost free period at the Northwestern Agricultural Research Center from 1950 thru 1987.

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
1986	May 16	31	Sept. 7	31	114
1987	May 22	28	Sept. 17	29	117
Mean for					
years	May 26	30	Sept. 14	30	111

Table 8. Temperature extremes at the Northwestern Agricultural Research Center, Kalispell, MT from 1950-1987.

YEAR	MINIMUM		MAXIMUM	
	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
1986	Nov. 10	-8	May 30	93
1987	Jan. 16, Dec. 3	-4	July 27	95

Table 9. Summary of temperature records at the Northwestern Agricultural Research Center, January 1950 thru December 1987.

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
1986	25.4	25.6	40.6	43.8	53.7	63.9	59.9	66.1	50.2	43.0	30.3	24.9	44.0
1987	22.2	27.9	35.0	47.8	55.6	61.6	62.9	59.8	56.1	43.2	35.3	25.4	44.4
MEAN	21.9	28.0	33.7	43.1	51.7	58.5	64.0	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 1987.

DATE	Total Precipitation (inches) by Months and Years												TOTAL
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
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
1986	2.39	2.33	0.50	1.34	2.92	1.83	2.09	0.81	3.63	0.80	1.78	0.63	21.05
1987	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98	0.81	0.12	0.91	1.18	18.15
MEAN	1.53	1.20	1.15	1.40	2.24	2.80	1.53	1.59	1.66	1.35	1.42	1.65	

Mean annual precipitation for 38 years = 19.52

CHEMICALS USED IN HERBICIDE STUDIES 1986-87, 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
Bromoxynil	Brominal /Buctril	3,5-dibromo-4-hydroxybenzonitrile	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	Hoechst Roussel
DPX-68311	Finesse	Chlorsulfuron + metsulfuron 5:1 ratio (See chemistry below)	DuPont
DPX-M6316	Harmony	Methyl 3-[[4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino carbonyl]amino sulfonyl]-2-thiophenecarboxylate	Dupont
DPX-L 5300	DPX-L 5300	Methyl 2 [[[[N-(4-methoxy-6-methyl-1,3,5-triazin-2-yl) methylamino] carbonyl]amino]sulfonyl]benzoate	DuPont
DPX-R 9674	DPX-R 9674	2:1 ratio of DPX-M6316 + DPX-L5300	DuPont
EPTC	Eptam	S-ethyl dipropylthiocarbamate	Stauffer/ICI
Fluaziflop	Fusilade	+ -2-[4-[[5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanoic acid	DuPont
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
MCPA	MCPA	[(4-chloro-p-tolyl)oxyl]acetic acid	As available
Metribuzin	Sencor or Lexone	4-amino-6- <u>tert</u> -butyl-3-(methylthio)- <u>as</u> triazin-5(4H)one	Mobay DuPont

Metsulfuron	Ally	2-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoic acid	DuPont
Fluorchloldone	Racer	1-(<u>m</u> -trifluoromethylphenyl)-3-chlor-4-chloromethyl-2-pyrrolidone	Stauffer/ICI
Sethoxydim	Poast	2[(1-ethoxyimino)butyl]-5[(2-ethylthio)-propyl]-3-hydroxy-2-cyclohexen-1-one	BASF
SC 0051	SC 0051	No chemistry available	Stauffer/ICI
Tralkoxydim	PP 604	2-[1-(ethoxyimino)propyl]-3-hydroxy-5-(2,4,6-trimethylphenyl)cyclhex-2-enone	ICI Amers.
Triallate	Fargo	S-(2,3,3-trichloroallyl)diisopropylthio-carbamate	Stauffer/ICI
2,4-D	2,4-D	(2,4-dichlorophenoxy)acetic acid	Cenex
2,4-DB	2,4-DB	4-(2,4-dichlorophenoxy)butyric acid	Rhone Poulenc

PROJECT TITLE: PP604 Wild Oat Herbicide Rate Study

YEAR/PROJECT: 1987/754

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

Three rates of PP604 and one rate of AC 222,293 were tested. Acceptable wild oat control was achieved using 4 and 6 oz ai per acre of PP604 and .45 lb. ai per acre of AC 222,293. Yields were significantly increased due to wild oat control.

RESEARCH METHODS:

Herbicides were applied to 10' X 12' plots of Lewis spring barley using a tractor mounted research-type sprayer. A volume of 24.85 gpa was delivered using 8002 nozzles at 32 psi. Treatments were replicated four times in a complete random block design.

Planting Data:

Crop: Lewis spring barley Planted: 4/15/87 Harvest: 8/19/87

Seedbed preparation: Fall plow and disc, spring disc and cultivation
seedbed preparation done with brillion packer

Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2, OM 4

Type planting - solid seeded with press-type drill, 7" spacing

Seeding depth 1 1/2 to 2", seeding rate 60 lbs/A

Maintenance sprays: Bromoxynil at .375 # ai/A on 5/15/87

Application:

Date: 5/13/87 Air temp: 73 F Soil temp: 71 F R.H. 35%

Wind veloc: 3-4 mph from the West Cloud cover: Clear

Soil moisture: Dry topsoil, very good moisture in subsoil

R-11 surfactant used with Assert at .6 fluid oz per gallon for each gallon that exceeded the 10 gallon per acre spray rate.

AL 411f was used at 1% concentration with each of the PP604 applns.

Plant growth stages at application:

Crop: 4-5 leaf, tillering

Fanweed (*Thlaspi arvense*) 6-10 lvs, 1-2" dia

Lambsquarter (*Chenopodium album*) 6 lvs, 1/2 - 1" dia

Henbit (*Lamium amplexicaule*) 2 lvs

Night flowering catchfly (*Silene noctiflora*) 4 lvs

Green foxtail (*Silene viridis*) 5-7 lvs, 1 1/2 "

Wild oat (*Avena fatua*) 3 leaf stage

RESULTS:

PP 604 was treated at 2, 4, and 6 oz ai/acre. Acceptable wild oat control was obtained at the 4 and 6 oz rates. The 2 oz treatment of PP 604 gave inadequate wild oat control. Wild oat counts made 7/2/87 revealed the effectiveness of PP 604 (at 4 and 6 oz ai/A) to control wild oats as well as the ineffectiveness of AC 222,293 and PP 604 at the 2 oz ai/A rate.

Yields were significantly increased due to the wild oat control in PP 604 plots (4 and 6 oz ai/A) and the AC 222,293 plot. Test weights, though not significantly different, were highest in those three plots which had the highest yield.

Percent plump was significantly less in the plots treated with the lower rates of PP 604 (at 2 and 4 oz ai/A) plots.

Table 1. Weed control data from the PP 604 Wild Oat Study grown on the Northwestern Agricultural Research Center, Kalispell, MT.
Seeded: April 15, 1987 Harvested: August 19, 1987

Treatment	Rate oz or lb ai/A	% WILD OAT CONTROL (OCULAR)			7/2/87 2
		6/1	7/1	7/21	W.OAT PLTS/FT Count
AC 222,293	.45 lb	87.50	99.75	86.50	4.875
PP604	6 oz.	93.75	98.25	90.75	2.375
PP604	4 oz.	100.0	91.25	82.00	3.375
PP604	2 oz.	71.25b	62.50b	46.25	8.125
MEAN		88.13	87.94	76.38	4.688
F VALUE	1/	5.201*	12.60**	2.894	3.437
C.V.%		6.147	5.562	15.70	28.90
L.S.D.		17.33	15.65	38.36	4.334

* Indicates statistical significance at the .05 level of probability

** Indicates statistical significance at the .01 level of probability

b Values significantly less than the standard treatment (AC 222,293)

1/ F value for treatment comparison

Table 2. Agronomic data from the PP 604 Wild Oat Study grown on the Northwestern Agricultural Research Center, Kalispell, MT.
Seeded: April 15, 1987 Harvested: August 19, 1987

Treatment	Rate oz or lb ai/A	YIELD	TEST WT	%	HEIGHT
		BU/A	LBS/BU	PLUMP	INCHES
AC 222,293	.45 lb	127.6	50.63	96.75	34.7
PP604	6 oz.	116.6	50.85	95.25	34.0
PP604	4 oz.	116.4	49.80	92.75b	34.3
PP604	2 oz.	97.9b	49.25	90.25b	34.7
MEAN		114.6	50.13	93.75	34.43
F VALUE	1/	7.354**	2.441	6.607*	.2749
C.V.%		3.955	.9459	1.186	2.153
L.S.D.		14.50	1.517	3.557	2.370

* Indicates statistical significance at the .05 level of probability

** Indicates statistical significance at the .01 level of probability

b Values significantly less than the standard treatment (AC 222,293)

1/ F value for treatment comparison

PROJECT TITLE: Evaluation of three post emergence herbicides for wild oat control and crop tolerance in spring barley.

YEAR/PROJECT: 1987/754

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

Three rates of PP604 used with four rates of crop oil concentrate when compared to AC222,293 were found to give acceptable wild oat control using 4 oz ai per acre of PP604 with 1% v/v crop oil concentrate. Yields were significantly increased when wild oats were control.

RESEARCH METHODS:

Herbicides were applied to 10' X 12' plots of Lewis spring barley using a tractor mounted research-type sprayer. A volume of 24.85 gpa was applied using 8002 nozzles at 32 psi. Treatments were replicated four times in a complete random block design.

Planting Data:

Crop: Lewis spring barley

Seedbed preparation: Fall plow and disc, spring disc and cultivation
seedbed preparation done with brillion packer

Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2, OM 4 %

Type planting - solid seeded with press-type drill, 7" spacing

Seeding depth 1 1/2 to 2 ", seeding rate 60 lbs/A

Maintenance sprays: Buctril at .375 # ai/A on 5/15/87

R-11 surfactant used with AC 222,293 at .6 fluid oz per gallon for each gallon that exceeded the 10 gallon per acre spray rate.

AL 411f was used as crop oil concentrate with each of the PP604 applns.

Application Data:

Date: 5/12/87 Air temp: 62 F Soil temp: 65 F R.H. 35%

Wind veloc: 3-5 mph from the SSE Cloud cover: Clear

Soil moisture: Dry topsoil, very good moisture in subsoil

Crop growth stages at application:

Crop: 4-5 leaf, tillering

Fanweed (*Thlaspi arvense*) 6-10 lvs, 1-2" dia

Lambsquarter (*Chenopodium album*) 6 lvs, 1/2 - 1" dia

Henbit (*Lamium amplexicaule*) 2 lvs

Night flowering catchfly (*Silene noctiflora*) 4 lvs

Green foxtail (*Silene viridis*) 5-7 lvs, 1 1/2 "

Wild oat (*Avena fatua*) 3 leaf stage

RESULTS:

PP604 at 2, 4, and 6 oz ai/acre with varying rates of crop oil concentrate (.5, 1, 1.5, and 2% v/v) resulted in 50 - 82% wild oat control. AC 222,293 and diclofop gave 47.5 and 30% control respectively. PP 604 applied with 1% v/v crop oil concentrate gave significantly better wild oat control than the same rate of PP604 with .5% v/v crop oil concentrate. Diclofop, AC 222,293, and PP 604 at the 4 oz ai/A rate (with .5% C.O.C.) gave poor wild oat control.

Yields of barley were reduced significantly because of wild oat populations. The check had a yield of 65.9 bu/A, but where weeds were controlled at the 80% level yields exceeded 100 bu/A. Test weights were significantly higher where there was some measure of wild oat control. Percent plump barley was significantly higher in all herbicide treatments when compared to the check, with exception of the diclofop treatments.

Table 1. Agronomic data from the Wild Oat Herbicide Study grown on the Northwestern Agricultural Research Center in Kalispell, MT.
Seeded: April 22, 1987 Harvested: August 20, 1987 Field R9

Treatment	Rate oz ai/A	% W. O. Control		# W.O. Plants/ft Ocular	2 Count
		7/1	7/8		
PP604 + 1% C.O.C.	2 oz.	56.25a	37.50a	1.750b	9.375
PP604 + 1% C.O.C.	4 oz.	71.25a	62.50a	1.125b	4.375b
PP604 + 1% C.O.C.	6 oz.	80.00a	65.00a	1.000b	3.250b
PP604 + .5% C.O.C.	4 oz.	50.00a	25.00a	2.000b	9.250
PP604 + 1.5% C.O.C.	4 oz.	55.00a	18.75	1.500b	8.250b
PP604 + 2% C.O.C.	4 oz.	82.50a	78.75a	.7500b	3.250b
AC 222,293 + R11	.45 lb	47.50a	27.50a	3.125b	11.13
Diclofop no surf.	.75 lb	30.00a	23.75a	2.875b	8.625
Check		.0000	.0000	7.250	13.40
MEAN		52.50	37.64	2.375	7.878
F-RATIO TRTS		7.043**	9.995**	10.44**	4.618**
SE TRT MEANS		9.719	8.130	.6186	1.653
CV (SE/MEAN)		18.51	21.60	26.05	20.98
LSD (0.05)		28.37	23.73	1.806	4.825

** Indicates statistical significance at the .01 level of probability

a/ Values significantly 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 Wild Oat Herbicide Study, NWARC.

Treatment	Rate oz ai/A	Yield Bu/A	Test Wt Lbs/Bu	% Plump	HT. (IN)
PF604 + 1% C.O.C.	2 oz	103.2a	50.88a	94.00a	37.6
PF604 + 1% C.O.C.	4 oz.	114.4a	51.80a	95.25a	37.7
PF604 + 1% C.O.C.	6 oz.	117.6a	51.50a	95.00a	37.1
PF604 + .5% C.O.C.	4 oz.	96.6a	50.00a	92.75a	37.9
PF604 + 1.5% C.O.C.	4 oz.	104.3a	50.92a	93.50a	37.8
PF604 + 2% C.O.C.	4 oz.	120.5a	52.15a	95.50a	36.4
AC 222,293 + R11	.45 lb	74.6	49.35a	89.25a	38.0
Diclofop no surf.	.75 lb	93.7a	48.90	87.00	37.3
Check		65.9	47.58	83.00	37.2
OVERALL MEAN		99.00	50.34	91.69	37.44
F-RATIO TRTS		5.434**	9.130**	4.423**	.8951
SE TRT MEANS		192.9	.4991	2.068	1.329
CV (SE/MEAN)		8.127	.9915	2.255	1.397
LSD (0.05)		23.48	1.457	6.037	1.526

** Indicates statistical significance at the .01 level of probability

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

PROJECT TITLE: Evaluation of rates in the combination of DFX-R9674 plus Diclofop-methyl in spring barley

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - V. R. Stewart, Todd K. Keener, N.W. Agricultural Research Center

SUMMARY:

Excellant broadspectrum weed control was obtained using the combination treatment of the herbicide DFX-R9674 and diclofop-methyl. No apparent antagonism was observed in yield data or wild oat control.

RESEARCH METHODS:

Several rates of DFX-R9674 and diclofop-methyl were applied post emergence to spring barley. The barley variety Lewis was seeded in 12 foot drill strips, which were planted parallel to one another and separated by 5 foot cultivated alleys. Treatments were positioned at right angles to the drill strips in a randomized complete block design, replicated four times. Plot size was 10' x 12'. Herbicides were applied using a research type tractor mounted sprayer with 8002 nozzles at 32 psi delivering 24.85 gpa. There was a very high population of broadleaf weeds present and a less than average population of wild oats (*Avena fatua*). An area of 48 square feet was harvested with a Hege combine for yield.

Planting Data:

Crop: Lewis spring barley

Type planting - solid seeded with press-type drill, 7" spacing

Seeding depth 1 1/2 to 2", seeding rate 60 lbs/A

Seedbed preparation: Fall plow and disc, spring disc and cultivation
seedbed preparation done with brillion packer

Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2, OM 4

Application Data:

Date: 5/13/87 Air temp: 65 F Soil temp: 62 F R.H. 38%

Wind veloc: 0-3 mph from the West Cloud cover: Clear

Soil moisture: Topsoil - fair, subsoil - good

Plant growth stages at application: Crop: 4-5 leaf, tillering

Fanweed (*Thlaspi arvense*) 6-10 lvs, 1-2" dia

Lambsquarter (*Chenopodium album*) 6 lvs, 1/2 - 1" dia

Wild buckwheat (*Polygonum convolvulus*) 2-4 lvs

Henbit (*Lamium amplexicaule*) 2 lvs

Green foxtail (*Silene viridis*) 2-5 lvs

Wild oat (*Avena fatua*) 2 1/2 lf

Surfactant used: R-11 at .25% v/v.

RESULTS:

Yield data proved to be non-significant after analysis demonstrating that there were no antagonistic effects from chemical combinations.

Control of wild buckwheat, fanweed, lambsquarter, night flowering catchfly, and henbit was excellant at all rates of DFX-R9674 tested (.0625 - .375 oz ai/A).

Wild oat control was good in all the diclofop treatments alone or in combination. Higher rates of diclofop were necessary to reduce the wild oat count significantly except where DFX-R9674 plus diclofop (.375 oz ai/A + ai/A).

Table 1. Agronomic data from the DPX-R9674 Wild Oat Antagonism Study
Northwestern Agricultural Research Center in Kalispell, MT.
Seeded: May 22, 1987 Harvested: August 20, 1987 Field R-9

Treatment	Rate oz or lb ai/A	Yield Bu/A	Test Wt. Lb./Bu	% Plump
R 9674 + Diclofop	.06oz +.75lb	104.0	50.75	97.00
R 9674 + Diclofop	.125oz +.75lb	110.3	51.00a	96.75
R 9674 + Diclofop	.25oz +.75lb	108.4	50.45	96.50
R 9674 + Diclofop	.375oz +.75lb	107.2	50.80a	98.25
R 9674 + Diclofop	.06oz +.94lb	106.1	50.80a	97.75
R 9674 + Diclofop	.125oz +.94lb	109.6	51.15a	97.75
R 9674 + Diclofop	.25oz +.94lb	117.1	50.72	96.75
R 9674 + Diclofop	.375oz +.94lb	113.0	50.47	97.25
Diclofop	.75lb	112.7	50.38	97.50
Diclofop	.94lb	122.1	50.20	96.25
R 9674 + surf.	.06oz	96.5	49.35	94.50
R 9674 + surf.	.125oz	102.1	49.38	95.25
R 9674 +surf.	.25oz	119.0	51.13a	97.50
R 9674 + surf.	.375oz	105.3	50.88a	97.25
R 9674 + Diclfop	.375lb +.75lb	116.0	50.50	96.00
Check		98.5	49.63	95.25

MEAN	109.2	50.47	96.72
F-RATIO TRTS 1/	.8598	1.977	1.738
CV % (SE/MEAN)	7.133	.8093	.8190
LSD	22.20	1.163	2.256

1/ F value for treatment comparison

a/ Indicates values that are significantly higher than the check at the .05 level.

* Indicates statistical significance at the .05 level of probability.

Table 2. Weed control scores from the DPX-R9674 Wild Oat Antagonism Study
Northwestern Agricultural Research Center in Kalispell, MT.
Seeded: May 22, 1987 Harvested: August 20, 1987 Field R-9

Treatment	Rate oz or lb ai/A	--- Percent Broadleaf Control 6/4/87 --- 1/				
		WBUCK	FNWD	LMQTR	HNBT	SET
R 9674 + Diclofop	.06oz+.75lb	88.75	99.75	97.50	100.0	83.75
R 9674 + Diclofop	.125oz+.75lb	97.50	98.50	100.0	98.75	65.00
R 9674 + Diclofop	.25oz+.75lb	97.50	98.75	98.75	98.75	56.25
R 9674 + Diclofop	.375oz+.75lb	100.0	100.0	100.0	100.0	57.50
R 9674 + Diclofop	.06oz+.94lb	92.50	98.75	100.0	93.75	88.75
R 9674 + Diclofop	.125oz+.94lb	97.50	98.75	98.75	100.0	88.75
R 9674 + Diclofop	.25oz+.94lb	98.75	100.0	99.75	100.0	82.25
R 9674 + Diclofop	.375oz+.94lb	97.50	100.0	98.75	100.0	27.50
Diclofop	.75lb	15.00	18.75	25.00	.0000	90.00
Diclofop	.94lb	.0000	.0000	.0000	.0000	93.75
R 9674 + surf.	.06lb	93.75	98.75	100.0	96.25	18.75
R 9674 + surf.	.125oz	95.00	100.0	100.0	100.0	41.25
R 9674 +surf.	.25oz	95.00	96.25	100.0	98.75	.0000
R 9674 + surf.	.375oz	100.0	100.0	100.0	98.75	18.75
R 9674 + Diclfop	.375lb+.75lb	98.75	97.50	95.00	96.25	88.75
Check		.0000	.0000	.0000	.0000	.0000

MEAN	80.00	82.39	83.66	80.08	56.31
F-RATIO TRTS 2/	42.20**	38.16**	14.05**	731.0**	6.669**
CV% (SE/MEAN)	6.809	7.052	10.74	1.837	23.43
LSD	15.52	16.55	25.59	4.190	37.58

1/ Weed scores are visual ratings:

WBUCK = wild buckwheat FNWD = fanweed LMQTR = lambsquarter SET = Setaria
HNBT = henbit NCF = night flowering catchfly W.OAT = wild oat

2/ F value value for treatment comparison

** Indicates statistical significance at the .01 level of probability

Table 3. Weed control scores from the DFX-R9674 Wild Oat Antagonism Study
Northwestern Agricultural Research Center in Kalispell, MT.
Seeded: May 22, 1987 Harvested: August 20, 1987 Field R-9

Treatment	Rate oz or lb/A	--- Percent Weed Control 7/10/87 ---					W. OATS PER FT2	HT IN.
		WBUCK	NFCF	FNWD	LMQTR	W.OAT		
		----- visual score -----						
R 9674 + Diclofop	.06+.75	70.00	96.25	100.0	100.0	86.25	2.7	31.1
R 9674 + Diclofop	.125+.75	100.0	100.0	100.0	100.0	87.50	2.6	31.6
R 9674 + Diclofop	.25+.75	93.50	98.75	100.0	100.0	86.00	2.6	33.2
R 9674 + Diclofop	.375+.75	98.75	100.0	100.0	100.0	90.0	1.6	33.2
R 9674 + Diclofop	.06+.94	92.50	98.75	98.75	100.0	92.25	2.5	32.6
R 9674 + Diclofop	.125+.94	95.50	100.0	97.50	90.0	92.25	1.6	32.2
R 9674 + Diclofop	.25+.94	98.75	100.0	100.0	100.0	91.25	2.0	35.0
R 9674 + Diclofop	.375+.94	96.25	100.0	100.0	98.75	88.00	2.3	33.5
Diclofop	.75	17.50	12.50	12.50	25.00	93.75	1.8	34.1
Diclofop	.94	.0000	.0000	.0000	22.50	89.75	1.5	32.9
R 9674 + Surf.	.06	86.75	100.0	97.50	100.0	.0000	6.3	33.3
R 9674 + Surf	.125	88.75	100.0	100.0	98.75	.0000	5.3	32.7
R 9674 + Surf	.25	97.50	100.0	100.0	100.0	.0000	3.9	35.8
R 9674 + Surf	.375	98.00	100.0	100.0	100.0	.0000	3.6	32.3
Bromox + Diclofop	.375+.75	97.50	100.0	98.75	87.50	93.75	1.1	32.7
Check		.0000	.0000	.0000	.0000	.0000	4.9	33.0

MEAN		78.52	84.14	83.52	85.00	61.92	2.9	83.97
F-RATIO TRTS 1/		21.40**	24.82**	35.61**	6.502**	190.8**	3.9**	1.064
CV (SE/MEAN)		9.104	8.090	6.91	13.16	5.048	27.11	3.446
LSD		20.36	19.36	16.56	31.85	8.904	2.238	8.241

1/ F value for treatment comparison

** Indicates statistical significance at the .01 level of probability

PROJECT TITLE: Evaluation of herbicide combinations of L5300, R9674, and M6316 with AC 222,293 or diclofop-methyl in spring barley

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - V. R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

DPX-L5300, DPX-M6316, and DPX-R9674 in combination with the post emergence applications of AC 222,293 and diclofop-methyl in spring barley gave very good broad-spectrum weed control with no obvious antagonism in wild oat control or reduction in yields.

RESEARCH METHODS:

Combinations of the post emergence broadleaf herbicides DPX-L5300, DPX-R9674, and DPX-M6316 were tank mixed with diclofop-methyl and AC222, 293. The barley variety Lewis was seeded in 12 foot drill strips, which were planted parallel to one another and separated by 5 foot cultivated alleys. Plots were positioned at right angles to the drilled strips in a randomized complete block design, replicated four times with plot size being 10'x 12'. Herbicides were applied in 24.85 gpa using a research-type tractor mounted sprayer with 8002 nozzles at 32 psi. There was a very high natural population of broadleaf weed species and a less than moderate population of wild oats (*Avena fatua*) in the test area. A 48 square foot area was harvested with a Hege combine for yield data.

Planting Data:

Crop: Lewis spring barley

Seedbed preparation: Fall plow and disc, spring disc and cultivation
seedbed finishing done with billion culti-packer

Previous crop: Spring barley Soil: Creston silt loam, pH 7.2, OM 4%

Type planting - 12' strips seeded with press-type drill, 7" spacing

Seeding depth 1 1/2 to 2", seeding rate 60 lbs/A

Application Data:

Date: 5/11/87 Air temp: 75 F Soil temp: 80 F R.H. 20%

Wind veloc: 2-5 mph from the South Cloud cover: Clear

Soil moisture: top-soil, dry subsoil moisture very good

Crop growth stages at application:

Crop: 5 leaf, tillering

Fanweed (*Thlaspi arvense*) 4-10 lvs, 1-2" dia

Lambsquarter (*Chenopodium album*) 4-6 lvs, 1/2 - 1" dia

Wild buckwheat (*Polygonum convolvulus*) 1-2 lvs

Henbit (*Lamium amplexicaule*) 2 lvs

Night flowering catchfly (*Silene noctiflora*) 4-6 lvs

Green foxtail (*Silene viridis*) 5-7 lvs

Pigweed (*Amaranthus retroflexus*) 2-6 lvs

Wild oat (*Avena fatua*) 2 1/2 - 3 lf

RESULTS:

Broadleaf herbicides gave excellent weed control throughout the study. Diclofop alone gave 96.3% green foxtail control (*Setaria viridis*) whereas in combination with R9674 and L5300 gave only 70% and 50% control respectively. In the first broadleaf weed ratings (Table 1) L5300 gave excellent control of lambsquarter (*Chenopodium album*), however wild buckwheat (*Polygonum convolvulus*) control was not satisfactory for L5300 and R9674.

Wild oat control was very good (92.5%) in any combination treatment that contained AC 222,293. AC 222,293 combined with R9674 and M6316 gave 99.5 and 97.5 % control of wild oats respectively. Wild oat control was not reduced in any of the combination treatments of AC 222,293 or diclofop-methyl, and in fact in most cases increased. There was no clear distinction of herbicide antagonism with any treatment. Wild oat control did seem to increase with an increase of rate of R9674 and L5300.

Yields were found to be significantly higher than the check when wild oat herbicides were used in combination with DFX-L5300, DFX-R9674, and DFX-M6316. This varied with the rate of the sulfonyl urea compound. Table 3. The combination of M6316 (.125 oz ai/A) plus diclofop (.75 lb. ai/A) was the highest yielding treatment in the study. The high rate of M6316 (.25 oz ai/A), though not statistically significant resulted in a somewhat lower yield.

Table 1. Percent weed control where sulfonyl urea compounds were combined with the wild oat herbicides diclofop and AC 222,293.
1st rating. Date planted: 4/22/87 Date harvested: 8/19/87.

Treatment	Rate oz. or lb AI/A	Percent Weed Control 6/10/87 2/-----					
		FNWD	HNBT	LMQTR	PGWD	WBUCK	FOXTL
DPX-L5300+ Surf. .125oz		96.25	95.00	92.50	100.0	91.25	65.00
DPX-L5300+ Surf. .25oz		98.75	95.00	95.00	98.75	90.50	62.50
DPX-R9674+ Surf. .25oz		97.50	93.75	96.25	100.0	95.00	55.00
DPX-R9674+ Surf. .375oz		100.0	92.25	81.25	100.0	78.50	50.00
DPX-L5300+ Dicl .125oz+.75lb		100.0	95.00	91.25	91.25	98.75	71.25
DPX-L5300+ Dicl .25oz +.75lb		100.0	100.0	98.75	99.75	90.00	75.00
DPX-L5300+ AC222.125oz+.45lb		100.0	93.50	88.75	98.75	93.75	56.25
+ Surf.							
DPX-L5300+ AC222.25oz +.45lb		97.50	97.50	95.00	100.0	93.25	76.25
+ Surf.							
DPX-R9674+ Dicl .25oz +.75lb		97.50	96.25	97.50	99.75	75.00	71.25
DPX-R9674+ Dicl .375oz+.75lb		91.25	95.00	97.50	98.25	93.75	77.50
DPX-R9674+ AC222.25oz +.45lb		98.75	97.50	97.50	98.75	97.50	67.50
+ Surf.							
DPX-R9674+ AC222.375oz+.45lb		100.0	98.75	97.50	97.50	97.25	86.25
+ Surf.							
DPX-M6313+ Dicl .125oz+.75lb		92.50	93.75	98.75	98.75	96.25	86.25
DPX-M6313+ Dicl .25oz +.75lb		97.50	97.50	95.00	100.0	86.25	91.25
DPX-M6313+ AC222.125oz+.45lb		96.25	97.50	85.00	100.0	86.25	91.25
+ Surf.							
DPX-M6313+ AC222.25oz +.45lb		93.75	98.75	81.25	72.50	92.50	73.75
+ Surf.							
AC222,293+ Surf .45lb		92.50	90.00	63.75	86.25	91.25	75.00
Diclfop .75lb		.0000	.0000	.0000	.0000	.0000	96.25
Bromoxynil .375lb		96.25	82.50	82.50	98.75	100.0	82.50
Bromoxynil .375lb+.75lb		98.75	87.50	85.00	98.75	100.0	83.75
+ diclfop							
Bromox+AC222,293.375lb+.45lb		100.0	98.50	97.50	98.75	93.75	82.50
+ Surf.							
Check	-----	.0000	.0000	.0000	.0000	.0000	.0000
OVERALL MEANS		88.40	86.16	82.60	88.02	83.67	73.58
F-RATIO TRTS		120.5	59.11	15.07	32.40	13.79	1.509
CV (SE/MEAN)		2.961	4.254	8.741	5.825	8.944	15.57
LSD (0.05)		7.399	10.3	20.41	14.4	21.15	32.38

Table 2. Percent weed control where sulfonyl urea compounds were combined with the wild oat herbicides diclofop and AC 222,293.
2nd rating. Date planted: 4/22/87 Date harvested: 8/19/87.

Treatment	Rate oz. or lb AI/A	Percent Weed Control 7/9/87 2/					
		FNWD	LMQTR	WBUCK	NFCF	W.OAT	HT(IN)
DPX-L5300 + Surf. .125oz		97.50	71.25	62.50	100.0	.0000	31.69
DPX-L5300 + Surf. .25oz		98.75	75.00	70.00	98.75	.0000	30.51
DPX-R9674 + Surf. .25oz		97.50	93.75	78.75	100.0	.0000	29.82
DPX-R9674 + Surf. .375oz		100.0	80.00	72.50	98.75	.0000	32.68
DPX-L5300 + Dicl. .125oz+.75lb		98.75	93.75	93.75	86.25	72.50	29.43
DPX-L5300 + Dicl. .25oz+.75lb		100.0	97.50	52.50	100.0	82.50	29.43
DPX-L5300 + AC222 .125oz+.45lb		100.0	95.00	75.00	87.50	92.50	31.00
+ Surf.							
DPX-L5300 + AC222 .25oz+.45lb		98.75	91.25	83.75	98.75	97.50	29.82
+ Surf.							
DPX-R9674 + Dicl. .25oz+.75lb		92.50	98.75	93.75	100.0	75.00	32.09
DPX-R9674 + Dicl. .375oz+.75lb		87.50	95.00	70.00	100.0	80.00	29.33
DPX-R9674 + AC222 .25oz+.45lb		98.75	100.0	85.00	100.0	99.50	31.50
+ Surf.							
DPX-R9674 + AC222 .375oz+.45lb		100.0	100.0	91.25	100.0	97.50	29.92
+ Surf.							
DPX-M6313 + Dicl. .125oz+.75lb		82.50	95.00	81.25	93.75	82.50	32.48
DPX-M6313 + Dicl. .25oz+.75lb		93.75	92.50	77.50	98.75	82.50	29.23
DPX-M6313 + AC222 .125oz+.45lb		85.00	83.75	86.25	95.00	95.00	31.59
+ Surf.							
DPX-M6313 + AC222 .25oz+.45lb		97.50	95.00	91.25	77.50	97.50	32.09
+ Surf.							
AC222,293 + Surf. .45lb		75.00	31.25	71.25	50.00	92.50	32.58
Diclfop .75lb		20.00	.0000	.0000	.0000	75.00	32.48
Bromoxynil .375lb		97.50	70.00	96.25	97.50	.0000	30.02
Bromoxynil .375lb+.75lb		82.50	66.25	81.25	73.75	90.00	30.71
+ diclfop							
Bromox+AC222,293 .375lb+.45lb		100.0	97.50	95.00	98.75	95.00	31.79
+ Surf.							
Check	-----	.0000	.0000	.0000	.0000	.0000	30.51
OVERALL MEAN		86.53	78.30	73.69	.006	31.98	30.97
F-RATIO TRTS		10.97	6.093	2.464	2.921	.0503	85.45
CV (SE/MEAN)		9.059	15.50	21.27	33.76	2.811	.0000
LSD (0.05)		22.15	34.30	44.29	31.30	6.255	5.102

Table 3. Agronomic data from sulfonyl urea compounds that were combined with the wild oat herbicides diclofop and AC 222,293.

Date planted: 4/22/87 Date harvested: 8/19/87.

Treatment	Rate oz. or lb AI/A	YIELD BU/A	TEST WT LBS/BU	% PLUMP
DPX-L5300 + Surf. .125oz		78.5	52.90	91.00
DPX-L5300 + Surf. .25oz		97.1	53.03	94.50
DPX-R9674 + Surf. .25oz		89.6	52.33	95.00
DPX-R9674 + Surf. .375oz		97.9	52.58	95.50
DPX-L5300 + Dicl. .125oz+.75lb		106.5a	52.8	95.75
DPX-L5300 + Dicl. .25oz+.75lb		98.4	52.58	95.00
DPX-L5300 + AC222 .125oz+.45lb		97.3	52.78	95.00
+ Surf.				
DPX-L5300 + AC222 .25oz+.45lb		103.2a	53.03	93.75
+ Surf.				
DPX-R9674 + Dicl. .25oz+.75lb		98.9	52.88	95.00
DPX-R9674 + Dicl. .375oz+.75lb		99.1	52.90	95.50
DPX-R9674 + AC222 .25oz+.45lb		98.7	52.90	96.25
+ Surf.				
DPX-R9674 + AC222 .375oz+.45lb		103.4a	52.95	93.50
+ Surf.				
DPX-M6313 + Dicl. .125oz+.75lb		107.4a	52.90	94.25
DPX-M6313 + Dicl. .25oz+.75lb		95.8	52.58	94.00
DPX-M6313 + AC222 .125oz+.45lb		99.8	52.70	96.25
+ Surf.				
DPX-M6313 + AC222 .25oz+.45lb		96.5	52.75	94.50
+ Surf.				
AC222,293 + Surf. .45lb		105.6a	52.95	91.25
Diclofop .75lb		97.1	52.20	87.75
Bromoxynil .375lb		99.3	52.65	91.00
Bromoxynil .375lb+.75lb		101.1	53.00	96.25
+ diclofop				
Bromox+AC222,293 .375lb+.45lb		100.0	53.08	95.25
+ Surf.				
Check -----		89.4	51.20	91.25
OVERALL MEAN		98.2	52.69	93.98
F-RATIO TRTS 1/		34.63**	1.571	1.254
CV (SE/MEAN)		4.384	.7630	1.805
LSD (0.05)		12.17	1.136	4.794

1/ F value for treatment comparison

** Indicates statistical significance at .01 level of probability

a/ Values significantly greater than the check

2/ Weed scores are based on ocular ratings of percent weed control. Weed codes are as follows: FNWD = fanweed, HNBT = henbit, LMQTR = lambs-quarter, PGWD = pigweed, WBUCK = wild buckwheat, FOXTL = foxtail, NFCF = night flowering catchfly, WOAT = wild oat.

PROJECT TITLE: Combining chlorsulfuron and metasulfuron with AC 222,293 at various rates to determine effective rates for broad spectrum weed control.

YEAR/PROJECT: 1987/754

PROJECT PERSONNEL: Leader - V. R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

The high rates of AC 222,293 combined with high rates of chlorsulfuron (.45 lb ai/A + .187 oz ai/A) did not appear to be beneficial over the lower rate combinations for broadleaf and wild oat control or other agronomic components (yield, test weight, or percent plump). There was no antagonistic effect distinguishable in weed ratings or in statistical analysis of yield data.

RESEARCH METHODS:

The barley variety Lewis was seeded in 12 foot drill strips, which were planted parallel to one another and separated by 5 foot cultivated alleys. Plots were positioned at right angles to the drilled strips in a randomized complete block design, replicated four times and were 10 x 12 feet in size. Herbicides were applied using a tractor mounted research-type sprayer with 8002 nozzles at 32 psi applying 24.85 gpa. There was a very high natural population of broadleaf weeds and a less than moderate population of wild oats (*Avena fatua*) in the area where the test was established. A 48 square feet area was harvested with a Hege combine for yield.

Planting Data:

Crop: Lewis spring barley Planted: 4/15/87 Harvest: 8/19/87
Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2, OM 4
Seedbed preparation: Fall plow and disc, spring disc and cultivation
seedbed finishing done with brillion culti-packer
Type planting - seeded with 1H press-type drill, 7" spacing, 12' width
Seeding depth 1 1/2 to 2 ", seeding rate 60 lbs/A

Application data:

Date: 5/11/87 Air temp: 75 F Soil temp: 80 F R.H. 20%
Wind veloc: 2-5 mph from the SEE Cloud cover: Clear
Soil moisture: top soil dry, sub soil- very good moisture

Plant growth stages:

Barley - 5 leaf, tillering
Fanweed (*Thlaspi arvense*) 4-8 lvs, 1/2" dia
Lambsquarter (*Chenopodium album*) 4-10 lvs, 1 1/2 " tall
Wild buckwheat (*Polygonum convolvulus*) 1-2 lvs
Henbit (*Lamium amplexicaule*) 2-6 lvs
Night flowering catchfly (*Silene noctiflora*) 3-6 lvs
Wild oat (*Avena fatua*) 2 1/2- 3 lf

RESULTS:

Broadleaf weed control with chlorsulfuron and metasulfuron was very good under the very heavy broadleaf weed pressure. The treatments with high rates of AC 222,293 combined with high rates of chlorsulfuron (.45 lb +.187 oz ai/A) did not appear to be beneficial over the lower rate combinations for broadleaf and wild oat control or other agronomic components such as yield, test weight, or percent plump. Likewise the lower rate combinations of AC 222,293 plus metasulfuron proved as effective as the higher rate. AC 222,293 alone gave poor broadleaf weed control but 83-91% wild oat control. Excellent broadleaf weed control was seen in chlorsulfuron plots where as metasulfuron alone proved just fair for control of all broadleaf weed species present. Chlorsulfuron and metasulfuron showed no activity against wild oats.

There was no antagonistic effect distinguishable in weed ratings or upon statistical analysis. It was observed that AC 222,293 wild oat control was less when mixed with metasulfuron, but not significantly than AC 222,293 alone or in other mixtures. Antagonism was not detected in the yield data. Yields were significantly higher in all those treatments combined with AC 222,293. An exception to this was chlorsulfuron applied at the .125 oz ai/A rate. Test weights were significantly higher in all combinations except AC 222,293 plus metasulfuron at the low rate. The treatments where compounds were tested alone had lower test weights.

Table 1. Agronomic data from the chlorsulfuron/metasulfuron plus AC 222,293 evaluation. N. W. Agric Research Center in Kalispell, MT. in 1987
Seeded: April 15, 1987 Harvested: August 19, 1987

Treatment 2/	Rate ai/A	Percent Weed Control 6/10/87 ----- 1/					
		FNWD	WBUCK	HNBT	LMQTR	W.OAT	HT (IN)
1. AC222,293 + .38 lb+.125 oz Chlor + Surf.		96.00	86.25	100.0	91.00	87.25	34.4
2. AC222,293 + .45 lb+.125 oz Chlor + Surf.		65.00	88.75	97.50	96.25	90.50	33.7
3. AC222,293 + .38 lb+.187 oz Chlor + Surf.		97.50	97.50	100.0	92.50	89.50	33.7
4. AC222,293 + .45 lb+.187 oz Chlor + Surf.		91.25	98.75	100.0	82.50	85.00	34.2
5. AC222,293 + .38 lb+.06 oz Meta + Surf.		92.25	75.00	100.0	88.75	83.75	35.1
6. AC222,293 + .45 lb+.06 oz Meta + Surf.		74.75	80.00	98.75	50.00	83.75	33.7
7. AC222,293+C.O.C..38 lb		48.75	57.50	36.25	22.50	82.50	34.9
8. AC222,293+C.O.C..45 lb		93.75	68.75	47.50	20.00	91.25	36.0
9. Chlor + Surf. .125 oz		97.50	92.50	100.0	93.75	.0000	35.5
10. Chlor + Surf. .187 oz		90.00	93.75	96.25	92.25	.0000	35.9
11. Meta + Surf. .06 oz		52.50	47.50	72.50	62.50	.0000	36.0
12. Check		.0000	.0000	.0000	.0000	.0000	34.9

MEAN	74.94	73.85	79.06	66.00	57.79	34.84
F VALUE 3/	5.822**	5.890**	8.440**	9.056**	119.7**	1.575
C.V.%	16.26	15.76	14.58	17.39	6.765	2.109
L.S.D.	35.06	33.49	33.17	33.03	11.25	2.114

1/ FNWD = Fanweed (*Thlaspi arvense*)

LMQTR= Lambsquarter (*Chenopodium album*)

WBUCK = Wild buckwheat (*Polygonum convolvulus*)

HNBT = Henbit (*Lamium amplexicaule*)

NFCF = Night flowering catchfly (*Silene noctiflora*)

W.OAT = Wild oat (*Avena fatua*)

2/ Chlor = chlorsulfuron, meta = metasulfuron, C.O.C.= Crop oil concentrate

3/ F value for treatment comparison

** Indicates statistical significance at the .01 level of probability

Table 2. Agronomic data from the chlorsulfuron/metasulfuron plus AC 222,293 evaluation. N. W. Agric Research Center in Kalispell, MT. in 1987

Treatment	Rate ai/A	Percent Weed Control 7/10/87			
		FNWD	LMQTR	WBUCK	NFCF
1. AC222,293 + .38 lb+.125 oz Chlor + Surf.		93.75	98.75	98.75	100.0
2. AC222,293 + .45 lb+.125 oz Chlor + Surf.		82.50	95.00	87.50	97.50
3. AC222,293 + .38 lb+.187 oz Chlor + Surf.		98.50	98.50	98.75	100.0
4. AC222,293 + .45 lb+.187 oz Chlor + Surf.		90.00	92.50	93.75	100.0
5. AC222,293 + .38 lb+.06 oz Meta + Surf.		91.25	92.50	75.00	80.00
6. AC222,293 + .45 lb+.06 oz Meta + Surf.		80.00	85.00	86.25	97.50
7. AC222,293+C.O.C..38 lb		36.25	18.75	41.25	.0000
8. AC222,293+C.O.C..45 lb		68.75	25.00	45.00	42.50
9. Chlor + Surf. .125 oz		91.25	100.0	82.50	100.0
10. Chlor + Surf. .187 oz		95.00	100.0	95.00	98.75
11. Meta + Surf. .06 oz		63.75	60.00	62.50	73.75
12. Check		.0000	.0000	.0000	.0000

MEAN	74.25	72.17	72.19	74.17
F VALUE 2/	6.772**	11.54**	6.546**	12.16**
D.V.%	15.15	15.01	16.28	14.93
L.S.D.	32.36	31.17	33.81	31.87

1/ Weed stages at application:

FNWD = Fanweed (*Thlaspi arvense*)

LMQTR = Lambsquarter (*Chenopodium album*)

WBUCK = Wild buckwheat (*Polygonum convolvulus*)

HBIT = Henbit (*Lamium amplexicaule*)

NFCF = Night flowering catchfly (*Silene noctiflora*)

W.OAT = Wild oat (*Avena fatua*)

2/ F value for variety comparison

** Indicates statistical significance at the .01 level of probability

Table 3. Agronomic data from the chlorsulfuron/metasulfuron plus AC 222,293 evaluation. N. W. Agric Research Center in Kalispell, MT. in 1987

Treatment	Rate ai/A	YIELD BU/A	TEST WT LBS/BU	% PLUMP
1. AC222,293 + .38 lb+.125 oz Chlor + Surf.		103.7a	51.50a	94.50
2. AC222,293 + .45 lb+.125 oz Chlor + Surf.		112.8a	52.05a	94.50
3. AC222,293 + .38 lb+.187 oz Chlor + Surf.		104.0a	52.42a	95.75
4. AC222,293 + .45 lb+.187 oz Chlor + Surf.		110.7a	51.88a	94.75
5. AC222,293 + .38 lb+.06 oz Meta + Surf.		99.3a	50.98	94.00
6. AC222,293 + .45 lb+.06 oz Meta + Surf.		104.3a	51.58a	95.25
7. AC222,293+C.O.C..38 lb		113.8a	50.35	93.50
8. AC222,293+C.O.C..45 lb		106.8a	52.28a	93.25
9. Chlor + Surf. .125 oz		96.2a	50.42	90.00
110. Chlor + Surf. .187 oz		84.0	50.70	90.00
111. Meta + Surf. .06 oz		76.9	48.75	88.75
112. Check		70.6	49.58	89.00
OVERALL MEAN		98.57	51.04	92.52
F VALUE 1/		3.781**	3.137**	2.076NS
C.V. %		7.388	1.249	1.842
L.S.D.		20.95	1.834	4.902

1/ F value for variety comparison

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

** Indicates values significantly different at the .01 level of probability

Surfactant used in treatments was R-11: .25% v/v with Chlorsulfuron, label rate with AC 222,293.

PROJECT TITLE: Winter wheat herbicide evaluation

YEAR/PROJECT: 1986/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

Test weight was significantly less in plots treated pre-emergence surface with 1.0 # ai/A of SC 0051. Percent stand was also significantly reduced with preplant incorporated applications of SC 0051 at .5 and 1.0 lb ai/A and with pre emergence surface applications at 1.0 lb.

RESEARCH METHODS:

Various herbicide treatments were applied pre-plant incorporated, pre emergence, and post emergence to Winridge winter wheat. Plots were 10' by 20', replicated four times in a randomized complete block. The treatments were applied using a reserach-type tractor mounted sprayer with 8002 nozzles at 32 psi delivering 24.85 gpa.

Application data:

Type:	Pre-I	PES	Post
Date:	9/20/85	10/7/85	4/18/86
Air temp	45	33	52
Soil temp	42	42	52
Wind	0	5	4-6
Rel Hum.	38	41	40
Soil moisture	good	fair	v. good
Sky	prr cldy	prr cldy	cldy
Weed stage of growth-----			GRMWL 4-8 lvs, 1 FANWD 4 lvs, 1/2-1" WBUCK 3-4 lvs, 1/2-1"

RESULTS:

SC 0051 was tested at pre-plant incorporated, pre-emergence surface, and post applications in comparison to fluorochloridone, chlorsulfuron, and bromoxynil plus MCPA. Yields responses were not significantly different when comparing different treatments to the check. SC 0051 (1.0 lb ai/A PES) significantly reduced test weights from that of untreated plots. Percent stand was significantly reduced with the applications of SC 0051 at PES (1.0 lb ia/A) and Pre-incorp (.5 and 1.0 lb ai/A). Good broadleaf weed control was obtained in all treatments except SC 0051 at .5 lb ai/A (post appln.) and the fluorochloridone treatment.

Table 1. Agronomic data from the Winter Wheat Herbicide Study grown on the Northwestern Agricultural Research Center in Kalispell, MT. Field R9
Seeded: September 20, 1986 Harvested July 31, 1987

Treatment 2/	Rate #/A	Appln Type 1/	Yield Bu/A	Test Wt Lb./Bu	HT (")	% Stand
Bromox + MCPA	.38	Post	70.94	59.73	39.07	98.75
Clorsulf	.125 oz	PES	70.78	60.08	39.96	93.75
Fluorochl	.38	PES	70.44	59.75	38.98	86.25
SC 0051	.25	Post	69.76	60.17	39.07	95.00
SC 0051	.5	PES	68.55	59.57	40.45	96.25
SC 0051	1.0	Pre-I	67.75	59.80	37.80	62.50b
Check	---	---	66.55	60.00	38.68	100.0
SC 0051	.5	Post	65.71	59.00	39.57	100.0
SC 0051	1.0	PES	65.49	58.22b	39.17	70.00b
SC 0051	.5	Pre-I	65.41	59.60	38.78	73.75b
MEAN			68.14	59.59	39.15	87.6
F-RATIO TRTS 3/			.7674	2.250*	.5954	7.177
CV (SE/MEAN)			3.785	.6507	2.408	5.911
L.S.D. .05			7.484	1.125	2.736	15.03

* Indicates statistical significance at the .05 level

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

1/ Application types: PES = pre emergence surface
Pre-I = pre plant incorporated
Post = post

2/ Treatments: SC 0051 Stauffer Chemical experimental
Fluorochl = Flourochloridone (Racer) Stauffer Chem.
Chlorsulf = Chlorsulfuron (Glean) DuPont Chemical

3/ F value for treatment comparison

Table 2. Weed control data from the Winter Wheat Herbicide Study .

Treatment 3/	Rate #/A	Appln Type 1	Percent Weed Control 2/		
			GRMWL	FANWD	WBUCK
Bromox + MCPA	.38	Post	100.0	100.0	100.0
Clorsulf	.125 oz	PES	100.0	100.0	100.0
Fluorochl	.38	PES	100.0	100.0	46.25
SC 0051	.25	Post	96.25	100.0	97.50
SC 0051	.5	PES	100.0	97.50	97.50
SC 0051	1.0	Pre-	100.0	100.0	100.0
Check	---	---	.0000	.0000	.0000
SC 0051	.5	Post	47.50	50.00	50.00
SC 0051	1.0	PES	100.0	100.0	98.75
SC 0051	.5	Pre-	98.75	100.0	100.0
MEAN			84.25	84.75	79.00
F-RATIO TRTS			14.67	13.33	11.18
CV (SE/MEAN)			10.48	10.87	13.23
L.S.D. .05			25.62	26.73	30.33

* Indicates statistical significance at the .05 level

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

1/ Application types: PES = pre emergence surface
Pre-I = pre plant incorporated
Post = post

2/ Percent weed control by ocular observation
GRMWL = Gromwell (*Lithospermum arvense*)
FANWD = Fanweed (*Thlaspi arvense*)
WBUCK = Wild buckwheat (*Polygonum convulvulus*)

3/ Treatments: SC 0051 Stauffer Chemical experimental
Fluorochl = Flourochloridone (Racer) Stauffer Chem.
Chlorsulf = Chlorsulfuron (Glean) DuPont Chemical

PROJECT TITLE: Evaluation of DPX-L5300 and DPX-R9674 crop tolerance to spring barley

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - V. R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center.

SUMMARY:

In testing several rates of DPX-L5300 and DPX-R9674 it was found that the lowest rates (.0625 and .125 oz ai/A respectively) did not give adequate control of wild buckwheat. A rate of .125 oz ai/A for L5300 and .187 oz ai/A was needed to effectively control fanweed, lambsquarter, wild buckwheat, night flowering catchfly, and henbit.

RESEARCH METHODS:

Several rates of the herbicides DPX-L5300, and DPX-R9674 were applied post emergence to Lewis spring barley containing a high population of broad-leaf weeds. Plots were 10'x 12', replicated four times and tested in a randomized complete block design. Applications were made using a research type tractor mounted sprayer using 8002 nozzles at 32 psi delivering 24.85 gpa.

Planting Data:

Crop: Ingrid spring barley Planted: 4/22/87 Harvest: 8/20/87
 Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2, OM 4
 Seedbed preparation: Fall plow and disc, spring disc and cultivation
 seedbed finishing done with brillion culti-packer
 Type planting - seeded with IH press-type drill, 12' strips, 7" spacing
 Seeding depth 1 1/2 to 2", seeding rate 60 lbs/A
 Maintenance sprays: Hoelon at .75 lb ai/A on 5/15/87

Application data:

Date: 5/13/87 Air temp: 54 F Soil temp: 56 F R.H. 38%
 Wind veloc: 0-2 mph from the SEE Cloud cover: Clear
 Soil moisture: Fair

Plant growth stages at application:

Crop: 4-5 leaf, tillering
 Fanweed (*Thlaspi arvense*) 6-10 lvs, 1-2" dia
 Lambsquarter (*Chenopodium album*) 6 lvs, 1/2 - 1" dia
 Wild buckwheat (*Polygonum convolvulus*) 1-2 lvs
 Chickweed (*Stellaria media*) seedlings
 Henbit (*Lamium amplexicaule*) 2 lvs

RESULTS:

Yields, test weights, and percent plumps were not statistically different in any of the treatments evaluated (Table 3). The only injury detected was slight stunting from bromoxynil + MCPA.

Applications of L5300 and R9674 gave excellent control of all species observed (Table 1 and 2). L5300 and R9674 did not effectively control wild buckwheat (*Polygonum convolvulus*) at the low rates (.062 and .125 oz ai/A respectively). The applications of bromoxynil and MCPA gave fair weed control.

Table 1. Weed control data from applications of L5300 and R9674 herbicides.

Treatment	Rate lb or oz ai/A	--- FNWD	1st LMQTR	Broadleaf NFCF	weed WBUCK	ratings HNBT	6/5/87 1/----- % INJ
DPX-L 5300 + surf.	.0625oz	99.00	98.75	92.50	91.25	100.0	.0000
L5300 + surf.	.125oz	99.50	99.75	95.75	96.25	99.75	.0000
L5300 + surf.	.1875oz	100.0	100.0	98.00	99.25	99.75	.0000
L5300 + surf.	.25oz	99.75	98.75	100.0	99.00	100.0	.0000
DPX-R 7964 + surf.	.125oz	96.00	97.25	94.75	94.75	98.25	.0000
R-7964 + surf.	.1875oz	99.75	98.50	99.50	99.50	99.75	.0000
R-7964 + surf.	.25oz	100.0	99.25	98.75	100.0	100.0	.0000
R-7964 + surf.	.3125oz	96.25	97.50	96.25	100.0	100.0	.0000
R-7964 + surf.	.375oz	100.0	100.0	97.25	99.25	99.25	.0000
Bromoxynil + MCPA	.375 lb +.375 lb	100.0	100.0	82.50	96.25	90.50	3.750
Check	---	.0000	.0000	.0000	.0000	.0000	.0000
MEAN		90.02	89.98	86.84	88.68	89.75	.3409
F-RATIO TRTS		1364.	868.8	29.67	314.7	1256.	1.000
CV (SE/MEAN)		.8992	1.126	6.175	1.878	.9400	331.7
LSD (0.05)		2.338	2.926	15.49	4.809	2.437	3.266

1/ FNWD = Fanweed, LMQTR = Lambsquarter, NFCF = Night flowering catchfly,
WBUCK = Wild buckwheat, % INJ = Percent injury

Table 1. Weed control data from applications of L5300 and R9674 herbicides.

Treatment	Rate lb or oz ai/A	--- FNWD	1st LMQTR	Broadleaf NFCF	weed WBUCK	ratings HNBT	6/5/87 1/----- % INJ
DPX-L 5300 + surf.	.0625oz	99.00	98.75	92.50	91.25	100.0	.0000
L5300 + surf.	.125oz	99.50	99.75	95.75	96.25	99.75	.0000
L5300 + surf.	.1875oz	100.0	100.0	98.00	99.25	99.75	.0000
L5300 + surf.	.25oz	99.75	98.75	100.0	99.00	100.0	.0000
DPX-R 7964 + surf.	.125oz	96.00	97.25	94.75	94.75	98.25	.0000
R-7964 + surf.	.1875oz	99.75	98.50	99.50	99.50	99.75	.0000
R-7964 + surf.	.25oz	100.0	99.25	98.75	100.0	100.0	.0000
R-7964 + surf.	.3125oz	96.25	97.50	96.25	100.0	100.0	.0000
R-7964 + surf.	.375oz	100.0	100.0	97.25	99.25	99.25	.0000
Bromoxynil + MCPA	.375 lb +.375 lb	100.0	100.0	82.50	96.25	90.50	3.750
Check	---	.0000	.0000	.0000	.0000	.0000	.0000
MEAN		90.02	89.98	86.84	88.68	89.75	.3409
F-RATIO TRTS		1364.	868.8	29.67	314.7	1256.	1.000
CV (SE/MEAN)		.8992	1.126	6.175	1.878	.9400	331.7
LSD (0.05)		2.338	2.926	15.49	4.809	2.437	3.266

1/ FNWD = Fanweed, LMQTR = Lambsquarter, NFCF = Night flowering catchfly,
WBUCK = Wild buckwheat, % INJ = Percent injury

Table 2. Weed control data from the application of L5300 and R9674 for broad-leaf weed control.

Treatment	Rate lb or oz ai/A	-- 2cd Broadleaf Weed Ratings 7/10/87 --			
		FNWD	LMQTR	WBUCK	NFCF
DPX-L 5300 + surf.	.062 oz	99.25	100.0	76.25	97.50
L5300 + surf.	.125 oz	100.0	100.0	91.25	99.75
L5300 + surf.	.187 oz	100.0	98.00	94.75	98.50
L5300 + surf.	.25 oz	100.0	100.0	99.00	97.50
DPX-R 7964 + surf.	.125 oz	100.0	100.0	61.00	97.50
R-7964 + surf.	.187 oz	100.0	99.75	96.75	100.0
R-7964 + surf.	.25 oz	100.0	100.0	95.00	99.25
R-7964 + surf.	.312 oz	99.50	99.75	98.75	100.0
R-7964 + surf.	.375 oz	100.0	100.0	99.75	100.0
Bromoxynil + MCPA	.375 lb +.375 lb	75.00	75.00	72.50	47.50
Check	---	.0000	.0000	.0000	.0000
MEAN		88.52	88.41	80.45	85.23
F-RATIO TRTS		16.12	15.96	7.309	15.26
CV (SE/MEAN)		8.522	8.565	13.62	9.674
LSD (0.05)		21.79	21.87	31.66	23.81

Table 3. Agronomic data from the L5300/R-9674 Broadleaf Herbicide Study.
Northwestern Agricultural Research Center in Kalispell, MT in 1987.
Seeded: May 22, 1987 Harvested: August 20, 1987

Treatment	Rate lb or oz ai/A	Yield Bu/A	Test Wt. Lbs/Bu	% Plump ---
DPX-L 5300 + surf.	.0625oz	126.8	52.0	97.0
L5300 + surf.	.125oz	124.3	52.5	98.0
L5300 + surf.	.1875oz	122.8	52.6	97.8
L5300 + surf.	.25oz	130.3	52.4	98.0
DPX-R 7964 + surf.	.125oz	119.2	52.1	96.8
R-7964 + surf.	.1875oz	127.1	52.5	97.5
R-7964 + surf.	.25oz	132.6	52.4	97.5
R-7964 + surf.	.3125oz	131.1	52.5	98.5
R-7964 + surf.	.375oz	132.7	55.0	98.0
Bromoxynil + MCPA	.375lb + .375lb	130.6	52.7	98.8
Check	---	126.5	52.3	97.3

Mean	127.6	52.7	97.7
F ratio	.5460	.8372	1.358
C.V.	4.580	1.641	.5329
L.S.D.	16.88	2.494	1.504

PROJECT TITLE: Effect of metasulfuron (Ally) on six spring barley varieties.

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, North-western Agricultural Research Center, Kalispell, Montana.

SUMMARY:

Yield and test weights did not vary significantly among the seven treatments of metasulfuron applied to six spring barley varieties. There were significant differences comparing the six varieties in individual yield, test weights, percent plumps, height, percent plot thinning, and lodging.

RESEARCH METHODS:

Herbicides were applied to 5' X 10' plots of six different barley varieties using a tractor mounted research-type sprayer. A volume of 24.58 gpa was applied using 8002 nozzles at 32 psi. Treatments and varieties were replicated four times each in a randomized complete block design.

Planting data:

Seedbed preparation - fall plow and disc, spring disc and cultivation. Seedbed finished with brillion cultipacker. Previous crop was Ingrid spring barley. Soil type: Creston silt loam, 7.2 pH, 4% O.M. Crop varieties: Gallatin, Lewis, Premier, Ingrid, Hector, or Bowman. Planted April 22, 1987 with reseach plot doible disc seeder. Depth of seeding 1-2". Seed per acre was 50 lbs. Maintenance spray was Hoelon at .75 lb ai/A.

Application Data:

Temperatures: Air - 63 F, Soil - 69 F Relative humidity - 29%
Wind 3-6 mph from the north Sky - cloudy
Soil moisture: top - dry, subsoil - good

Crop and weed stages:

Barley 5-7 leaf, tillering. Fanweed 4-10 leaves, 1-1 1/2" tall.
Lambsquarter 6-10 leaves, 1-2" tall
Nightflowering catchfly 6-12 leaves, 1-2" tall
Wild buckwheat - 2-4 leaves. Chickweed seedling to 15 leaves.

RESULTS:

Six herbicide treatments plus one control were applied acrosss six barley varieties to determine effects on yields and other agronomic characteristics. Yield differences for herbicide treatments were found to be statistically non-significant at the .05 level, however, the combination of metasulfuron and the phenoxy compounds did have somewhat lower yields. The varieties Bowman and Gallatin were the high yielding varieties, Table 1. Treatments did not significantly affect test weights, however variety differences were noted with Premier being significantly less than other varieties, except Ingrid. Table 2. In Table 3 the data shows a significant reduction in percent plump where metasulfuron was used alone and in combination with 2,4-D. Statistically significant height differences were noted in varieties. Table 4. The phenoxy compounds increased lodging percentages when compared to the metasufuron treatments. Lodging differences were found in varieties as would be expected. Table 5 and 6.

Table 1. Yield data from six barley varieties treated with metasulfuron alone and in combination with 2,4-D, MCPA, and bromoxynil.

Treatment	Rate/ A	Gallatin	Lewis	Premier	Ingrid Bu/A	Hector	Bowman	Mean
Metasulfuron +surfactant	.06 oz	116.8	123.0	107.8	95.1	109.3	121.1	112.2
Metasulfuron +surfactant	.125 oz	115.7	104.8	106.3	93.6	107.4	116.6	107.4
Metasulf. + 2,4-D	.06 oz+ 4 oz.	121.4	113.9	106.8	97.9	107.5	115.3	110.4
Metasulf. + 2,4-D	.125 oz + 4 oz.	107.4	106.1	99.4	95.4	105.2	110.6	104.0
2,4-D	4 oz.	112.0	106.4	108.1	96.3	102.5	119.6	107.5
Bromox. + MCPA	.375 lb .375 lb	119.1	110.2	107.1	91.6	105.6	113.8	107.9
Check	-----	103.9	103.4	103.9	98.1	99.8	109.9	103.1
Mean		113.8c	109.7bc	105.6b	95.4a	105.3b	115.3c	
F (Treatments)				1.72 NS				
F (Varieties)				10.09**				
LSD (Varieties)				6.30				
C.V. %				5.50				

Treatment	Rate/ A	Gallatin	Lewis	Premier	Ingrid Lbs/Bu	Hector	Bowman	Mean
Metasulfuron +surfactant	.06 oz	51.05	51.25	49.08	49.38	49.78	50.90	50.24
Metasulfuron +surfactant	.125 oz	51.58	50.73	49.70	49.72	50.33	51.15	50.53
Metasulf. + 2,4-D	.06 oz+ 4 oz.	51.40	50.75	49.48	49.90	50.33	51.22	49.26
Metasulf. + 2,4-D	.125 oz + 4 oz.	50.78	51.25	49.20	50.03	50.17	50.78	50.37
2,4-D	4 oz.	51.55	51.13	48.78	49.95	50.30	51.17	50.48
Bromox. + MCPA	.375 lb .375 lb	51.58	51.00	49.65	50.20	50.58	51.05	50.67
Check	-----	51.70	51.48	49.90	50.88	50.78	51.35	52.26

F (treatments)	1.740
F (varieties)	3.70**
LSD (varieties)	1.747
C.V.%	3.29

Table 3. Percent plump data from six barley varieties treated with metasulfuron alone and in combination with 2,4-D, MCPA, and bromoxynil.

Treatment	Rate #	Gallatin	Lewis	Premier	Ingrid	Hector	Bowman	Mean
----- % Plump -----								
Metasulfuron +surfactant	.06 oz	94.75	96.00	94.75	90.00	95.00	98.50	94.83a
Metasulfuron +surfactant	.125 oz	95.25	93.25	93.50	89.50	94.50	98.25	94.04a
Metasulf. + 2,4-D	.06 oz + 4 oz.	95.25	94.50	93.50	92.25	95.75	99.00	95.04a
Metasulf. + 2,4-D	.125 oz + 4 oz.	97.00	96.75	96.75	95.50	96.00	98.75	96.79b
2,4-D	4 oz.	97.75	97.50	96.75	94.25	96.25	99.50	97.00b
Bromox. + MCPA	.375 lb .375 lb	96.75	97.25	97.00	93.75	96.75	99.50	96.83b
Check	-----	96.50	97.25	96.25	98.25	97.00	98.25	97.25b

Mean	96.18b	96.07b	95.50b	93.36a	95.89b	98.82c
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F (treatment)	5.02**
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LSD (teatment)	1.61
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F (variety)	10.75**
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LSD (variety)	1.49
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C.V. %	1.47
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Table 4. Height data from six barley varieties treated with metasulfuron alone and in combination with 2,4-D, MCPA, and bromoxynil.

Treatment	Rate/ A	Gallatin	Lewis	Premier	Ingrid	Hector	Bowman	Mean
Height (Inches)								
Metasulfuron	.06 oz	34.9	33.3	22.4	25.3	33.4	34.6	30.7b
+surfactant								
Metasulfuron	.125 oz	34.9	32.9	24.6	25.2	33.6	33.8	30.8b
+surfactant								
Metasulf. +	.06 oz+	34.5	32.4	24.4	23.3	32.0	35.6	30.4ab
2,4-D	4 oz.							
Metasulf. +	.125 oz	32.0	32.2	21.7	24.5	33.1	34.0	29.6ab
2,4-D	+ 4 oz.							
2,4-D	4 oz.	33.0	32.0	19.8	23.9	31.9	34.0	29.1a
Bromox. +	.375 lb	34.4	30.4	22.0	23.5	32.5	33.0	29.3a
MCPA	.375 lb							
Check	-----	33.5	31.0	20.9	23.4	32.5	33.9	29.2a

Mean 33.9de 32.0c 22.2a 24.2a 32.7cd 34.1e

F (treatments) 2.30*

F (varieties) 133.70**

LSD (treatments) 3.48

LSD (varieties) 3.22

C.V. % 4.02

Table 5. Percent lodging data from six barley varieties treated with metasulfuron alone and in combination with 2,4-D, MCPA, and bromoxynil.

Treatment	Rate/ #	Gallatin	Lewis	Premier	Ingrid	Hector	Bowman	Mean
----- % Lodging -----								
Metasulfuron +surfactant	.06 oz	16	27	0	0	44	0	14.5a
Metasulfuron +surfactant	.125 oz	25	25	0	0	40	0	14.9a
Metasulf. + 2,4-D	.06 oz+ 4 oz.	25	25	0	24	31	0	17.4a
Metasulf. + 2,4-D	.125 oz + 4 oz.	42	44	24	46	72	25	42.1b
2,4-D	4 oz.	37	69	48	68	79	25	54.0b
Bromox. + MCPA	.375 lb .375 lb	49	69	47	83	72	25	57.1b
Check	-----	37	50	44	36	70	25	43.6b

Mean 33.0bc 43.9cd 23.0ab 36.6bc 58.2d 14.1a

F (treatments) 9.23**

F (varieties) 7.37**

LSD (treatments) 17.30

LSD (varieties) 15.99

C.V. 2 92.97

Table 6. Lodging severity data from six barley varieties treated with metasulfuron alone and in combination with 2,4-D, MCPA, and bromoxynil.

Treatment	Rate	Gallatin	Lewis	Premier	Ingrid	Hector	Bowman	Mean
----- Lodging Severity 1/ -----								
Metasulfuron +surfactant	.06 oz	3.8	3.5	0	0	3.3	0	1.75a
Metasulfuron +surfactant	.125 oz	2.3	2.3	0	0	4.2	0	1.46a
Metasulf. + 2,4-D	.06 oz+ 4 oz.	2.3	2.3	0	2.0	3.0	0	1.58a
Metasulf. + 2,4-D	.125 oz + 4 oz.	4.0	3.5	2.0	3.8	5.3	1.3	3.29b
2,4-D	4 oz.	4.0	4.8	3.5	6.0	6.3	1.8	4.38b
Bromox. + MCPA	.375 lb .375 lb	3.5	5.0	3.8	7.3	5.0	1.3	4.29b
Check	-----	4.0	5.3	3.5	5.0	5.0	1.8	4.08b

Mean 3.39b 3.79b 1.82a 3.43b 4.57b .86

F (treatments) 7.00**

F (varieties) 8.57**

LSD (treatments) 1.42

LSD (varieties) 1.31

C.V.% 41.65

1/ Lodging severity rated on 0-9 scale, 0 = no lodging, 9 = lodged to ground

PROJECT TITLE: Evaluation of sulfonyl ureas in combination with bromoxynil or bromoxynil plus MCPA in winter wheat.

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT

SUMMARY:

Several sulfonyl ureas herbicides in combination with either bromoxynil or bromoxynil + MCPA were evaluated. It was found that none of the combinations caused crop injury and all treatments successfully controlled both chickweed and tansey mustard.

RESEARCH METHODS AND DATA:

Bromoxynil or bromoxynil plus MCPA were tank mixed with chlorsulfuron (Glean), DFX-G8311 (Finesse), DFX-T6376 (Ally), DFX-R9674 (Matrix), DFX-M6316 (Harmony), and DFX-L5300 (Express) and applied post emergence to winter wheat. Plots were 10' x 20', replicated three times in a randomized complete block design. The plots were established in a solid seeded field of Stephens winter wheat. Applications were made using a research-type tractor mounted sprayer using 8002 nozzles at 32 psi that delivered 24.85 gpa.

Planting and Application Data:

Crop: Stephen winter wheat Planted: 9/15/87 Harvest: none
Type planting - solid seeded with press-type drill, 7" spacing
Seeding depth 1 1/2 to 2", seeding rate 60 lbs/A
Seedbed preparation: Fall plow and disc, spring disc and cultivation
Previous crop: fallow Soil type: Chamokane fine sandy loam, pH 7.2, OM 3

Application: Post Date: 4/21/87 Air temp: 40 F Soil temp: 45 F R.H. 54%
Wind veloc: 0 mph Cloud cover: Clear Soil moisture: Fair

Plant growth stages at application: Crop: 5-7 leaf, tillered
Tansey mustard (Sisymbrium incisum) 2-3" dia, 1 1/2" tall
Chickweed (Stellaria media) seedling to 3" tall

RESULTS:

Bromoxynil combined with all the sulfonyl urea compounds resulted in excellent broadleaf weed control. This was also the case when bromoxynil + MCPA was combined with the sulfonyl ureas. The lower rates of the combinations with DFX-R9674, DFX-M6316, and DFX-L5300 all performed as well as those combinations at higher rates. Ratings were taken May 8 and June 4, 1987. Table 1. There was no obvious crop injury noted from any of the herbicide treatments. Due to severe lodging no harvest was made.

Table 1. Evaluation of bromoxynil or bromoxynil plus MCPA with sulfonyl ureas as post emergence applications in winter wheat on the Jim Buechel farm, Kalispell, MT.

Date planted: Sept. 15, 1986 No harvest taken.

Plot #	Treatment	Rate ai/A	Percent Weed Control		T. Mustard		Vigor 5/8
			Chickweed 5/8	6/4	5/8	6/4	
1.	Bromox. + Chlors.	.25# +.125oz	100.0	100.0	90.00	93.33	100.0
2.	Bromox. + GB311	.25# +.125oz	100.0	100.0	91.67	100.0	100.0
3.	Bromox. + Meta-S	.25# +.06oz	100.0	83.33	100.0	100.0	100.0
4.	Bromox. + R9674	.25# +.125oz	100.0	100.0	80.00	83.33	100.0
5.	Bromox. + R9674	.25# +.25oz	100.0	100.0	98.33	100.0	100.0
6.	Bromox. + M6316	.25# +.125oz	100.0	100.0	91.67	83.33	95.00
7.	Bromox. + M6316	.25# +.25oz	100.0	83.33	96.67	76.67	100.0
8.	Bromox. + L5300	.25# +.125oz	100.0	100.0	81.67	100.0	100.0
9.	Bromox. + L5300	.25# +.25oz	100.0	100.0	100.0	100.0	100.0
10.	Bromox.	.25#	100.0	100.0	80.00	40.00	95.00
11.	Bromox.	.375#	100.0	100.0	75.00	23.33	100.0
12.	Bromox+MCPA	.25#	93.33	100.0	100.0	100.0	100.0
13.	Bromox+MCPA	.375#	100.0	100.0	100.0	100.0	100.0
14.	MCPA	.25#	66.67	78.33	96.67	100.0	100.0
15.	MCPA	.375#	91.67	100.0	86.67	100.0	96.67
16.	Bromox+MCPA+Chlors.	.25# +.125oz	100.0	100.0	100.0	100.0	100.0
17.	Bromox+MCPA+GB311	.25# +.125oz	100.0	100.0	100.0	100.0	100.0
18.	Bromox+MCPA+Meta-S	.25# +.06oz	100.0	100.0	96.67	100.0	100.0
19.	Bromox+MCPA+R9674	.25# +.125oz	100.0	100.0	100.0	100.0	100.0
20.	Bromox+MCPA+R9674	.25# +.25oz	100.0	100.0	100.0	100.0	100.0
21.	Bromox+MCPA+M6316	.25# +.125oz	100.0	100.0	100.0	100.0	100.0
22.	Bromox+MCPA+M6316	.25# +.25oz	100.0	100.0	100.0	100.0	100.0
23.	Bromox+MCPA+L5300	.25# +.125oz	100.0	100.0	98.33	100.0	100.0
24.	Bromox+MCPA+L5300	.25# +.25oz	100.0	100.0	100.0	100.0	100.0
25.	Chlors+surf. 1/	.25oz	100.0	100.0	100.0	76.67	100.0
26.	GB311 + surf.	.25oz	100.0	100.0	98.33	100.0	100.0
27.	T6376 + surf.	.25oz	100.0	100.0	100.0	100.0	100.0
28.	R9674 + surf.	.25oz	100.0	100.0	100.0	100.0	100.0
29.	M6316 + surf.	.25oz	96.67	100.0	95.33	100.0	100.0
30.	L5300 + surf.	.25oz	100.0	100.0	96.67	100.0	100.0
31.	Check	----	.0000	.0000	.0000	.0000	100.0
OVERALL MEAN			95.11	92.15	89.57	95.00	95.82
F-RATIO TRTS			8.816	10.09	7.498	15.07	.9721
CV (SE/MEAN)			6.623	6.336	9.800	5.012	5.285
LSD (0.05)			17.82	16.52	24.83	13.47	14.78

1/ Surfactant added at .25% v/v (R-11)

All treatments were tank mixed

PROJECT TITLE: Evaluation of the combination of glyphosate plus 2,4-D applied pre plant to winter wheat

YEAR/PROJECT: 1987/754

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

There were no detrimental effects noted from preplant applications of glyphosate plus 2,4-D (Landmaster) to winter wheat yields, test weights, % stands, plant counts and height.

RESEARCH METHODS:

Treatments of glyphosate plus 2,4-D (Landmaster, 12.9% glyphosate and 21.5% 2,4-D, or .9 lb and 1.6 lb respectively) were applied at two rates (54 and 108 oz/A) 14, 7, and 0 days before planting of winter wheat. Plots were 10'x 20', replicated three times in both the dryland and irrigated location. Treatments were applied using a research-type tractor mounted sprayer using 8002 nozzles at 32 psi that delivered 24.85 gpa. Seeding Hawk winter wheat at 80 lbs/A was accomplished with a small plot research seeder.

Planting data:

Crop: Hawk winter wheat Planted 9/17/86 Harvested: 8/6/87
 Planted with plot seeder, double disc drill, 7" spacing
 Seeding depth 1 - 1 1/2 inches, 80 lbs/A
 Plots were 10'x 20', replicated three times
 Seedbed preparation: Fall plow and disc, spring disc and cultivation
 Seedbed finishing done with brillion and cultipacker
 Previous crop: Fallow Soil type: Creston silt loam, pH 7.2 OM 4
 Fertilizer: 200 lb/A 16-20-0 on 9/17/86, 120 lb/A 34-0-0 on 4/13/87
 Irrigated .5" 9/17/86 with standard pipe irrigation, Rainbird nozzles
 Cover spray: Bronate (.375 lb ai/A) 10/15/86

Application:	14 day pre	7 day pre	0 day pre
Date:	9/3/86	9/10/86	9/17/86
Air:	74	63	49
Soil:	73	55	52
Wind:	0-2 mph	0-2 mph	0
Rel H:	23%	53%	68%
Soil:	good moisture	v.good moisture	v. good moisture
Sky:	Prtly cldy	Overcast	Sunny

RESULTS:

The only agricultural component measured that was significantly affected by the herbicide applications was percent stand. All other measurements (yield, test weight, % stand, plants per row, and height) were not significantly effected across treatments. All measurements were higher coming from the irrigated test site in comparison to dryland, as would be expected. Stands were reduced slightly with 54 oz/A applications the day of planting. Stand reduction was greatest in those plots treated on the day of planting. Table 3.

Table 1. Agronomic data from the Landmaster on Winter Wheat Study North-western Agricultural Research Center in Kalispell, MT. in 1987.
Seeded: Sept. 9, 1986 Harvested: August 6, 1987

Treatment	Rate oz/A	Days Pre-Plt	Yield Bu/A			Test Wt Lbs/Bu		
			Dry	Irr	Mean	Dry	Irr	Mean
1. Landmaster	54	14	69.1	76.2	72.7	60.7	61.5	61.1
2. Landmaster	54	7	52.4	78.6	65.5	60.3	61.3	60.8
3. Landmaster	54	0	71.9	76.5	74.2	61.3	61.8	61.5
4. Landmaster	108	14	71.5	76.4	74.0	60.8	61.0	60.9
5. Landmaster	108	7	64.0	82.1	73.1	60.6	60.9	60.8
6. Landmaster	108	0	54.6	68.7	61.7	59.3	61.0	60.1
7. Check			68.1	70.6	69.3	60.8	60.8	60.8
Mean			64.53	75.56		60.51	61.19	

Table 2. Agronomic data from the Landmaster on Winter Wheat Study North-western Agricultural Research Center in Kalispell, MT. in 1987.

Treatment	Rate oz/A	Days Pre-Plt	Plts/Ft Row			HT (")		
			Dry	Irr	Mean	Dry	Irr	Mean
1. Landmaster	54	14	18.0	18.0	18.0	2.5	2.5	2.5
2. Landmaster	54	7	19.3	17.0	18.2	2.5	2.5	2.5
3. Landmaster	54	0	18.0	17.7	17.8	2.5	2.5	2.5
4. Landmaster	108	14	15.7	16.7	16.2	2.5	2.5	2.5
5. Landmaster	108	7	18.7	21.0	19.8	2.5	2.5	2.5
6. Landmaster	108	0	16.7	19.7	18.2	2.5	2.5	2.5
7. Check			16.7	17.7	17.2	2.5	2.5	2.5
Mean			17.57	18.24		2.5	2.5	

% stand, plants/foot row, and height notes were taken on October 15, 1987 fourteen days post emergence.

Stand reduction notes were taken on Nov. 5, 1987.

Table 3. Agronomic data from the Landmaster on Winter Wheat Study Northwestern Agricultural Research Center in Kalispell, MT. in 1987.

Treatment	Rate oz/A	Days Pre-Plt	% Stands			Stand Reduc.		
			Dry	Irr	Mean	Dry	Irr	Mean
1. Landmaster	54	14	100.0	100.0	100.0	0.0	0.0	0.0
2. Landmaster	54	7	100.0	100.0	100.0	0.0	0.0	0.0
3. Landmaster	54	0	93.3	93.3	93.3	15.0	13.3	14.7
4. Landmaster	108	14	100.0	100.0	100.0	0.0	0.0	0.0
5. Landmaster	108	7	93.3	100.0	96.7	6.7	5.0	5.8
6. Landmaster	108	0	100.0	100.0	100.0	10.0	16.7	13.3
7. Check			86.7	100.0	93.3	0.0	0.0	0.0
Mean			96.19	99.05		4.52	5.00	

% stand, plants/foot row, and height notes were taken on October 15, 1987 fourteen days post emergence.

Stand reduction notes were taken on Nov. 5, 1987.

PROJECT TITLE: Evaluation of pre-plant applications of Landmaster plus chlorsulfuron or metasulfuron in spring barley.

YEAR/PROJECT: 754/1987 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center.

SUMMARY:

In observing yield, test weight, percent plump, and percent plot loss in spring barley no detrimental effects could be attributed to pre-plant applications of Landmaster plus chlorsulfuron or metasulfuron 14,7,3 or 0 days prior to planting.

RESEARCH METHODS:

Treatments of glyphosate plus 2,4-D (Landmaster, 12.9% glyphosate and 21.5% 2,4-D, or .9 and 1.6 lb. ai respectively) were applied at 54 oz/A to plots 14, 7, 3, and 0 days prior to planting spring barley. Plots were 10' X 20', replicated four times in a randomized complete block. Treatments were applied with a research-type, tractor mounted sprayer using 8002 nozzles at 32 psi that delivered 24.85 gpa.

Planting data:

Crop: Lewis spring barley

Seedbed preparation: Fall plow and disc, spring disc and cultivation, final seedbed preparation done with brillion and cultipacker.

Previous crop: Spring barley Soil type: Creston silt loam, pH 7.2
O.M. % 4

Type planting: solid seeded with research seeder, 6" spacing,
double disc openers, seeded to a depth of 1 1/2 - 2 inches, 60 lbs/A.

Application data:

	Type: Pre-14	Pre-7	Pre-3	0 Day	Post
Date:	4/23	4/30	5/4	5/7	5/21
Temps-Air:	50	73	70	65	55
Soil:	53	81	79	61	58
RH %:	38	23	22	47	29
Wind:	0 mph	4 mph	0-3mph	0-2	2 mph
Sky:	clr	clr	clr	clr	cldy
Top soil:	good	dry	dry	dry	dry
Sub soil:	vgood	good	vgood	vgood	good

Plant stages at application:

	Crop: N/A	N/A	N/A	seeded	2 leaf
Fanweed:	"	"	"	seedling	4 lvs
G. Foxtail:	"	"	"	seedling	3-5 lf
Thistle:	"	"	"	seedling	1-2"

Weed species:

Fanweed (*Thlaspi arvense*)

Green foxtail (*Silene viridis*)

Thistle (*Cirsium arvense*)

RESULTS:

There were no significant differences found in yield data obtained from plots that had been pre-plant treated with either Landmaster, Landmaster plus chlorsulfuron, Landmaster plus metasulfuron, or the sulfonyl ureas alone at 14, 7, 3, and 0 days prior to planting. However, a significant loss of plant numbers in some treatments was recorded in the same application period, or in comparing similar treatments across the planting dates.

Table 1. Agronomic data from pre-plant applications of Landmaster plus chlorsulfuron or metasulfuron in spring barley. Northwestern Agricultural Research Center in Kalispell, MT. in 1987 Field R-9. Seeded: May 7, 1987 Harvested: August 28, 1987

Treatment	Appln Time 1/	Rate Oz/A	YIELD BU/A	TEST WT LBS/BU	% PLUMP	% PLOT THIN	PLNTS PER ROW FOOT 2/
Landmaster	14 day	54	78.2	53.07	90.50	1.250	3.400
Landmaster + metasul.	14 day	54 +.1	91.3	51.99	93.00	6.000	4.800
Metasulfur.	14 day	.1	69.6	52.19	93.75	1.750	4.450
Landmaster + chlorsu.	14 day	54 +.17	87.2	51.64	94.75	7.250	4.225
Chlorsulfu.	14 day	.17	87.4	51.19	94.00	5.000	3.875
Landmaster	7 day	54	80.5	52.31	93.75	3.000	4.975
Landmaster + metasul.	7 day	54 +.1	84.0	51.34	92.00	4.250	4.050
Metasulfur.	7 day	.1	82.2	51.55	95.00	11.75	4.400
Landmaster + chlorsu.	7 day	54 +.17	88.0	50.38	92.00	6.750	3.875
Chlorsulfu.	7 day	.17	88.3	51.69	96.00	2.500	5.975
Landmaster	3 day	54	83.4	51.01	90.50	2.500	4.125
Landmaster + metasul.	3 day	54 +.1	84.5	51.56	93.25	6.750	4.300
Metasulfur.	3 day	.1	85.8	51.31	94.00	1.250	3.975
Landmaster + chlorsu.	3 day	54 +.17	86.3	51.94	93.50	1.250	4.050
Chlorsulfu.	3 day	.17	96.7	51.75	94.25	2.500	4.725
Landmaster	0 day	54	84.2	51.00	92.75	1.250	3.900
Landmaster + metasul.	0 day	54 +.1	84.8	52.00	93.50	6.750	5.250
Metasulfur.	0 day	.1	83.3	51.53	94.25	1.750	4.225
Landmaster + chlorsu.	0 day	54 +.17	91.9	52.09	94.75	1.250	5.225
Chlorsulfu.	0 day	.17	79.5	52.70	93.75	3.750	4.950
MEAN			84.84	51.71	93.46	3.925	4.438
F-RATIO TRTS 3/			1.395	.9993	1.078	1.762	2.071*
CV (SE/MEAN)			5.635	1.191	1.434	54.65	9.593
LSD (0.05)			13.54	1.745	3.795	6.074	1.206

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1/ Application time: 14, 7, 3, and 0 days pre plant
2/ Plants per foot of row, seven inch spacing
3/ F value for treatment comparison
* Indicates statistical significance at the .05 probability level

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PROJECT TITLE: Post Emergence Grass Herbicide Study on Established Alfalfa

YEAR/PROJECT: 1987/754 Weed Control in Farm Crops

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center.

#### SUMMARY:

Sequential applications of sethoxydim between cuttings of alfalfa and repeated applications of fluazifop to alfalfa previous to first cutting did not effect yield but did cause significantly less quackgrass in the hay composition.

#### RESEARCH METHODS:

The herbicide study was initiated in an established stand of Apollo alfalfa (seeded May 1984). Plots were 10 feet by 20 feet with 3 replications in a randomized complete block design. Treatments were applied using a tractor mounted research type sprayer going 2.6 mph. Spray volume was 11.67 gpa from 8001 nozzles at 32 psi.

#### Application data:

| Appln. date     | 5/4/87     | 5/19/87   | 7/7/87    | 8/13/87  |
|-----------------|------------|-----------|-----------|----------|
| Treatment       | 1st Trtmts | 2cd Fusil | 2nd Seth  | 3rd Seth |
| Air Temp        | 60 F       | 59 F      | 62 F      | 75 F     |
| Soil Temp       | 63 F       | 60 F      | 65 F      | 63 F     |
| R.H.%           | 22 %       | 35 %      | 25 %      | 0        |
| Wind (mph)      | 0-3        | 4-6       | 0-2       | 0        |
| From the        | SW         | SW        | SSW       | --       |
| Sky             | Clear      | Cloudy    | PrtlyCldy | Cldy     |
| Soil: top       | Good       | Good      | Fair      | Good     |
| subsoil         | v.good     | v.good    | Fair      | Fair     |
| Stage of Growth |            |           |           |          |
| Alfalfa         | 12"        | 24"       | 7"        | 6"       |
| Quackgrass      | 12-13"     | 24-26"    | 6-8"      | 5-6"     |
| Dandelion       | 10-12"     | 10-12"    | ---       | ---      |
| Plantain        | 8-10"      | 10-11"    | ---       | ---      |

#### RESULTS:

The herbicide sethoxydim was applied post emergence to quackgrass in established alfalfa at various intervals and rates previous to the 1st, 2nd, or 3rd cutting. Fluazifop was applied post emergence to quackgrass and alfalfa prior to the 1st cutting with a follow-up application 2 weeks after the first treatment. Yield of hay and pure alfalfa was not affected significantly in any of the three cuttings by the herbicide applications. Table 1.

Quackgrass growth was suppressed completely by each treatment and very little top growth was seen above the alfalfa canopy. Closer observation revealed that quackgrass control averaged about 50% for the treatments in this study. Although somewhat shorter and less vigorous a fair percentage of quackgrass did survive each herbicide treatment.

Percent alfalfa composition was increased for all sethoxydim and fluazifop plots. Grass percentages were significantly reduced for the first cutting. In the second and third cutting the percentage of grass fell below 2.2% and herbicide induced differences were negligible or difficult to detect. Table 2.



## HARVEST TECHNIQUE:

Plots were trimmed and 32 sq. ft were secured as a yield sample from each plot. A Rem forage harvester was used for harvest of each cutting. Species composition subsamples were taken at random using a sickle.

Table 1. Agronomic data from the Post Emergence Grass Herbicide study established in alfalfa grown on the Northwestern Agricultural Research Center in 1987.

| 1st Cut: 6/8/87        |                 |                    | 2nd Cut: 7/21/87 |                    |      | 3rd Cut: 9/25/87    |      |              |      |
|------------------------|-----------------|--------------------|------------------|--------------------|------|---------------------|------|--------------|------|
| Treatment<br>1/        | Rate<br>lb ai/A | -----              |                  | YIELD              |      | TONS / ACRE 2/----- |      | -----        |      |
|                        |                 | 1st Harvest<br>Hay | Alf              | 2nd Harvest<br>Hay | Alf  | 3rd Harvest<br>Hay  | Alf  | Total<br>Hay | Alf  |
| Check                  | --              | 2.40               | 2.18             | .89                | .81  | 1.07                | 1.03 | 4.37         | 4.03 |
| Sethoxydim<br>+ C.O.C. | .5 +.5          | 2.40               | 2.38             | 1.08               | 1.07 | 1.50                | 1.47 | 4.99         | 4.93 |
| Sethoxydim<br>+ C.O.C. | .4 +.3 +.3      | 2.40               | 2.38             | 1.09               | 1.08 | 1.36                | 1.36 | 4.86         | 4.83 |
| Fluazifop<br>+ C.O.C.  | .125 +.125      | 2.24               | 2.20             | .97                | .95  | 1.50                | 1.48 | 4.71         | 4.65 |
| Fluazifop<br>+ C.O.C   | .188 +.125      | 2.22               | 2.18             | 1.16               | 1.14 | 1.14                | 1.12 | 4.53         | 4.46 |
| MEAN                   |                 | 2.33               | 2.26             | 1.04               | 1.01 | 1.31                | 1.29 | 4.69         | 4.57 |
| F-RATIO TRTS           |                 | .423               | .645             | .815               | 1.11 | 2.72                | 2.76 | 2.63         | 3.80 |
| CV (SE/MEAN)           |                 | 6.36               | 5.80             | 11.7               | 12.5 | 9.28                | 9.48 | 3.29         | 3.9  |
| LSD (0.05)             |                 | .484               | .429             | .397               | .415 | .398                | .401 | .503         | .596 |

- 1/ Sequential treatments represented by multiple rates. Sethoxydim applications were between second and third cuttings timed according to quackgrass growth stage. Fluazifop applications were all previous to the first cut, 2 weeks between applications.
- 2/ Yield data given as Tons/A of dry matter ( Hay ) or pure alfalfa ( Alf ) per cutting.

Table 2. Agronomic data from the Post Emergence Grass Herbicide Study established in alfalfa grown on the Northwestern Agricultural Research Center in 1987.

| 1st Cut: 6/8/87        |                 |                       | 2nd Cut: 7/21/87 |       |             | 3rd Cut: 9/25/87 |     |             |     |     |
|------------------------|-----------------|-----------------------|------------------|-------|-------------|------------------|-----|-------------|-----|-----|
| Treatment              | Rate<br>lb ai/A | % Species Composition |                  |       |             |                  |     |             |     |     |
|                        |                 | 1st Harvest           |                  |       | 2nd Harvest |                  |     | 3rd Harvest |     |     |
|                        |                 | Alf                   | Grs              | Brd   | Alf         | Grs              | Brd | Alf         | Grs | Brd |
| Check                  | --              | 91.2                  | 8.8              | .01   | 99.7        | .30              | .0  | 97.0        | 2.1 | .20 |
| Sethoxydim<br>+ C.O.C  | .5 +.5          | 98.9                  | .8b              | .20   | 99.9        | .10              | .0  | 97.8        | 2.2 | .01 |
| Sethoxydim.<br>+ C.O.C | .4 +.3 +.3      | 99.3                  | .5b              | .20   | 100.0       | .01              | .0  | 99.8a       | .2  | .01 |
| Fluazifop<br>+ C.O.C   | .125 +.125      | 98.6                  | .8b              | .60a  | 99.9        | .10              | .0  | 98.7a       | 1.2 | .04 |
| Fluazifop<br>+ C.O.C   | .188 +.125      | 98.4                  | 1.0b             | .30a  | 98.8        | 1.2              | .0  | 98.7a       | 1.3 | .00 |
| OVERALL MEAN           |                 | 97.2                  | 2.38             | .26   | 99.6        | .34              | .00 | 98.4        | 1.3 | .05 |
| F-RATIO TRTS           |                 | 3.63                  | 3.85             | 9.0** | .855        | .86              | .00 | 4.47*       | 1.7 | 2.3 |
| CV (SE/MEAN)           |                 | 1.84                  | 76.5             | 25.   | .555        | 159              | .00 | .508        | 43. | 110 |
| LSD (0.05)             |                 | 5.85                  | 5.96             | .21   | 1.80        | 1.8              | .00 | 1.63        | 1.9 | .21 |

5/ % Species Composition determined by hand separation of a 500-1000 gram subsample into different species components and then percentages determined on a weight basis. Grass specie was quackgrass ( *Agropyron repens* ), broadleaf species mainly dandelion ( *Taraxacum officinale* ) and common plantain ( *Plantago major* ).

\* Indicates statistical significance at the .05 level

\*\* Indicates statistical significance at the the .01 level

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

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



PROJECT TITLE: Spring Barley Variety Trials

YEAR/PROJECT: 1987/756 Small Grains Production

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.  
Cooperators - Dr. Tom Blake and Patrick Hensleigh, Plant Science, Bozeman, MT.

#### 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 offstation locations. It is these data collected over many years that aid in recommending varieties for northwestern Montana.

The spring barley nurseries grown at Kalispell this season were the Intrastate and Early Yield nurseries. One offstation nursery was grown at the Western Agricultural Research Center in Corvallis, MT.

#### RESULTS: Intrastate Spring Barley

Yields were slightly above last year with the average yield from sixty-nine varieties being 95.37 bu/A. Clark was used as the check variety for comparison and had a yield of 106.25 bu/A. In comparison to Clark there were twenty varieties that yielded significantly less ( 90.75 bu/A or less ). Thirty-one varieties had yields above 100 bu/A. The highest yielding was MT 851012 at 117.67 bu/A. Test weights were slightly less than last year with the average being 50.5 lbs/bu. Clark had a test weight of 48.63 lbs/bu, down from 51.5 lbs/bu of last year. Five varieties had test weights above 52 lbs/bu and were significantly higher than Clark. Percent plump levels were also lower this year with the average being 92.9%. Lodging was not severe in this nursery and scald was light to moderate in severity. All but two varieties ( Moravian and Wanupana ) had some scald infection.

#### Early Yield Nursery

Excellent yields were harvested from the Early Yield Nursery this year and were approximately equal to last year ( average yield 131.14 bu/A ). Steptoe had an yield of 176.56 bu/A. Lewis ( 131.63 bu/A ) was the check variety in this nursery. The lowest yield was 105 bu/A from MT 860005, a Clark/Bellona cross. Test weights were also about equal to last year's with the average being 52.17 lbs/bu. The majority of varieties had test weights less than Lewis ( 53.43 lbs/bu ). Percent plump data was very good and had an average of 96.99%. As this test was located on a heavier soil there was moderate to sever lodging.

#### Offstation - Ravalli County, Western Agricultural Research Center

Sixteen spring barley varieties were tested under irrigation. Despite some harsh environmental conditions and slight shattering this nursery performed well. Gallatin, Lewis, Premier and Klages all yielded slightly higher than the check variety Ingrid. The majority of test weights were lee than Ingrid and the percent plumps did not vary much from the mean of 97.3%.



Table 1. Agronomic data from the 1987 Intrastate Spring Barley Nursery grown on the Northwestern Agricultural Research Center in Kalispell, MT.  
Date seeded: April 3, 1987 Date harvested: August 18, 1987

| CI or<br>State # | VARIETY             | YIELD<br>BU/A | TEST WT<br>LBS/BU | PERCENT<br>PLUMP | HEIGHT<br>INCHES | HEADING<br>DATE |
|------------------|---------------------|---------------|-------------------|------------------|------------------|-----------------|
| MT851012         | CLARK/WA877178      | 117.67        | 49.17             | 92.67            | 27.56            | 161.67b         |
| CI 15687         | KIMBERLY            | 115.87        | 50.13             | 96.33a           | 28.35            | 168.67a         |
| MT 83424         | CLARK/TR450         | 114.12        | 50.43             | 95.00            | 27.03            | 164.33          |
| AB6871           | AB6871              | 113.19        | 51.10             | 97.67a           | 29.40            | 165.00          |
| MT 81616         | TR440/CLARK         | 109.83        | 48.97             | 94.33            | 27.82            | 166.33          |
| MT851195         | MT 41918/TR 450     | 109.48        | 50.13             | 95.67            | 27.03            | 162.67b         |
| MT 81502         | Clark//Kgs/Zy       | 107.81        | 50.53             | 94.33            | 25.72            | 163.67          |
| PI491534         | GALLATIN            | 106.75        | 51.77             | 96.67a           | 27.17            | 162.00b         |
| FM 1             | TRIUMPH             | 106.56        | 51.10             | 98.67a           | 22.57b           | 164.67          |
| CI 15857         | CLARK               | 106.25        | 48.63             | 92.67            | 28.08            | 165.00          |
| MT 83422         | CLARK/TR450         | 105.94        | 51.37             | 98.00a           | 26.64            | 168.33a         |
| MT851177         | MT 41918/BRIDGER 82 | 105.83        | 49.70             | 94.67            | 22.97b           | 162.00b         |
| BA 1202          | BUSCH AGR 4038      | 105.29        | 49.93             | 97.33a           | 24.54b           | 164.33          |
| MT851051         | HARRINGTON/MT 41921 | 104.73        | 50.13             | 98.00a           | 29.66            | 165.33          |
| BA 1201          | BUSCH AGR 529       | 104.58        | 50.63             | 98.33a           | 28.74            | 165.33          |
| MT 83533         | CLARK/LAMONT        | 104.33        | 50.60             | 96.33a           | 25.46            | 165.00          |
| MT851219         | ID810264/MT 4126    | 104.13        | 49.33             | 93.67            | 25.98            | 164.33          |
| SK 76333         | HARRINGTON          | 103.92        | 49.10             | 93.67            | 23.49b           | 163.67          |
| MT851005         | CLARK/ID 810264     | 103.54        | 49.60             | 97.00a           | 25.59            | 165.00          |
| MT851216         | ID810264/MT 4126    | 103.10        | 49.67             | 95.67            | 25.59            | 164.33          |
| MT 81161         | Lewis//Kgs/Smt      | 102.85        | 50.20             | 96.00a           | 26.38            | 164.00          |
| MT 83444         | BON 2 ROW SM II LAX | 102.46        | 51.17             | 96.33a           | 27.17            | 165.67          |
| MT 81143         | Hcr/Kgs//Kgs/Smt    | 102.17        | 51.77             | 98.33a           | 26.64            | 164.33          |
| CI 6398          | BETZES              | 102.10        | 50.43             | 91.67            | 26.38            | 163.33b         |
| CI 15229         | STEPTOE             | 102.08        | 46.70             | 97.67a           | 23.10b           | 159.33b         |
| CI 15856         | LEWIS               | 101.69        | 50.50             | 97.33a           | 24.15b           | 165.33          |
| MT851032         | HARRINGTON/CLARK    | 101.31        | 49.10             | 93.33            | 26.12            | 163.67          |
| MT851221         | ID810264/MT41918    | 100.71        | 50.03             | 95.33            | 27.17            | 163.67          |
| MT 83491         | CLARK/MT 41279      | 100.60        | 50.53             | 96.00a           | 25.07b           | 166.00          |
| VD 02481         | VDH 024-81          | 100.08        | 52.13             | 97.00a           | 23.23b           | 166.67a         |
| MT851161         | MT 41918/MT 41279   | 100.08        | 50.67             | 94.67            | 23.62b           | 165.33          |
| MT851039         | HARRINGTON/MT 41279 | 99.92         | 50.20             | 97.00a           | 26.25            | 165.67          |
| MT 83435         | CLARK/TR450         | 99.81         | 50.93             | 96.67a           | 27.69            | 166.33          |
| MT851211         | ID786871/HARRINGTON | 99.77         | 50.97             | 95.33            | 27.03            | 168.67a         |
| NA 18            | PREMIER             | 98.56         | 50.20             | 98.33a           | 26.77            | 170.67a         |
| MT 83518         | CLARK/LAMONT        | 98.12         | 50.60             | 94.33            | 25.85            | 164.67          |
| VD 22872         | PISTON              | 97.25         | 51.08             | 95.67            | 25.20b           | 165.67          |
| VD404382         | ARAMIR*VDH 256-73/A | 96.67         | 51.00             | 96.00a           | 25.59            | 164.00          |
| MT851013         | CLARK/WA877178      | 95.48         | 50.10             | 95.00            | 24.67b           | 163.67          |
| CI 15514         | HECTOR              | 94.75         | 50.33             | 96.67a           | 25.98            | 165.33          |
| CB 2             | BELLONA             | 93.19         | 50.87             | 96.00a           | 24.67b           | 168.67a         |
| MT 83592         | CLARK/ID 765988     | 92.83         | 49.43             | 93.67            | 23.49b           | 165.00          |
| VD415082         | SI 212-75/VDH222-69 | 92.08         | 51.17             | 98.33a           | 24.28b           | 165.33          |
| VD405282         | ARAMIR/VDH222-69/AT | 91.85         | 51.60             | 97.33a           | 21.92b           | 164.67          |
| MT328202         | STEPTOE/KLAGES      | 90.75b        | 49.53             | 99.67a           | 29.13            | 165.33          |



Table 1. ( Cont'd ) Agronomic data from the 1987 Intrastate Spring Barley

| CI or<br>State # | VARIETY             | YIELD<br>BU/A | TEST WT<br>LBS/BU | PERCENT<br>PLUMP | HEIGHT<br>INCHES | HEADING<br>DATE |
|------------------|---------------------|---------------|-------------------|------------------|------------------|-----------------|
| CO 3             | MORAVIAN 3          | 90.46b        | 52.37a            | 98.33a           | 24.15b           | 161.33b         |
| CI 15478         | KLAGES              | 89.54b        | 49.77             | 95.00            | 25.33            | 164.00          |
| BE 15            | WANUBET             | 89.50b        | 56.87a            | 74.00b           | 29.79            | 165.33          |
| MT140523         | HECTOR/KLAGES       | 87.21b        | 50.53             | 96.00a           | 22.31b           | 165.67          |
| MT851031         | HARRINGTON/CLARK    | 86.60b        | 50.47             | 98.00a           | 28.48            | 167.33a         |
| CI 9558          | PIROLINE            | 84.19b        | 51.53             | 96.67a           | 25.20b           | 162.00b         |
| CB 8331          | CEBECO 8331         | 83.94b        | 50.27             | 98.67a           | 24.41b           | 165.67          |
| CI 5438          | COMPANA             | 82.79b        | 48.53             | 97.00a           | 24.02b           | 162.00b         |
| VD403582         | Vander Have 4035-82 | 82.33b        | 50.83             | 97.33a           | 22.44b           | 164.33          |
| CI 15773         | MOREX               | 81.02b        | 47.97             | 92.00            | 29.53            | 159.67b         |
| PI483237         | BOWMAN              | 80.60b        | 51.20             | 98.33a           | 25.20b           | 165.00          |
| CB 8444          | CEBECO 8444         | 80.06b        | 50.10             | 97.00a           | 22.97b           | 166.00          |
| MN 36            | ROBUST              | 78.08b        | 49.37             | 96.33a           | 28.08            | 162.33b         |
| BE 17            | WANUBET M1          | 77.31b        | 55.03a            | 26.33b           | 27.17            | 166.00          |
| BFC 79-7         | WAXBAR              | 77.15b        | 52.17a            | 65.67b           | 29.27            | 166.67a         |
| BE 19            | PROWASHONUPANA      | 69.23b        | 46.43             | 73.33b           | 24.28b           | 162.33b         |
| BE 6             | WANUPANA            | 60.50b        | 53.47a            | 86.00            | 23.10b           | 162.67b         |
| GS 3             | FIESTA              | 57.75b        | 46.20             | 99.00a           | 15.49b           | 152.00b         |
| BE 7             | WASHONUPANA         | 55.56b        | 46.20             | 39.00b           | 22.97b           | 163.33b         |

|           |        |        |          |        |         |
|-----------|--------|--------|----------|--------|---------|
| $\bar{X}$ | 95.37  | 50.50  | 92.88    | 25.64  | 164.47  |
| F value   | 6.01** | 2.93** | 123.30** | 6.03** | 21.55** |
| C.V.%     | 5.72   | 2.50   | 1.20     | 3.88   | .34     |
| L.S.D.    | 15.27  | 3.53   | 3.13     | 2.78   | 1.56    |

Table 2. 1987 Intrastate Spring Barley Nursery, lodging and disease.

| CI or<br>State # | VARIETY             | LODGING<br>PREV | LODGING<br>SEVER | SCALD<br>TYPE | SCALD<br>SEVER |
|------------------|---------------------|-----------------|------------------|---------------|----------------|
| MT851012         | CLARK/WA877178      | 63.00a          | 3.67a            | .67           | 10.17a         |
| CI 15687         | KIMBERLY            | 3.33            | 1.00             | .33           | 1.83           |
| MT 83424         | CLARK/TR450         | .00             | .00              | .87           | 2.00           |
| AB6871           | AB6871              | .00             | .00              | .53           | .33            |
| MT 81616         | TR440/CLARK         | .00             | .00              | .20           | .17            |
| MT851195         | MT 41918/TR 450     | .00             | .00              | .40           | .33            |
| MT 81502         | Clark//Kgs/Zy       | .00             | .00              | .20           | 1.67           |
| PI491534         | GALLATIN            | .00             | .00              | .73           | 6.83           |
| FM 1             | TRIUMPH             | .00             | .00              | .60           | .50            |
| CI 15857         | CLARK               | 5.00            | .67              | .73           | 2.00           |
| MT 83422         | CLARK/TR450         | .00             | .00              | .20           | 3.33           |
| MT851177         | MT 41918/BRIDGER 82 | .00             | .00              | .27           | .33            |
| BA 1202          | BUSCH AGR 4038      | .00             | .00              | .53           | 6.67           |

Table 2. (Cont'd) 1987 Intrastate Spring Barley Nursery

| CI or<br>State # | VARIETY                | LODGING<br>PREV | LODGING<br>SEVER | SCALD<br>TYPE | SCALD<br>SEVER |
|------------------|------------------------|-----------------|------------------|---------------|----------------|
| MT851051         | HARRINGTON/MT 41921    | .00             | .00              | .33           | .17            |
| BA 1201          | BUSCH AGR 529          | .00             | .00              | .20           | 1.67           |
| MT 83533         | CLARK/LAMONT           | .00             | .00              | .40           | 3.50           |
| MT851219         | ID810264/MT 4126       | 5.00            | 1.00             | .67           | .33            |
| SK 76333         | HARRINGTON             | .00             | .00              | .67           | 1.83           |
| MT851005         | CLARK/ID 810264        | 50.00a          | 2.67a            | .67           | .33            |
| MT851216         | ID810264/MT 4126       | .00             | .00              | .67           | 5.00           |
| MT 81161         | Lewis//Kgs/Smt         | .00             | .00              | .33           | .17            |
| MT 83444         | BON 2 ROW SM II LAX    | .00             | .00              | .40           | .33            |
| MT 81143         | Hcr/Kgs//Kgs/Smt       | .00             | .00              | .07           | 2.33           |
| CI 6398          | BETZES                 | 6.67            | .67              | .20           | .17            |
| CI 15229         | STEPTOE                | .00             | .00              | .47           | .33            |
| CI 15856         | LEWIS                  | .00             | .00              | .27           | 1.83           |
| MT851032         | HARRINGTON/CLARK       | 6.67            | .67              | .67           | 1.83           |
| MT851221         | ID810264/MT41918       | 10.00           | 1.33             | .67           | 5.17           |
| MT 83491         | CLARK/MT 41279         | .00             | .00              | .67           | .33            |
| VD 02481         | VDH 024-81             | .00             | .00              | .33           | 1.67           |
| MT851161         | MT 41918/MT 41279      | .00             | .00              | .20           | 1.67           |
| MT851039         | HARRINGTON/MT 41279    | .00             | .00              | .27           | .33            |
| MT 83435         | CLARK/TR450            | .00             | .00              | .53           | 1.83           |
| MT851211         | ID786871/HARRINGTON    | .00             | .00              | .40           | 1.83           |
| NA 18            | PREMIER                | .00             | .00              | .27           | 3.50           |
| MT 83518         | CLARK/LAMONT           | 3.33            | .67              | .20           | 2.33           |
| VD 22872         | PISTON                 | .00             | .00              | .67           | 3.50           |
| VD404382         | ARAMIR*VDH 256-73/ATEM | .00             | .00              | .20           | .17            |
| MT851013         | CLARK/WAS77178         | 36.67a          | 1.67             | .20           | .17            |
| CI 15514         | HECTOR                 | 3.33            | .67              | .20           | 5.00           |
| CB 2             | BELLONA                | .00             | .00              | .67           | 1.83           |
| MT 83592         | CLARK/ID 765988        | .00             | .00              | .67           | 3.50           |
| VD415082         | SI 212-75/VDH222-69/AT | .00             | .00              | .33           | 1.67           |
| VD405282         | ARAMIR/VDH222-69/ATEM  | .00             | .00              | .40           | .33            |
| MT328202         | STEPTOE/KLAGES         | .00             | .00              | .07           | .17            |
| CO 3             | MORAVIAN 3             | .00             | .00              | .00           | .00            |
| CI 15478         | KLAGES                 | 3.33            | .67              | .67           | 3.50           |
| BE 15            | WANUBET                | 45.00a          | 3.33a            | .53           | 1.83           |
| MT140523         | HECTOR/KLAGES          | .00             | .00              | .20           | .17            |
| MT851031         | HARRINGTON/CLARK       | 6.67            | 1.00             | .33           | 1.67           |
| CI 9558          | PIROLINE               | .00             | .00              | .33           | .17            |
| CB 8331          | CEBECCO 8331           | .00             | .00              | .33           | 6.67           |
| CI 5438          | COMPANA                | 63.00a          | 5.00a            | 1.00          | 15.00a         |
| VD403582         | Vander Have 4035-82    | .00             | .00              | .40           | 8.33           |
| CI 15773         | MOREX                  | 10.00           | 1.33             | .60           | 25.00a         |
| PI483237         | BOWMAN                 | .00             | .00              | .27           | 3.50           |
| CB 8444          | CEBECCO 8444           | .00             | .00              | .67           | 6.83           |
| MN 36            | ROBUST                 | .00             | .00              | .67           | 28.33a         |
| BE 17            | WANUBET M1             | 51.67a          | 4.67a            | .53           | 5.00           |
| BFC 79-7         | WAXBAR                 | 96.00a          | 8.33a            | .73           | 6.83           |



Table 2. (Cont'd) 1987 Intrastate Spring Barley Nursery

| CI or<br>State # | VARIETY           | LODGING<br>PREV | LODGING<br>SEVER | SCALD<br>TYPE | SCALD<br>SEVER |
|------------------|-------------------|-----------------|------------------|---------------|----------------|
| BE               | 19 PROWASHONUPANA | 15.00           | 3.67a            | .67           | 1.83           |
| BE               | 6 WANUPANA        | 85.00a          | 4.67a            | .00           | .00            |
| GS               | 3 FIESTA          | .00             | .00              | .47           | 15.00a         |
| BE               | 7 WASHONUPANA     | 21.67           | 3.67a            | .73           | 13.50a         |

|           |        |        |       |        |
|-----------|--------|--------|-------|--------|
| $\bar{X}$ | 9.22   | .80    | .44   | 3.66   |
| F value   | 6.88** | 5.83** | .91   | 3.77** |
| C.V. %    | 88.07  | 84.82  | 53.77 | 76.50  |
| L.S.D.    | 22.74  | 1.89   | .67   | 7.83   |

Table 3. Agronomic data from the 1987 Early Yield Trial grown on the North-western Agricultural Research Center, Kalispell, MT

Date Seeded: April 7, 1987

Date harvested: August 21, 1987

| CI or<br>State # | VARIETY             | YIELD TEST WT |        | %     | HEIGHT | HEAD   | ---LODGING--- |       |
|------------------|---------------------|---------------|--------|-------|--------|--------|---------------|-------|
|                  |                     | BU/A          | LBS/BU |       |        |        | PREV          | SEVER |
| CI 15229         | STEPTOE             | 176.5a        | 47.6b  | 97.6  | 30.7b  | 163.0b | 28.3          | 2.0b  |
| MT861626         | GALLATIN/HARRINGTON | 152.7a        | 51.9b  | 98.0  | 34.2   | 166.6  | 69.6          | 6.0   |
| MT860326         | LEWIS/TR 533        | 149.8a        | 53.0   | 94.6  | 33.0   | 165.3b | 43.3          | 5.0   |
| MT860737         | GALLATIN/APEX       | 149.6a        | 53.0   | 98.6a | 32.4   | 165.0b | .0b           | .0b   |
| MT860756         | GALLATIN/BELLONA    | 147.3         | 52.8   | 98.0  | 32.9   | 165.0b | .0b           | .0b   |
| MT861183         | WA 890878/MENUET    | 145.9         | 51.6b  | 99.0a | 31.7   | 166.0b | 6.6           | 1.0b  |
| MT860839         | SUNBAR 560/MT 41549 | 143.6         | 52.5b  | 95.3  | 29.5b  | 165.0b | 59.6          | 4.6   |
| MT860121         | CLARK/MENUET        | 142.6         | 52.4b  | 98.0  | 33.9   | 165.0b | 96.0          | 5.0   |
| MT860881         | SUNBAR 560/MENUET   | 141.7         | 52.4b  | 98.3a | 33.3   | 168.0  | 30.0          | 1.0b  |
| MT861596         | LEWIS/MT 41549      | 140.9         | 52.5b  | 93.3b | 32.1   | 165.0b | 60.0          | 5.0   |
| MT861252         | TR215/BIRKA         | 140.8         | 51.1b  | 98.0  | 32.8   | 174.0a | 38.3          | 3.0   |
| MT860188         | LEWIS/APEX          | 139.0         | 52.7b  | 97.6  | 33.3   | 166.0b | 6.6           | 2.0b  |
| MT860373         | LEWIS/BIRKA         | 138.9         | 53.2   | 98.3a | 33.8   | 170.6a | .0b           | .0b   |
| MT860310         | LEWIS/TR 533        | 138.6         | 52.1b  | 97.3  | 33.8   | 168.3  | 76.3          | 5.3   |
| MT860189         | LEWIS/APEX          | 138.5         | 52.2b  | 96.6  | 33.4   | 169.0  | 66.6          | 4.6   |
| MT860219         | LEWIS/APEX          | 138.3         | 52.4b  | 96.6  | 30.8b  | 166.0b | 6.6           | 1.3b  |
| MT861202         | WA 890878/MENUET    | 138.1         | 52.4b  | 96.6  | 31.7   | 170.6a | .0b           | .0    |
| MT861604         | LEWIS/MT 41549      | 136.9         | 52.0b  | 92.0b | 32.4   | 169.0  | 89.6          | 5.3   |
| SK 76333         | HARRINGTON          | 135.8         | 51.6b  | 98.0  | 32.0   | 166.6  | 56.6          | 4.0   |
| MT861621         | GALLATIN/HARRINGTON | 135.4         | 53.0   | 98.0  | 34.6   | 168.3  | 45.0          | 4.0   |
| MT861426         | MT861426            | 135.2         | 52.2b  | 96.3  | 33.8   | 170.0a | 46.3          | 4.0   |
| MT860461         | HARRINGTON/APEX     | 134.0         | 52.1b  | 98.0  | 33.4   | 171.6a | 93.0          | 5.3   |
| MT860767         | GALLATIN/BELLONA    | 133.8         | 52.4b  | 98.6a | 31.3   | 169.3  | 10.0          | 3.3   |
| MT860224         | LEWIS/APEX          | 133.5         | 52.7b  | 97.6  | 32.8   | 169.6a | 97.6a         | 6.3   |
| MT860225         | LEWIS/APEX          | 133.2         | 51.9b  | 97.0  | 33.7   | 169.6a | 81.6          | 5.3   |
| MT860754         | GALLATIN/BELLONA    | 133.1         | 52.2b  | 97.3  | 31.6   | 170.6a | 10.0          | 1.3b  |
| MT860868         | SUNBAR 560/MENUET   | 131.8         | 51.7b  | 98.0  | 31.5   | 168.6  | .0b           | .0b   |
| MT860220         | LEWIS/APEX          | 131.8         | 53.2   | 97.6  | 32.6   | 170.0a | 13.3          | 3.3   |
| CI 15856         | LEWIS               | 131.6         | 53.4   | 96.3  | 34.1   | 168.0  | 50.0          | 5.0   |
| MT860760         | GALLATIN/BELLONA    | 130.6         | 53.3   | 97.3  | 32.4   | 169.6a | 72.6          | 4.3   |
| MT860403         | LEWIS/MENUET        | 130.5         | 53.8   | 98.0  | 36.0   | 171.6a | 56.6          | 5.3   |
| MT861572         | LEWIS/MT 41549      | 130.0         | 52.6b  | 91.6b | 33.4   | 169.6a | 96.0a         | 3.6   |
| MT860279         | LEWIS/OR 74352      | 129.9         | 52.2b  | 97.6  | 36.8   | 166.0b | 73.0          | 4.0   |
| MT860397         | LEWIS/MENUET        | 129.1         | 53.0   | 98.0  | 33.7   | 171.3a | 15.0          | 2.3b  |
| MT860878         | SUNBAR 560/MENUET   | 128.9         | 51.4b  | 96.6  | 29.6b  | 169.6a | 23.3          | 3.0   |
| MT860098         | CLARK/BIRKA         | 128.7         | 52.3b  | 97.3  | 33.3   | 169.3  | 96.3a         | 5.3   |
| MT860192         | LEWIS/APEX          | 128.3         | 52.3b  | 98.0  | 32.5   | 169.6a | 53.3          | 3.6   |
| MT860402         | LEWIS/MENUET        | 128.2         | 52.8   | 97.3  | 34.5   | 171.0a | .0b           | .0b   |
| MT860372         | LEWIS/BIRKA         | 128.1         | 52.4b  | 96.6  | 33.7   | 173.6a | 41.3          | 3.6   |
| MT860186         | LEWIS/APEX          | 127.5         | 51.9b  | 97.0  | 31.7   | 171.0a | 53.0          | 3.0   |
| MT860454         | HARRINGTON/APEX     | 126.3         | 51.8b  | 96.0  | 32.4   | 170.6a | 53.3          | 2.3b  |
| PI483237         | BOWMAN              | 126.2         | 51.9b  | 97.3  | 34.3   | 166.0b | 33.0          | 1.3b  |
| MT860006         | CLARK/BELLONA       | 125.6         | 51.9b  | 95.0  | 33.2   | 170.0a | 63.3          | 6.3   |
| MT861044         | ID 786954/MT 41549  | 125.5         | 52.5b  | 98.0  | 32.6   | 172.0a | 64.6          | 3.0   |
| MT860823         | APEX/TRIUMPH        | 125.4         | 51.9b  | 97.6  | 34.1   | 169.3  | 10.0          | 2.6   |



Table 3. Agronomic data from the 1987 Early Yield Trial grown on the North-western Agricultural Research Center, Kalispell, MT  
 Date Seeded: April 7, 1987 Date harvested: August 21, 1987

| CI or<br>State # | VARIETY             | YIELD<br>BU/A | TEST WT<br>LBS/BU | %<br>PLUMP | HEIGHT<br>INCHES | HEAD<br>DATE | ---LODGING--- |       |
|------------------|---------------------|---------------|-------------------|------------|------------------|--------------|---------------|-------|
|                  |                     |               |                   |            |                  |              | PREV          | SEVER |
| MT861363         | MT 41238/BEATRICE   | 125.3         | 52.3b             | 95.3       | 34.2             | 170.6a       | 66.0          | 3.0   |
| MT861724         | ND5698/MENUET       | 125.3         | 52.3b             | 98.6a      | 35.7             | 168.0        | 89.6          | 3.6   |
| MT860721         | GALLATIN/APEX       | 125.2         | 52.3b             | 97.6       | 30.9b            | 167.3        | 5.0           | 1.0b  |
| MT860041         | CLARK/ND5976        | 125.0         | 51.5b             | 98.6a      | 38.0a            | 166.6        | 97.6a         | 5.0   |
| CI 15478         | KLAGES              | 123.6         | 50.3b             | 92.6b      | 34.1             | 172.3a       | 99.0a         | 6.3   |
| MT860429         | LEWIS/TRIUMPH       | 123.5         | 51.3b             | 97.6       | 35.3             | 168.0        | 96.0a         | 5.0   |
| CI 15514         | HECTOR              | 123.5         | 52.0b             | 97.6       | 36.2             | 168.3        | 99.0a         | 6.3   |
| MT860036         | CLARK/ND5976        | 123.1         | 51.9b             | 97.6       | 35.5             | 165.6b       | 63.3          | 4.0   |
| MT861454         | GALLATIN/SUNBAR 550 | 122.6         | 52.2b             | 97.6       | 32.9             | 168.6        | 41.6          | 3.3   |
| MT860722         | GALLATIN/APEX       | 122.4         | 54.0              | 97.0       | 31.3             | 168.3        | 33.3          | 3.3   |
| MT861554         | CLARK/TR 533        | 121.7         | 50.8b             | 96.6       | 34.3             | 171.3a       | 71.3          | 4.6   |
| MT860463         | HARRINGTON/APEX     | 120.6         | 51.9b             | 97.6       | 33.8             | 169.6a       | 80.0          | 4.3   |
| MT860045         | CLARK/ND5976        | 118.0         | 51.6b             | 98.6a      | 34.7             | 165.3b       | 40.0          | 2.6   |
| MT861293         | B 709/WA 889278     | 117.0         | 51.1b             | 92.0b      | 33.8             | 173.0a       | 81.3          | 5.3   |
| MT860449         | HARRINGTON/APEX     | 116.0         | 51.4b             | 96.6       | 31.6             | 169.3        | 85.0          | 4.6   |
| MT861330         | MT 41238/ND 5698    | 115.0         | 52.8b             | 98.6a      | 35.9             | 170.0a       | 91.3          | 3.6   |
| MT860293         | LEWIS/OR 74352      | 109.7b        | 52.7b             | 98.0       | 35.7             | 168.6        | 79.3          | 4.6   |
| MT861536         | CLARK/TR 533        | 109.2b        | 50.9b             | 96.6       | 35.3             | 171.0a       | 71.6          | 5.0   |
| MT860005         | CLARK/BELLONA       | 105.9b        | 51.4b             | 94.6       | 32.0             | 172.0a       | 73.0          | 6.0   |
| $\bar{X}$        |                     | 131.1         | 52.17             | 96.9       | 33.4             | 168.8        | 52.4          | 3.6   |
| F value          |                     | 3.2**         | 17.52**           | 6.5**      | 2.67**           | 17.9**       | 4.0**         | 3.7** |
| C.V.%            |                     | 4.8           | .41               | .68        | 3.07             | .34          | 31.1          | 26.3  |
| L.S.D.           |                     | 17.7          | .61               | 1.84       | 2.87             | 1.61         | 45.55         | 2.6   |

1/ Check value

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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 off station spring barley nursery grown on the Western Agricultural Research Center, Corvallis MT.

Date seeded: April 14, 1987 Date harvested: September 1, 1987

|                              | VARIETY    | YIELD<br>BU/A | TEST WT<br>LBS/BU | PERCENT<br>PLUMP | HEIGHT<br>INCHES |
|------------------------------|------------|---------------|-------------------|------------------|------------------|
| MT 13104                     | GALLATIN   | 97.15         | 51.30             | 96.33            | 24.02            |
| CI 15856                     | LEWIS      | 96.92         | 50.47b            | 98.00            | 22.44            |
| NA 18                        | PREMIER    | 91.87         | 50.20b            | 96.33            | 24.41            |
| CI 15478                     | KLAGES     | 91.83         | 50.50b            | 96.33            | 23.23            |
| CI 10083                     | INGRID     | 89.77         | 52.00             | 98.33            | 24.80            |
| FM 1                         | TRIUMPH    | 89.75         | 50.67b            | 98.00            | 19.68            |
| CI 15857                     | CLARK      | 89.21         | 50.07b            | 96.33            | 22.83            |
| SK 76333                     | HARRINGTON | 87.19         | 49.93b            | 98.00            | 25.59            |
| CB 2                         | BELLONA    | 86.73         | 50.70b            | 97.00            | 22.44            |
| CI 9558                      | PIROLINE   | 83.77         | 50.77b            | 97.00            | 23.62            |
| CI 15229                     | STEPTOE    | 82.85         | 44.60b            | 96.33            | 22.05            |
| CI 15514                     | HECTOR     | 82.48         | 51.33             | 97.00            | 22.05            |
| PI483238                     | HAZEN      | 82.19         | 45.83b            | 97.67            | 23.62            |
| GS 1                         | COLUMBIA   | 79.65         | 43.63b            | 97.67            | 18.50            |
| VD 3                         | MENUET     | 78.31         | 50.50b            | 98.00            | 19.68            |
| CI 15773                     | MOREX      | 70.06         | 46.80b            | 96.67            | 23.62            |
| EXPERIMENTAL MEANS           |            | 86.23         | 49.33             | 97.31            | .00              |
| F TEST FOR VAR. 2/           |            | 1.65          | 90.36**           | 1.24             | .00              |
| C.V. 2: (S OF MEAN/MEAN)*100 |            | 6.37          | .55               | .71              | .00              |
| LSD (0.05)                   |            | 15.88         | .78               | 1.98             | .00              |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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

Fertilizer applied 4/14/87, 120 lbs /A as 29/14/0



PROJECT TITLE: 1987 Uniform Northwestern Oat Nursery

YEAR/PROJECT: 1987/756 Small Grains Production

PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.  
Cooperators - Darrel Wesenberg, USDA, Aberdeen, Idaho

SUMMARY:

To determine the adaptability of new and introduced oat varieties to Montana the Northwestern Uniform Oat Nursery is grown in Kalispell and throughout the state in dryland and irrigated conditions.

RESULTS:

Yields were not as high as last year but did average 158.30 bu/A. Monida had the highest yield ( 184.66 bu/A ) of the twenty-nine varieties tested. Cascade, the high yielding variety of last year was just above average in yield this season at 162.46 bu/A. Otana, the check variety, had one of the lower yields but had the highest test weight ( 147.83 bu/A yield, 37.83 lbs/bu test weight ). IL 753402, was the only other variety having a test weight above 37.0 lb/bu. Heights ranged in the nursery from 30.8 inches to 45.0 inches in height with Dumont, Otana, and Otana being the tall varieties. There was moderate to heavy lodging in Steele and Dumont. No lodging was recorded in Otana.

Table 1. Agronomic data from the 1987 N. W. Uniform Oat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT. Field Y-1.

Seeded: April 7, 1987

Harvested: August 11, 1987

| CI or<br>State #             | VARIETY             | YIELD<br>BU/A | TEST WT<br>LB/BU | HT<br>(IN) | HEADING<br>DATE | LODG<br>PREV | LODG<br>% |
|------------------------------|---------------------|---------------|------------------|------------|-----------------|--------------|-----------|
| ID751170                     | MONIDA              | 184.66        | 34.70b           | 43.31      | 166.00          | 36.67        | 4.67      |
| ID783965                     | AURORA NYCRR COMPOS | 174.72        | 34.87b           | 40.81b     | 165.00          | 51.67        | 4.33      |
| ID804725                     | CAYUSE/74/AB1956    | 173.47        | 33.80b           | 30.84b     | 165.00          | .00          | .00       |
| CI 8263                      | CAYUSE              | 168.97        | 32.80b           | 37.66b     | 165.67          | 28.33        | 2.67      |
| ID 80988                     | 74AB1952/74AB2608   | 168.15        | 33.20b           | 30.58b     | 166.00          | .00          | .00       |
| ID815792                     | CAYUSE/74/AB1956    | 167.21        | 36.20            | 37.80b     | 163.67b         | 20.00        | 3.33      |
| ID 75861                     | CAYUSE/OTANA        | 166.53        | 32.83b           | 37.01b     | 168.33a         | 33.00        | 2.33      |
| ID 82248                     | CAYUSE/MONIDA       | 165.40        | 32.67b           | 33.86b     | 168.00a         | 13.33        | 1.33      |
| ID766843                     | K71299/3/OTANA/2/CO | 165.28        | 35.00b           | 33.99b     | 163.67b         | 5.00         | 1.33      |
| ID742608                     | CAYUSE/OTANA        | 165.28        | 33.10b           | 35.56b     | 170.67a         | 31.67        | 2.67      |
| OT 308                       | CALIBRE             | 165.15        | 36.93            | 43.31      | 166.00          | 68.00        | 4.33      |
| ID805322                     | BORDER/74AB1956     | 165.09        | 34.63b           | 30.84b     | 168.33a         | .00          | .00       |
| OT 726                       | CASCADE             | 162.46        | 33.57b           | 48.29a     | 165.00          | 65.00        | 5.00      |
| ND820603                     | FROKER/RL 3038/2/HU | 161.52        | 36.63            | 38.71b     | 165.00          | 20.00        | 1.67      |
| CI 9297                      | APPALOOSA           | 161.09        | 30.77b           | 38.85b     | 168.33a         | 28.33        | 3.00      |
| CI 9081                      | RANDOM              | 160.40        | 33.53b           | 41.34b     | 163.00b         | 61.67        | 5.67      |
| W 78286                      | DUMONT              | 155.58        | 35.53b           | 45.67      | 166.00          | 63.00        | 5.00      |
| CI 9401                      | OGLE                | 155.58        | 34.00b           | 37.40b     | 161.00b         | 6.67         | 1.67      |
| CI 6611                      | PARK                | 154.39        | 34.77b           | 42.78      | 168.33a         | 26.67        | 1.67      |
| ID805807                     | 74AB2608/CAYUSE     | 152.39        | 33.20b           | 35.83b     | 168.67a         | .00          | .00       |
| ID821178                     | 74AB1952/75AB1576   | 151.96        | 34.03b           | 31.63b     | 164.67b         | .00          | .00       |
| CI467882                     | BORDER              | 149.52        | 33.00b           | 39.50b     | 166.67          | 31.67        | 2.67      |
| W 80474                      | RIEL                | 148.95        | 36.63            | 41.34b     | 165.00          | 6.67         | .67       |
| CI 9412                      | PORTER              | 148.83        | 36.53            | 39.11b     | 165.33          | 33.00        | 2.33      |
| CI 9252                      | OTANA 1/            | 147.83        | 37.83            | 45.01      | 166.00          | 41.67        | 3.00      |
| IL753402                     | COKE 227//3/CI5068  | 142.89        | 37.03            | 37.53b     | 162.00b         | .00          | .00       |
| ND 1001                      | STEELE              | 138.20        | 35.27b           | 45.67      | 163.33b         | 26.67        | 2.33      |
| WI X4872                     | N569-42-51/FROKER// | 136.14        | 33.70b           | 37.66b     | 162.00b         | .00          | .00       |
| A 835353                     | PA 7733-551/OGLE    | 133.07        | 30.60b           | 31.23b     | 161.00b         | .00          | .00       |
| EXPERIMENTAL MEANS           |                     | 158.30        | 34.39            | 38.38      | 165.44          | 24.09        | 2.13      |
| F TEST FOR VAR. 2/           |                     | 1.50          | 7.52**           | 23.44**    | 39.61**         | 1.66         | 1.73*     |
| C.V. 2: (S OF MEAN/MEAN)*100 |                     | 6.22          | 1.91             | 2.64       | .23             | 71.72        | 63.95     |
| LSD (0.05)                   |                     | 27.90         | 1.86             | 2.87       | 1.08            | 48.95        | 3.85      |

1/ Check variety for variety comparison

2/ F value determining significance differences among varieties

3/ Lodging notes: Lodg prev = degree of lodging ( 0 = none, 9 = lodged to ground ). Lodg % = percent of plot lodged.

\* Indicates statistical significance at the .05 level

\*\* Indicates statistical significance at the .01 level



PROJECT TITLE: Spring Wheat Variety Trials

YEAR/PROJECT: 1987/756 Small Grains Production

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

SUMMARY:

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

Three nurseries were grown in western Montana this year, the Advanced Yield, the Western Regional and two offstation spring wheat nurseries grown in Lake and Ravalli.

RESULTS:

Western Regional Spring Wheat

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Owens was used as the check variety in this nursery and had a yield of 101.62 bu/A. The mean for the nursery, which had 36 varieties total, was 105.91 bu/A. Only three varieties had yields significantly higher than Owens and they were ORS 8512, UT 1821, and ORS 8511 ( 117 bu/A or above ). Federation had the lowest yield at 71.07 bu/A. Test weights were reduced slightly from previous years with the mean being 58.18 lbs/bu. Leaf rust and stripe rust were observed throughout the nursery yet were at significant levels in only four or five varieties. Lodging was light throughout this nursery.

Advanced Yield Spring Wheat Nursery -

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The mean yield for the Advanced Yield nursery was 96.86 bu/A, 10 bushels less the 1986 average. Wheaton, the highest yielding variety, produced 119.83 bu/A. Fifteen varieties yielded above 100 bu/A with thirty-four of the entries have yields less than that. Lancer was the low yielding variety at 79.68 bu/A. The test weights mean was 59.36 lbs/bu. Leaf and stripe rust were recorded in the nursery but only a few varieties exceeded 40% severity level. There was a moderate amount of lodging throughout the nursery with some varieties ( Lancer, Cutless, Glenman, Lew, Fortuna, and Success ) having lodging severity up to 90%.

Offstation Spring Wheat Nursery -

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Twenty-four spring wheat varieties were grown in this year's offstation spring wheat nursery.

Lake County, Haake farm - Nordic, Treasure and MT 7926 all had yields that were slightly greater than the check variety Newana which had a low yield of 33.25 bu/A. The yields from this nursery were lower than normal due to a dry location and some shattering. The average yield was 29.13 bu/A with the high and low yield being 41.55 bu/A ( Nordic ) and 20.55 bu/A ( Glenman ) respectively. Test weights were normal even with the environmental conditons as they were. Under these growing conditions Nordic did show extra vigor to have the highest yield, test weight and height.

Ravalli County - Western Agricultural Research Center. Extremely low yields were harvested due to dry seedbed, thin stands, and shattering. Yields were so low in some plots that test weights could not be obtained.



Table 1. Agronomic data from the Western Regional Spring Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT.  
Date seeded: April 7, 1987 Date harvested: August 31, 1987

| CI or<br>State # | VARIETY              | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Heading<br>Date | Height<br>Inches |
|------------------|----------------------|---------------|-------------------|-----------------|------------------|
| ORS 8512         | BOW.S,CM33023-F      | 121.53a       | 61.70a            | 163.00b         | 30.05b           |
| UT 1821          | UT76S88-1398/WYNNE   | 120.73a       | 60.53a            | 167.00a         | 38.32a           |
| ORS 8511         | KVZ/3/TQB/CFN//BB/4/ | 117.82a       | 59.87             | 164.00          | 32.15            |
| ORS 8509         | VEERY.S,CM33027F     | 114.65        | 59.60             | 164.33          | 30.31b           |
| ID 315           | SLG//COWBIRD S./SLG  | 114.32        | 56.77             | 163.67          | 35.83            |
| ID 372           | OWENS/FIELDWIN       | 113.95        | 58.80             | 164.00          | 36.35a           |
| ORS 8510         | MINIVET.S,CM37705K   | 113.57        | 60.43a            | 164.00          | 32.81            |
| CI 17903         | MCKAY                | 112.90        | 59.13             | 165.33          | 33.73            |
| OR 8508          | TANAGER'S',CM30697-2 | 111.82        | 60.27a            | 161.00b         | 31.89b           |
| ORS 8422         | TITMOUSE.S,CM30136-3 | 109.27        | 58.70             | 164.00          | 30.84b           |
| WA 7183          | K78504/K79129-33//K7 | 109.15        | 58.10             | 166.00          | 33.73            |
| ID 365           | COWBIRD"S"/STERLING  | 108.52        | 57.70             | 164.33          | 33.07            |
| UT 1111          | UT76S88-1292/UT74S25 | 108.47        | 57.37             | 167.33a         | 38.58a           |
| ID 373           | ID172/FIELDWIN SEL.8 | 108.33        | 58.83             | 163.67          | 33.86            |
| ID 307           | COWBIRD"S"/STERLING  | 107.65        | 58.53             | 164.67          | 31.10b           |
| ID 341           | COWBIRD"S"/5/MC/BJ06 | 106.78        | 59.37             | 166.67a         | 31.10b           |
| WA 6920          | PENAWAWA             | 106.40        | 58.53             | 164.67          | 33.20            |
| WA 7492          | K78504/K74129-33//K7 | 106.40        | 57.37             | 165.00          | 35.56            |
| WA 7176          | K78504/K74129-33//K7 | 106.18        | 58.17             | 165.33          | 36.48a           |
| WA 7075          | K73579/BORAH         | 105.50        | 58.00             | 164.00          | 34.12            |
| ID 348           | 2*SLG//COWBIRD"S"/SL | 105.13        | 57.87             | 164.67          | 33.46            |
| ORS 8418         | TV18A-CM067/HORK'S'  | 104.98        | 59.43             | 161.67b         | 31.76b           |
| ID 303           | MC/BJ066/4/TZPF/SN64 | 104.90        | 59.03             | 163.67          | 33.60            |
| UT 2506          | POWELL/UT74S25-916   | 104.08        | 57.10             | 166.33a         | 37.01a           |
| WA 7496          | K7400315/PTM70S.47   | 103.83        | 55.93b            | 164.00          | 30.18b           |
| UT461941         | UT76S88-1292/UT74S25 | 103.57        | 58.30             | 168.00a         | 38.19a           |
| WA 7328          | NHS07664/NDM000004,8 | 103.23        | 56.37b            | 165.67          | 37.80a           |
| UT402265         | WYNNE/ID125          | 102.68        | 59.10             | 170.00a         | 38.85a           |
| ID 312           | COWBIRD S./2*STERLIN | 102.10        | 58.20             | 163.00b         | 31.36b           |
| CI 17904         | OWENS                | 101.62        | 58.37             | 164.67          | 33.99            |
| ID 319           | SLG//COWBIRD S./SLG  | 101.40        | 56.63             | 164.00          | 34.25            |
| WA 7326          | K7205078/CI14193,565 | 98.92         | 57.63             | 165.67          | 35.96            |
| WA 6831          | EDWALL               | 97.22         | 56.17             | 165.33          | 33.07            |
| ID 366           | BRH/3/II-60-101//TZP | 93.55         | 58.03             | 165.00          | 36.09a           |
| UT 2171          | UT76S88-1398/UT74S25 | 90.47         | 55.20b            | 166.33a         | 40.42a           |
| CI 4734          | FEDERATION           | 71.07b        | 53.37b            | 165.33          | 42.26a           |

|    |           |        |        |         |         |
|----|-----------|--------|--------|---------|---------|
|    | $\bar{X}$ | 105.91 | 58.18  | 164.87  | 34.48   |
| 2/ | F value   | 3.00** | 6.49** | 11.02** | 16.77** |
|    | C.V. %    | 4.89   | 1.09   | .31     | 2.16    |
|    | L.S.D.    | 14.61  | 1.79   | 1.44    | 2.10    |



Table 2. Agronomic data from the Western Regional Spring Wheat Nursery ( Cont'd )

| CI or<br>State # | Variety              | LfRust<br>Type | Lf Rust<br>Sever | Stripe<br>Type | Stripe<br>Sever | ---Lodging--<br>Prev | Sever  |
|------------------|----------------------|----------------|------------------|----------------|-----------------|----------------------|--------|
| ORS 8512         | BOW.S,CM33023-F      | .07b           | 1.67             | .00            | .00             | 16.67                | 1.33   |
| UT 1821          | UT76S88-1398/WYNNE   | 1.00           | 18.33            | .07            | 3.33            | .00                  | .00    |
| ORS 8511         | KVZ/3/TDB/CFN//BB/4/ | .07b           | 1.67             | .00            | .00             | .00                  | .00    |
| ORS 8509         | VEERY.S,CM33027F     | .33            | 5.00             | .00            | .00             | .00                  | .00    |
| ID 315           | SLG//COWBIRD S./SLG  | .33            | 1.67             | .07            | 3.33            | 18.33                | 2.33   |
| ID 372           | DWENS/FIELDWIN       | 1.00           | 46.67a           | .00            | .00             | 25.00                | 2.00   |
| ORS 8510         | MINIVET.S,CM37705K   | .00b           | .00              | .00            | .00             | .00                  | .00    |
| CI 17903         | MCKAY                | .07b           | 1.67             | .07            | 1.67            | 1.67                 | 1.33   |
| OR 8508          | TANAGER'S',CM30697-2 | .13b           | 3.33             | .00            | .00             | .00                  | .00    |
| ORS 8422         | TITMOUSE.S,CM30136-3 | .73            | 13.33            | .00            | .00             | .00                  | .00    |
| WA 7183          | K78504/K79129-33//K7 | .33            | 1.67             | .13            | 6.67            | .00                  | .00    |
| ID 365           | COWBIRD"S"/STERLING  | .40            | 3.33             | .00            | .00             | 6.67                 | 2.33   |
| UT 1111          | UT76S88-1292/UT74S25 | 1.00           | 10.00            | .73a           | 38.33           | .00                  | .00    |
| ID 373           | ID172/FIELDWIN SEL.8 | 1.00           | 26.67            | .53a           | 6.67            | .00                  | .00    |
| ID 307           | COWBIRD"S"/STERLING  | .33            | 3.33             | .23            | 5.00            | .00                  | .00    |
| ID 341           | COWBIRD"S"/5/MC/BJ06 | .27            | 10.00            | .00            | .00             | .00                  | .00    |
| WA 6920          | PENAWAWA             | .67            | 3.33             | .53a           | 10.00           | 1.67                 | 1.00   |
| WA 7492          | K78504/K74129-33//K7 | .07b           | 3.33             | .07            | 3.33            | 25.00                | 1.00   |
| WA 7176          | K78504/K74129-33//K7 | .60            | 16.67            | .40a           | 5.00            | .00                  | .00    |
| WA 7075          | K73579/BORAH         | .33            | 3.33             | .00            | .00             | .00                  | .00    |
| ID 348           | 2*SLG//COWBIRD"S"/SL | 1.00           | 23.33            | .00            | .00             | .00                  | .00    |
| ORS 8418         | TV18A-CM067/HORK'S   | .07b           | 1.67             | .33            | 3.33            | 16.67                | 1.33   |
| ID 303           | MC/BJ066/4/TZPP/SN64 | .33            | 1.67             | .27            | 8.33            | .00                  | .00    |
| UT 2506          | POWELL/UT74S25-916   | .73            | 18.33            | .00            | .00             | 5.00                 | 1.00   |
| WA 7496          | K7400315/PTM70S.47   | .00b           | .00              | .47a           | 10.00           | .00                  | .00    |
| UT461941         | UT76S88-1292/UT74S25 | .73            | 13.33            | .00            | .00             | 16.67                | 2.67   |
| WA 7328          | NHS07664/NDM000004,8 | .27            | 3.33             | .00            | .00             | .00                  | .00    |
| UT402265         | WYNNE/ID125          | .53            | 5.00             | .07            | 1.67            | 23.33                | 2.00   |
| ID 312           | COWBIRD S./2*STERLIN | 1.00           | 58.33a           | .00            | .00             | .00                  | .00    |
| CI 17904         | DWENS 1/             | .67            | 15.00            | .00            | .00             | 28.33                | 2.33   |
| ID 319           | SLG//COWBIRD S./SLG  | .87            | 61.67a           | .00            | .00             | 6.67                 | 1.00   |
| WA 7326          | K7205078/CI14193,S65 | .07b           | 3.33             | .27            | 8.33            | 13.33                | 2.67   |
| WA 6831          | EDWALL               | .00b           | .00              | .47a           | 10.00           | .00                  | .00    |
| ID 366           | BRH/3/II-60-101//TZP | 1.00           | 48.33a           | .07            | 1.67            | 25.00                | 2.67   |
| UT 2171          | UT76S88-1398/UT74S25 | .33            | 3.33             | .00            | .00             | .00                  | .00    |
| CI 4734          | FEDERATION           | .00b           | .00              | .00            | .00             | 36.67                | 2.00   |
| X                |                      | .45            | 11.99            | .13            | 3.52            | 7.41                 | .81    |
| F value 2/       |                      | 3.86**         | 7.75**           | 2.29**         | 5.62**          | 1.26                 | 1.37   |
| C.V. %           |                      | 40.73          | 49.87            | 100.74         | 82.39           | 129.43               | 106.97 |
| L.S.D.           |                      | .52            | 16.87            | .38            | 8.18            | 27.04                | 2.43   |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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

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



Table 3. Agronomic data from the Advanced Yield Spring Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT.

Date seeded: April 7, 1987 Date harvested: August 31, 1987

| CI or<br>State # | VARIETY                   | YIELD<br>BU/A | TEST WT<br>LBS/BU | HEAD<br>DATE | HEIGHT<br>INCHES |
|------------------|---------------------------|---------------|-------------------|--------------|------------------|
| PI469271         | WHEATON                   | 119.83a       | 59.53             | 163.33       | 31.50b           |
| TREA0000         | TREASURE                  | 109.03        | 56.30b            | 165.33a      | 33.73            |
| MT 8363          | MT7448/MT703              | 108.90        | 57.77             | 162.00b      | 33.20            |
| MT 8336          | PM 23/ MT7448             | 108.30        | 60.70a            | 165.00a      | 35.83            |
| MT 8520          | DLAF/MT7336               | 106.07        | 58.83             | 164.00       | 34.65            |
| MT 8182          | YDING "S"/PCI "S"-287     | 105.72        | 57.70             | 163.33       | 37.14            |
| CI 17430         | NEWANA                    | 105.03        | 59.43             | 165.67a      | 32.68            |
| WFBLAKER         | LAKER                     | 104.28        | 61.77a            | 166.67a      | 31.89b           |
| MT 8626          | CI15838/MT7418//PONDERA   | 104.12        | 59.27             | 162.33b      | 33.60            |
| PI486349         | SUCCESS                   | 103.95        | 59.30             | 166.00a      | 35.96            |
| MT 8434          | MT7421/NEWANA             | 102.68        | 60.87a            | 162.67       | 34.65            |
| MT 8407          | SU73/MT7336               | 102.32        | 60.17a            | 162.67       | 39.24a           |
| MT 8564          | DLAF/LEW                  | 102.32        | 60.37a            | 166.00a      | 41.08a           |
| MT 8446          | MT7336/SHORTANA           | 100.73        | 59.50             | 163.00       | 33.0a            |
| MT 8561          | DLAF/MT7336               | 100.08        | 57.43b            | 165.67a      | 34.38            |
| MT 8602          | CI15838/MT7418//PONDERA   | 99.97         | 59.63             | 162.00b      | 33.46            |
| MT 8664          | UNKNOWN                   | 99.62         | 59.00             | 165.67a      | 33.46            |
| MT 8320          | PM 23/ MT7448             | 99.40         | 58.87             | 164.67       | 33.46            |
| MT 8550          | RS6880/PONDERA            | 98.57         | 59.20             | 165.67a      | 36.75            |
| ND 606           | Su28-1*2/3/LEW//TIOGA/RL6 | 98.22         | 59.60             | 165.33a      | 39.63a           |
| MT 8601          | NEWANA/MT7746             | 98.07         | 60.80a            | 161.67b      | 33.60            |
| MT 8447          | SU73/MT7336               | 97.58         | 60.43a            | 163.67       | 37.93            |
| CI 17828         | PONDERA                   | 97.50         | 59.03             | 162.33b      | 33.33            |
| PNR02369         | PIONEER 2369              | 96.65         | 60.07             | 163.67       | 31.50b           |
| MT 8647          | MT7635/NAC0ZARI'S         | 96.63         | 59.03             | 162.00b      | 35.04            |
| CI 17904         | DWENS                     | 95.37         | 58.77             | 163.67       | 35.30            |
| CI 10003         | THATCHER                  | 95.08         | 58.53             | 164.00       | 35.70            |
| CI 17282         | CROSBY                    | 94.90         | 60.50a            | 162.33b      | 40.55a           |
| MT 8623          | PAVON76/LEW               | 94.53         | 59.60             | 165.67       | 36.75            |
| MT 8515          | MT7421/NEWANA             | 94.30         | 60.53a            | 163.00       | 36.48            |
| MT 8666          | LEN/MT7632                | 94.08         | 58.03             | 161.33b      | 31.76b           |
| MT 8402          | MT7336/SHORTANA           | 93.73         | 59.03             | 162.67       | 31.89b           |
| COFF0000         | COPPER                    | 93.55         | 59.27             | 162.33b      | 31.23b           |
| MT 7926          | ND 681/MT 6830            | 93.47         | 60.27a            | 165.00a      | 41.47a           |
| MT 8537          | RS6880/MT7746             | 92.93         | 60.37a            | 162.67       | 34.51            |
| ND 597           | BUTTE86                   | 92.63         | 59.93             | 161.67b      | 35.30            |
| MT 8529          | CI15838/MT7418//PONDERA   | 92.20         | 60.20a            | 163.00       | 32.94            |
| CI 13596         | FORTUNA                   | 90.77         | 60.03             | 164.00       | 39.37a           |
| MT 8327          | N2211/MT7448              | 90.75         | 58.27             | 163.00       | 33.73            |
| MT 8429          | MT7421/MT7031             | 90.75         | 58.93             | 165.00a      | 37.53            |
| CI17429          | LEW                       | 90.55         | 59.43             | 165.67a      | 38.45            |



Table 3. ( Cont'd ) Agronomic data from the Advanced Yield Spring Wheat

| CI or<br>State # | VARIETY                 | YIELD<br>BU/A | TEST WT<br>LBS/BU | HEAD<br>DATE | HEIGHT<br>INCHES |
|------------------|-------------------------|---------------|-------------------|--------------|------------------|
| PI 15892         | WARD                    | 90.35         | 59.53             | 162.00b      | 41.08a           |
| PI483235         | GLENMAN                 | 90.18         | 56.70b            | 165.00a      | 34.25            |
| MT 8424          | MT7336/NORANA           | 89.45         | 57.87             | 164.33       | 34.78            |
| C982-324         | RAMBO                   | 88.30         | 59.93             | 165.00       | 33.46            |
| MT 8533          | CI15838/MT7418//PONDERA | 86.23         | 59.60             | 162.67       | 34.12            |
| NDCUT            | CUTLESS                 | 85.85         | 59.50             | 162.67       | 36.22            |
| MT 8616          | MT7635/ANGUS            | 80.70         | 60.77a            | 164.00       | 34.65            |
| CANLANC          | LANDER                  | 79.68         | 58.87             | 165.67a      | 44.23a           |

|            |       |        |         |        |
|------------|-------|--------|---------|--------|
| X          | 96.86 | 59.37  | 163.81  | 35.44  |
| F value 2/ | 1.43  | 5.24** | 10.65** | 6.99** |
| C.V. %     | 6.55  | .80    | .27     | 3.20   |
| L.S.D.     | 17.81 | 1.34   | 1.26    | 3.18   |

Table 4. Agronomic data from the Advanced Yield Spring Wheat Nursery,  
Disease and lodging data.

| CI or<br>State # | VARIETY                 | LF RUST | LF RUST | STFRUST | STFRUST | LODGING | LODGING |
|------------------|-------------------------|---------|---------|---------|---------|---------|---------|
|                  |                         | TYPE    | PREV    | TYPE    | SEVER   | PREV    | SEVER   |
| PI469271         | WHEATON                 | .00b    | .00     | .20     | 5.00    | .00b    | .00b    |
| TREA0000         | TREASURE                | .67     | 18.33   | .33     | 16.67   | 30.00   | 2.00    |
| MT 8363          | MT7448/MT703            | .87     | 15.00   | .07     | 3.33    | .00b    | .00b    |
| MT 8336          | PM 23/ MT7448           | 1.00    | 21.67   | .00     | .00     | .00b    | .00b    |
| MT 8520          | DLAF/MT7336             | .53     | 3.33    | .20     | 1.67    | .00b    | .00b    |
| MT 8182          | YDING "S"/PCI "S"-287   | .53     | 18.33   | .07     | 6.67    | 33.00   | 1.67b   |
| CI 17430         | NEWANA                  | .87     | 5.00    | .87a    | 5.00    | .00b    | .00b    |
| WPBLAKER         | LAKER                   | .00b    | .00     | 1.00a   | 36.67a  | .00b    | .00b    |
| MT 8626          | CI15838/MT7418//PONDERA | .60     | 6.67    | .27     | 3.33    | 33.00   | 1.67b   |
| PI486349         | SUCCESS                 | .00b    | .00     | .07     | 5.00    | 89.67   | 6.67    |
| MT 8434          | MT7421/NEWANA           | .00b    | .00     | .73a    | 11.67   | 49.67   | 3.67    |
| MT 8407          | SU73/MT7336             | .67     | 1.83    | .00     | .00     | 3.33b   | 1.33b   |
| MT 8564          | DLAF/LEW                | .07b    | 1.67    | .00     | .00     | 93.00a  | 4.33    |
| MT 8446          | MT7336/SHORTANA         | .33     | 10.00   | .00     | .00     | .00b    | .00b    |
| MT 8561          | DLAF/MT7336             | .00b    | .00     | .87a    | 15.00   | .00b    | .00b    |
| MT 8602          | CI15838/MT7418//PONDERA | .53     | 5.00    | .07     | 1.67    | .00b    | .00b    |
| MT 8664          | UNKNOWN                 | 1.00    | 16.67   | .13     | 5.00    | 30.00   | 1.67b   |
| MT 8320          | PM 23/ MT7448           | .47     | 11.67   | .00     | .00     | .00b    | .00b    |
| MT 8550          | RS6880/PONDERA          | 1.00    | 21.67   | .07     | 1.67    | .00b    | .00b    |
| ND 606           | Su28-1*2/3/LEW//TIOGA/R | .00b    | .00     | .73a    | 10.00   | 6.67    | 1.33b   |
| MT 8601          | NEWANA/MT7746           | 1.00    | 28.33a  | .00     | .00     | .00b    | .00b    |
| MT 8447          | SU73/MT7336             | .33     | 1.67    | .07     | 6.67    | .00b    | .00b    |

Table 4. ( Cont'd ) Agronomic data from the Advanced Yield Spring Wheat

## Disease and lodging data.

| CI or<br>State # | VARIETY                         | LF<br>TYPE | RUSTLF<br>PREV | RUSTST<br>TYPE | PRUSTST<br>SEVER | PRUSTST<br>PREV | LODGING<br>SEVER |
|------------------|---------------------------------|------------|----------------|----------------|------------------|-----------------|------------------|
| CI 17828         | PONDERA                         | .87        | 41.67a         | .00            | .00              | .00b            | .00b             |
| PNR02369         | PIONEER 2369                    | .00b       | .00            | .60a           | 20.00a           | .00b            | .00b             |
| MT 8647          | MT7635/NACDZARI'S <sup>1/</sup> | .60        | 11.67          | .00            | .00              | 28.33           | 1.67b            |
| CI 17904         | OWENS                           | .67        | 5.00           | .07            | 1.67             | 48.33           | 5.00             |
| CI 10003         | THATCHER                        | .67        | 16.67          | .40            | 10.00            | 61.67           | 2.33             |
| CI 17282         | CROSBY                          | .20        | 1.67           | .87a           | 13.33            | 5.00b           | 1.33b            |
| MT 8623          | PAVON76/LEW                     | .33        | 3.33           | .60a           | 20.00a           | 55.00           | 3.33             |
| MT 8515          | MT7421/NEWANA                   | 1.00       | 26.67a         | .00            | .00              | 3.33b           | 1.00b            |
| MT 8666          | LEN/MT7632                      | .67        | 5.00           | .67a           | 3.33             | .00b            | .00b             |
| MT 8402          | MT7336/SHORTANA                 | .73        | 8.33           | .00            | .00              | .00b            | .00b             |
| COPPO0000        | COPPER                          | .53        | 3.33           | .07            | 1.67             | 3.33b           | 1.33b            |
| MT 7926          | ND 681/MT 6830                  | .40        | 3.33           | .07            | 3.33             | 46.67           | 3.00             |
| MT 8537          | RS6880/MT7746                   | .87        | 13.33          | .00            | .00              | .00b            | .00b             |
| ND 597           | BUTTE86                         | .00b       | .00            | .33            | 3.33             | .00b            | .00b             |
| MT 8529          | CI15838/MT7418//PONDERA         | 1.00       | 21.67          | .00            | .00              | 33.00           | 1.67b            |
| CI 13596         | FORTUNA                         | .00b       | .00            | .13            | 11.67            | 97.67a          | 5.00             |
| MT 8327          | N2211/MT7448                    | .00b       | .00            | .40            | 11.67            | .00b            | .00b             |
| MT 8429          | MT7421/MT7031                   | .67        | 18.33          | .67a           | 11.67            | .00b            | .00b             |
| CI17429          | LEW                             | .00b       | .00            | .60a           | 16.67            | 97.67a          | 5.00             |
| PI 15892         | WARD                            | .33        | 6.67           | .53            | 23.33a           | .00b            | .00              |
| PI483235         | GLENMAN                         | .40        | 20.00          | .00            | .00              | 94.67a          | 6.67             |
| MT 8424          | MT7336/NORANA                   | .67        | 16.67          | .40            | 6.67             | 6.67            | 2.33             |
| C982-324         | RAMBO                           | .00b       | .00            | .87a           | 28.33a           | .00b            | .00b             |
| MT 8533          | CI15838/MT7418//PONDERA         | 1.00       | 26.67a         | .00            | .00              | 31.67           | 4.00             |
| NDCUT            | CUTLESS                         | .00b       | .00            | .00            | .00              | 96.00a          | 6.33             |
| MT 8616          | MT7635/ANGUS                    | .00b       | .00            | .07            | 3.33             | 68.33           | 6.00             |
| CANLAND          | LANDER                          | .00b       | .00            | .73a           | 21.67a           | 99.00a          | 6.67             |

|            |        |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|--------|
| $\bar{X}$  | .45    | 8.91   | .28    | 7.07   | 25.40  | 1.78   |
| F value 2/ | 3.37** | 2.32** | 3.64** | 2.25** | 5.34** | 4.48** |
| C.V.%      | 44.87  | 73.65  | 59.60  | 80.84  | 59.01  | 58.93  |
| L.S.D.     | .57    | 18.43  | .47    | 16.06  | 42.08  | 2.94   |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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 spring wheat nursery grown on the Lonnie Haak farm in Polson, MT. in 1987.

Date seeded: April 14, 1987      Date harvested: September 2, 1987

| CI or<br>State #             | VARIETY        | YIELD<br>BU/A | TEST WT<br>LBS/BU | HEIGHT<br>INCHES |
|------------------------------|----------------|---------------|-------------------|------------------|
| HS82-175                     | NORDIC         | 41.55         | 61.37a            | 29.53            |
| TREA0000                     | TREASURE       | 38.07         | 58.10b            | 25.59            |
| MT 7926                      | ND 681/MT 6830 | 37.12         | 59.77             | 28.74            |
| CI 17430                     | NEWANA 1/      | 33.25         | 59.70             | 19.68            |
| C982-324                     | RAMBO          | 32.57         | 59.93             | 20.47            |
| NK58002                      | NORAK          | 30.97         | 58.50b            | 18.90            |
| CI 17920                     | MARSHALL       | 30.82         | 58.27b            | 18.50            |
| NK000000                     | NK 751         | 30.10         | 57.83b            | 21.26            |
| HS82-288                     | TELEMARK       | 29.77         | 56.37b            | 23.62            |
| CI 17904                     | OWENS          | 28.93         | 58.53b            | 17.32            |
| CI 17790                     | LEN            | 28.53         | 58.60b            | 16.54            |
| CI 17429                     | LEW            | 28.37         | 57.60b            | 22.83            |
| CI 17910                     | ALEX           | 28.25         | 58.70b            | 20.47            |
| CI 15930                     | OLAF           | 27.90         | 58.17b            | 20.47            |
| ND 582                       | STOA           | 27.50         | 58.10b            | 20.47            |
| PI469271                     | WHEATON        | 27.48         | 57.37b            | 19.68            |
| PI486349                     | SUCCESS        | 26.77         | 58.10b            | 18.90            |
| CI 17828                     | PONDERA        | 26.43         | 59.87             | 20.87            |
| ND 597                       | BUTTE86        | 25.85         | 59.30             | 20.08            |
| CI 13596                     | FORTUNA        | 25.52         | 57.20b            | 26.77            |
| WPB00926                     | WESTBRED 926   | 24.82         | 58.50b            | 21.65            |
| COFF0000                     | COPPER         | 24.45         | 58.00b            | 20.47            |
| PNR02369                     | PIONEER 2369   | 23.57         | 58.80b            | 22.83            |
| PI483235                     | GLENMAN        | 20.55         | 55.37b            | 16.54            |
| EXPERIMENTAL MEANS           |                | 29.13         | 58.42             | .00              |
| F TEST FOR VAR. 2/           |                | 1.23          | 26.28**           | .00              |
| STANDARD ERROR OF THE MEAN   |                | 4.31          | .24               | .00              |
| C.V. 2: (S OF MEAN/MEAN)*100 |                | 14.78         | .41               | .00              |
| LSD (0.05)                   |                | 12.26         | .69               | .00              |

1/ Check Variety

2/ F value for variety comparison

\*\* Signifies statistical significance at the .01 level of probability

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

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

Fertilized 4/14/87 with 120 lbs 29/14/0

Table 6. Agronomic data from the offstation spring wheat nursery grown on the Western Agricultural Research Center, Corvallis, MT in 1987. Date seeded: April 14, 1987 Date harvested: Sept. 1, 1987

| CI or<br>State #             | VARIETY        | YIELD<br>BU/A | TEST WT<br>LBS/BU | HEIGHT<br>INCHES |
|------------------------------|----------------|---------------|-------------------|------------------|
| CI 17528                     | PONDERA        | 28.30a        | 56.30             | 27.17            |
| CI 17790                     | LEN            | 27.10a        | 56.50             | 26.77            |
| COFF0000                     | COPPER         | 25.87a        | 57.50             | 23.62            |
| PI483235                     | GLENMAN        | 20.00         | 55.30             | 28.35            |
| CI 15930                     | OLAF           | 19.45         | 56.30             | 28.35            |
| CI 17920                     | MARSHALL       | 18.38         | 56.50             | 27.56            |
| CI 17904                     | OWENS          | 16.67         | 54.80             | 27.56            |
| ND 597                       | BUTTE86        | 16.50         | 56.00             | 33.07            |
| CI 17430                     | NEWANA 1/      | 16.45         | 56.80             | 25.59            |
| C982-324                     | RAMBO          | 15.80         | 56.80             | 28.74            |
| HS82-288                     | TELEMARK       | 14.77         | 55.50             | 25.98            |
| HS82-175                     | NORDIC         | 13.70         | 58.30             | 28.35            |
| NK58002                      | NORAK          | 11.83         | .00               | 26.77            |
| CI 17429                     | LEW            | 11.43         | .00               | 36.61            |
| CI 13596                     | FORTUNA        | 9.75          | .00               | 33.46            |
| NK000000                     | NK 751         | 9.40          | .00               | 25.59            |
| PI486349                     | SUCCESS        | 8.12          | .00               | 29.92            |
| PNR02369                     | PIONEER 2369   | 7.82          | .00               | 23.62            |
| PI469271                     | WHEATON        | 7.80          | .00               | 24.41            |
| MT 7926                      | ND 681/MT 6830 | 7.13b         | .00               | 31.50            |
| CI 17910                     | ALEX           | 6.77b         | .00               | 35.43            |
| ND 582                       | STDA           | 6.65b         | .00               | 31.50            |
| TREA0000                     | TREASURE       | 6.20b         | .00               | 25.98            |
| WFB00926                     | WESTBRED 926   | 4.17b         | .00               | 25.98            |
| EXPERIMENTAL MEANS           |                | 13.75         | .00               | .00              |
| F TEST FOR VAR. 2/           |                | 5.26**        | .00               | .00              |
| STANDARD ERROR OF THE MEAN   |                | 3.01          | .00               | .00              |
| C.V. 2: (S OF MEAN/MEAN)*100 |                | 21.90         | .00               | .00              |
| LSD (0.05)                   |                | 8.57          | .00               | .00              |

1/ Check variety

2/ F value for variety comparison

\*\* Signifies statistical significance at the .01 probability level

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

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

Fertilized 4/14/87 with 120 lbs 29/14/0



PROJECT TITLE: Winter Wheat Variety Evaluations

YEAR/PROJECT: 1987/756 Small Grain Production

PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

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 varieties from these nurseries are tested under varying growing conditions of western Montana through off-station nursery evaluations. These data are used in making recommendations to the Montana producer.

Continuous snow cover began on November 29th and continued until March 2nd ( 94 days ) which was 11 days short of the snow cover last year. Dwarf smut infection levels were low to nonexistent at the Stillwater location whereas at the Kalispell sites there was light smut in the hard red varieties with medium to heavy smut in some of the soft white winter wheat varieties.

Yields at the Kalispell location were much higher this year but the 1987 yields from Stillwater were much lower than last year's.

RESULTS:

Western Regional Hard Red Winter Wheat - Kalispell

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Very good yields were recorded from the hard red winter wheat nursery grown at Kalispell. The average yield was 23 bushel above that of last year. The yields of four Utah varieties ( UT 15651b, UT 156712, UT 156775, and UT 156751 ), all exceeded 114 bushel per acre. Excellent yields were reported for most varieties with the mean yield of 96.18 bushels per acre.

Test weights averaged 61.33 lbs/bu. Kharkof had the lowest test weight at 56.83 lbs/bu. Heading dates and heights are reported in Table 1.

Dwarf smut ( TCK ) levels were low in the hard red winter wheats with only four varieties showing susceptibility above .75% . ( WA 7522, OROR 8320, Wanser, and Kharkof ).

Western Regional Hard Red Winter Wheat - Stillwater

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Moderate to low yields were obtained from the Stillwater Hard Red Winter Wheat nursery due to low plant populations which resulted from winter injury, snow mold and flooding of the test site. The average yield of the nursery was 50.63 bu/A, which was approximately 21 bushel less per acre than last year. Two of the Utah varieties that did well at the Kalispell site also were top yielding varieties at this location ( UT156752, and UT 156751 ). Yields were near 60 bu/A.

Test weight, heights and winter survival data are found in Table 2. It should be noted that those data reflect the adverse growing conditions this season.

#### Western Regional Soft White Winter Wheat Nursery - Kalispell

Excellent yields were obtained in this nursery. The mean yield was 102.55 bu/A. Twenty-four varieties had yields in excess of 104 bu/A and 26 varieties yielded significantly less than Lewjain (the check variety). Table 3. Elgin had the lowest yield at 44.64 bu/A.

Test weights averaged about 58 lb/bu. Only eight varieties had test weights in excess of 60 lbs/bu. Heading on the average was seven days earlier than the previous season. Smut percentages were higher than in the red wheat nursery with eleven varieties having 5% or higher infection level. Table 3.

#### Western Regional Soft White Winter Wheat Nursery - Stillwater

Yields at the Stillwater location were about 16 bu/A lower than the previous year. Stands were reduced up to 60% during the winter. Test weights were down from any other previous year with the average test weight for the nursery being 52.35 lbs/bu. Height was also reduced in comparison to previous measurements due to the environmental conditions.

#### Intrastate Winter Wheat Nursery - Kalispell

Yields in 1987 were 27 bu/A below 1986 averages in the Intrastate nursery. Nugaines and Winridge had the highest yields with 108 and 101 bu/A respectively. All but 13 varieties had significantly lower yields in comparison to Winridge. Test weight, height, and heading date were all average for this location (Table 5).

Percent smut was highest (2%) in the variety Roughrider and was detected in the majority of varieties. Lodging, although not prevalent did appear in seven varieties above 20%. The severity of lodging in those varieties was not severe.

#### Offstation Winter Wheat Nurseries

The 1987 Offstation winter wheat nurseries grown on the Foss McIntyre farm (Ravalli Co.), the Don Callahan farm (Lake Co.), and at Stillwater. Neely, MT 2039, Cheyenne and Winridge were the highest yielding varieties when averaged across all locations. Yields were fair for the Stillwater and Lake County location but the stands at the Ravalli County site were very poor and resulted in very low yields. Table 6. Test weights were good at all locations and were the lowest at the Stillwater location. Table 7.



Table 1. Agronomic data from the Western Regional Hard Red Winter Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT in 1987. Field E-4.  
Date planted: September 15, 1986 Date harvested: August 3, 1987

| CI or<br>State # | Variety or Pedigree  | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Heading<br>Date | Height<br>Inches | %Smut<br>ocular |
|------------------|----------------------|---------------|-------------------|-----------------|------------------|-----------------|
| UT156516         | MANNING/SADOVO-1     | 126.16        | 61.58             | 146.00          | 35.43            | .00             |
| UT156712         | MANNING/BEZOSTAJA-1  | 120.23        | 62.40             | 148.00          | 35.33            | .25             |
| ID 301           | HGL/ID5006/4/II-60-1 | 117.99        | 62.15             | 152.00          | 36.91            | .75             |
| UT156775         | MANNING/BEZOSTAJA-1  | 114.82        | 61.35             | 149.75          | 37.01            | .25             |
| UT156751         | MANNING/BEZOSTAJA-1  | 114.54        | 63.35             | 149.75          | 37.60            | .00             |
| ID 353           | ABERDEEN SEL.        | 109.05        | 61.65             | 153.00          | 38.78            | .00             |
| WA 7522          | HATTON SIB//SHORT WH | 108.00        | 61.78             | 155.00          | 43.31            | 5.25            |
| ORCR8313         | PROBSTORFER-EXTREM/T | 104.14        | 62.38             | 146.75          | 37.70            | .50             |
| WA 6820          | GWB127/GWB236-7/STUR | 103.38        | 60.30             | 146.75          | 35.53            | .25             |
| ID 354           | ABERDEEN SEL.        | 100.14        | 61.95             | 153.50          | 43.21            | .25             |
| ID 352           | ABERDEEN SEL.        | 99.69         | 62.20             | 155.25          | 44.59            | .00             |
| ID 0338          | SN64/II-60-155/HGL/3 | 99.18         | 61.55             | 150.00          | 40.85            | .25             |
| WA 7429          | ID92/N7403301, NB308 | 98.86         | 62.03             | 155.00          | 45.96            | .75             |
| ID 302           | ARBON/3/DM/CLM//BURT | 98.46         | 61.03             | 149.50          | 38.68            | .25             |
| OR 8315          | F60213-76, MEX CB782 | 98.26         | 59.73             | 149.00          | 30.02            | .25             |
| ORCR8601         | PMF//CND S/GLL       | 98.00         | 62.48             | 147.25          | 36.42            | .50             |
| WA 7525          | CERCO/HTN/5/KVZ/3/BN | 97.90         | 62.33             | 152.25          | 43.50            | .25             |
| WA 7524          | CI9342/ITANA//ID092  | 97.63         | 61.40             | 153.00          | 38.19            | .00             |
| ORCR8320         | MARNE DESPREZ/COLOTA | 96.46         | 61.05             | 147.00          | 36.61            | 6.25            |
| MT 79123         | UT755079/CST56//TX65 | 95.51         | 60.10             | 145.25          | 36.52            | .25             |
| MT 79121         | UT755079/CST56//TX65 | 94.41         | 60.52             | 145.25          | 35.73            | .00             |
| ID 351           | ABERDEEN SEL.        | 94.01         | 62.43             | 155.25          | 43.80            | .00             |
| ID 0337          | A781011W-W A7257W-71 | 92.79         | 62.73             | 154.00          | 39.47            | .00             |
| ID 0336          | ATL 50/4/R/R//2*CNN/ | 90.01         | 61.35             | 153.50          | 43.80            | .00             |
| CI 13844         | WANSER               | 89.46         | 59.50             | 151.75          | 45.47            | 4.50            |
| ORCR8414         | PMF//CND S/GLL       | 86.60         | 61.40             | 146.25          | 35.63            | .00             |
| MT 79125         | UT755079/CST56//TX65 | 84.91         | 60.15             | 149.75          | 38.98            | .25             |
| ID 0333          | A75211W-81-1-3T BUCK | 84.65         | 62.50             | 151.75          | 46.46            | .25             |
| ID 298           | ZIT65 OR 2CNN OR 2MC | 81.76         | 62.75             | 152.75          | 43.70            | .00             |
| ID 297           | A68203W-E-1-3-3/A682 | 81.48         | 61.63             | 154.75          | 45.08            | .00             |
| WA 7523          | FREDRICK/SPRAGUE, NB | 80.53         | 58.90             | 155.75          | 43.31            | .50             |
| ID 0335          | TK/BURT/4/BM 6/4/UT  | 79.98         | 60.87             | 154.50          | 47.93            | .00             |
| ID 0332          | II-60-156/CI14107//I | 78.90         | 60.22             | 153.00          | 40.35            | .00             |
| ID 0331          | RGR/3/II-60-157/MC/M | 75.83         | 61.93             | 151.25          | 46.65            | .00             |
| CI 1442          | KHARKOF              | 70.54         | 56.83             | 155.50          | 48.23            | 3.00            |

|         |        |         |         |         |       |
|---------|--------|---------|---------|---------|-------|
| X       | 96.18  | 61.33   | 151.11  | 40.48   | .71   |
| F value | 7.67** | 15.63** | 39.00** | 14.99** | 1.09  |
| C.V.%   | 4.92   | .53     | .35     | 2.86    | 99.43 |
| L.S.D.  | 13.28  | .92     | 1.50    | 3.25    | 4.26  |

Table 2. Agronomic data from the Western Regional Hard Red Winter Wheat Nursery grown on the Oscar Buller farm, Kalispell MT in 1987.  
Date planted: September 17, 1986 Date harvested: August 27, 1987

| VARIETY                       | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Height<br>Inches | % Wntr<br>Survivl |
|-------------------------------|---------------|-------------------|------------------|-------------------|
| UT156712 MANNING/BEZOSTAJA-1  | 64.38         | 58.15             | 26.48            | 52.50             |
| WA 7523 FREDRICK/SPRAGUE, NB  | 61.30         | 54.32             | 34.25            | 60.00             |
| WA 7429 ID92/N7403301, N8308  | 59.54         | 57.10             | 35.04            | 55.00             |
| UT156751 MANNING/BEZOSTAJA-1  | 59.29         | 57.33             | 29.72            | 55.00             |
| ID 0333 A75211W-B1-1-3T BUCK  | 58.24         | 59.22             | 35.53            | 52.50             |
| ID 297 A68203W-E-1-3-3/A682   | 57.65         | 58.22             | 32.87            | 52.50             |
| ID 301 HGL/ID5006/4/II-60-1   | 56.61         | 56.48             | 28.84            | 57.50             |
| ID 0337 A781011W-W A7257W-71  | 56.21         | 59.53             | 29.63            | 70.00             |
| ID 0331 RGR/3/II-60-157/MC/M  | 56.09         | 57.65             | 37.50            | 57.50             |
| WA 7524 CI9342/ITANA//ID092   | 55.61         | 57.65             | 31.00            | 50.00             |
| CI 13844 WANSE                | 55.58         | 56.85             | 33.76            | 50.00             |
| WA 7522 HATTON SIB//SHORT WH  | 54.66         | 56.40             | 34.15            | 57.50             |
| ID 298 2IT65 OR 2CNN OR 2MC   | 53.91         | 59.73             | 32.48            | 67.50             |
| ID 353 ABERDEEN SEL.          | 53.50         | 58.08             | 28.64            | 62.50             |
| ID 352 ABERDEEN SEL.          | 53.39         | 58.40             | 32.78            | 60.00             |
| ID 0332 II-60-156/CI14107//I  | 52.43         | 57.23             | 31.50            | 37.50             |
| WA 7525 CERCO/HTN/5/KVZ/3/BN  | 52.28         | 58.55             | 34.74            | 65.00             |
| WA 6820 GWB127/GWB236-7/STUR  | 51.84         | 55.95             | 25.79            | 45.00             |
| ORCR8320 MARNE DESPREZ/COLOTA | 50.89         | 56.03             | 26.57            | 42.50             |
| UT156775 MANNING/BEZOSTAJA-1  | 50.46         | 56.78             | 28.44            | 67.50             |
| ID 302 ARBON/3/DM/CLM//BURT   | 48.64         | 57.38             | 28.74            | 70.00             |
| UT156516 MANNING/SADOVO-1     | 48.53         | 56.25             | 25.79            | 65.00             |
| ID 0335 TK/BURT/4/SM 6/4/UT   | 48.31         | 58.70             | 36.52            | 60.00             |
| MT 79125 UT755079/CST56//TX65 | 47.00         | 57.23             | 27.85            | 70.00             |
| ID 351 ABERDEEN SEL.          | 46.96         | 55.38             | 33.66            | 65.00             |
| ORCR8313 PROBSTORFER-EXTREM/T | 46.96         | 57.40             | 27.95            | 57.50             |
| ORCR8414 PMF//CND S/GLL       | 46.48         | 57.15             | 27.07            | 62.50             |
| ID 0336 ATL 50/4/R/R//2*CNN/  | 45.18         | 56.03             | 34.06            | 65.00             |
| CI 1442 KHARKOF               | 43.24         | 57.43             | 35.73            | 67.50             |
| OR 8315 F60213-76, MEX CB782  | 43.06         | 54.65             | 23.82            | 70.00             |
| ID 354 ABERDEEN SEL.          | 40.81         | 59.67             | 28.54            | 82.50             |
| ORCR8601 PMF//CND S/GLL       | 40.75         | 56.85             | 28.54            | 70.00             |
| MT 79123 UT755079/CST56//TX65 | 40.14         | 57.08             | 25.98            | 60.00             |
| ID 0338 SN64/II-60-155/HGL/3  | 39.10         | 58.65             | 28.84            | 77.50             |
| MT 79121 UT755079/CST56//TX65 | 34.88         | 56.65             | 25.00            | 65.00             |

|         |        |       |       |       |
|---------|--------|-------|-------|-------|
| X       | 50.68  | 57.32 | 30.51 | 60.71 |
| F value | 2.32** | 7.32  | 10.11 | 1.14  |
| C.V.%   | 9.04   | .84   | 3.85  | 14.67 |
| L.S.D.  | 12.86  | 1.34  | 3.30  | 24.98 |



Table 3. Agronomic data from the Western Uniform Soft White Winter Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT in 1987.

Planting date: September 15, 1986 Harvest date: August 4, 1987

| CI or State | Variety or Pedigree   | YIELD<br>BU/A | TEST WT<br>LBS/BU | HEAD<br>DATE | HEIGHT<br>INCHES | HEADS/<br>3 FT RW | SMUT HD<br>/3 FT | %<br>SMUT |
|-------------|-----------------------|---------------|-------------------|--------------|------------------|-------------------|------------------|-----------|
| WA 7529     | LUKE/VH67375//VPM/MD  | 127.41        | 59.53             | 154.50b      | 32.97            | 30.00             | .00              | .00       |
| ORCW8521    | TJB259-83/3/CD/P101/  | 126.56        | 60.98             | 152.00b      | 40.35a           | 24.50             | 1.00             | .25       |
| CI 17909    | LEWJAIN 1/            | 126.18        | 60.45             | 156.25       | 31.59            | 26.00             | .00              | .00       |
| WA 7526     | TRES COMPOSITE CROSS  | 126.11        | 60.40             | 155.00       | 34.15a           | 24.50             | .00              | .00       |
| OR 843      | HYSLOP/CERCO, H-308   | 124.03        | 59.80             | 154.25b      | 37.01a           | 25.00             | 5.00             | 15.00     |
| WA 7216     | V77254, OASIS/WA63621 | 123.59        | 59.83             | 156.75       | 33.66a           | 31.00             | .00              | .00       |
| ORF75336    | YMH/MCD/2/T.SFELTA/3  | 121.01        | 57.40b            | 151.50b      | 32.97            | 28.00             | 3.50             | 12.50     |
| PV 1        | KALSUP                | 119.48        | 59.28             | 154.25b      | 31.40            | 28.00             | .50              | .00       |
| WA 7527     | TRES MULTILINE 86     | 119.21        | 60.25             | 154.00b      | 33.07            | 21.50             | .00              | .00       |
| ID 0330     | NEELY SPN//SPN (A79   | 118.45        | 58.65b            | 149.00b      | 34.15a           | 25.00             | 1.50             | 1.50      |
| CI 17419    | DAWS                  | 116.88        | 59.83             | 154.00b      | 31.40            | 22.50             | .00              | .00       |
| CI 17917    | TRES (WA 6698)        | 116.05        | 60.30             | 155.50       | 33.46a           | 26.00             | .50              | 5.00      |
| ORCW8421    | PJB 847/1543/YMH/63-  | 114.11b       | 59.80             | 153.50b      | 33.56a           | 26.00             | .50              | .25       |
| OR 845      | HYSLOP/YAYLA//63-11   | 114.03b       | 60.60             | 152.00b      | 32.48            | 25.50             | .00              | .25       |
| ID 0329     | NEELY/SPN//SPN (A79   | 113.10b       | 59.05             | 147.25b      | 33.37a           | 28.50             | 1.00             | 5.00      |
| ORCW8522    | RMN 73-71/TORIM       | 112.06b       | 60.90             | 147.50b      | 31.99            | 24.50             | .50              | 2.50      |
| PI486429    | DUSTY ( WA 6912 )     | 111.59b       | 59.33             | 155.50       | 31.59            | 32.00             | 1.00             | .00       |
| WA 7163     | VPM/M05951/2*OR68007  | 111.20b       | 59.75             | 156.00       | 32.68            | 35.50             | .00              | .00       |
| WA 7432     | VPM1/MDS//CERCO/3/L   | 110.17b       | 55.58b            | 158.00a      | 26.97b           | 31.50             | .00              | .00       |
| ORFW 301    | DAWS/SM4//MDM//SM11,  | 109.83b       | 58.65b            | 150.00b      | 31.00            | 28.50             | 4.00             | 20.00     |
| OR 842      | HYSLOP/CERCO, B-307   | 109.58b       | 60.15             | 154.75       | 36.81a           | 31.00             | .00              | .00       |
| WA 7166     | VPM/M05421*TYEE       | 108.91b       | 59.35             | 154.00b      | 31.69            | 20.00             | .00              | .00       |
| WA 7435     | WA4303/FURDUE SEL./   | 105.35b       | 58.90b            | 155.00       | 25.30b           | 24.50             | .00              | .00       |
| CI 17596    | STEPHENS              | 104.19b       | 59.03b            | 151.75b      | 30.81            | 26.00             | .50              | 2.50      |
| WA 7528     | FARD/BRB//WA6581, VDO | 99.81b        | 58.90b            | 155.50       | 28.84b           | 24.00             | .00              | .00       |
| WA 7217     | VPM/MDS 951/2*BRB     | 96.99b        | 58.40b            | 157.00       | 33.27            | 23.50             | .00              | .00       |
| ORCW8416    | NORTENO/YAMHILL//67   | 93.99b        | 56.73b            | 155.50       | 31.30            | 22.00             | 2.00             | .00       |
| WA 7437     | FAHA/CI13645/2*CH/A   | 92.16b        | 57.35b            | 156.25       | 31.50            | 22.00             | .00              | .00       |
| ORCW8519    | 6720-10//YAMHILL/HY   | 91.56b        | 56.40b            | 156.25       | 32.09            | 19.00             | .00              | .25       |
| WA 7433     | MARIS HUNTSMAN/VH07   | 89.84b        | 54.27b            | 156.50       | 31.20            | 26.00             | 3.00             | 3.50      |
| CI 13740    | MORO                  | 85.66b        | 58.08b            | 151.00b      | 38.58a           | 22.50             | .00              | .25       |
| OR 8270     | MCD/ROMANIAN/OR7141,  | 81.80b        | 54.15b            | 152.50b      | 29.63b           | 28.00             | 4.50             | .00       |
| OR 7996     | HYS/YAYLA/WA4995/3/C  | 80.53b        | 55.53b            | 156.25       | 32.48            | 28.50             | 3.50             | 7.50      |
| ORCW8517    | TJB801-12795/STEPHE   | 73.53b        | 55.33b            | 149.75b      | 36.12a           | 25.00             | 2.50             | 15.00     |
| CI 13968    | NUGAINES              | 64.60b        | 54.85b            | 152.75b      | 31.40            | 29.00             | 11.50            | 20.00     |
| CI 1442     | KHARKOF               | 56.81b        | 55.33b            | 154.75       | 46.46a           | 27.00             | 5.00             | 12.50     |
| ORCW8314    | 7C/CNO/CAL/3/YMH      | 55.90b        | 53.78b            | 150.75b      | 30.61            | 32.50             | 3.00             | 6.00      |
| CI 11755    | ELGIN                 | 44.64b        | 51.78b            | 155.75       | 37.11a           | 36.00             | 10.00            | 30.00     |
| $\bar{X}$   |                       | 102.55        | 58.12             | 153.76       | 33.03            | 26.59             | 1.70             | 4.20      |
| F value     |                       | 2/25.52**     | 27.66**           | 23.56**      | 33.68**          | 1.03              | 1.26             | 1.00      |
| C.V.%       |                       | 4.16          | .77               | .36          | 1.90             | 14.59             | 141.43           | 173.15    |
| L.S.D.      |                       | 11.96         | 1.26              | 1.55         | 1.76             | 11.12             | 6.88             | 20.86     |

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



Table 4. Agronomic data from the Western Regional Soft White Winter Wheat Nursery grown on the Oscar Buller Farm, Kalispell, MT in 1987  
Date planted: September 17, 1986 Date harvested: August 27, 1987

| CI or<br>State # | Variety or Pedigree   | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Height<br>Inches | % Wntr<br>Kill |
|------------------|-----------------------|---------------|-------------------|------------------|----------------|
| CI 17909         | LEWJAIN 1/            | 66.64         | 52.78             | 27.17            | 12.50          |
| WA 7163          | VPM/M05951/2*OR68007  | 64.95         | 53.58             | 28.44            | 15.00          |
| WA 7435          | WA4303/PURDUE SEL./   | 63.23         | 55.40a            | 21.56b           | 35.00          |
| OR 842           | HYSLOP/CERCO, B-307   | 62.28         | 53.53             | 32.18a           | 25.00          |
| PI486429         | DUSTY ( WA 6912 )     | 61.89         | 53.23             | 27.66            | 25.00          |
| WA 7526          | TRES COMPOSITE CROSS  | 61.28         | 52.03             | 27.66            | 17.50          |
| WA 7527          | TRES MULTILINE 86     | 60.83         | 53.48             | 27.85            | 25.00          |
| WA 7166          | VPM/M05421*TYEE       | 60.76         | 53.18             | 26.57            | 22.50          |
| OR 843           | HYSLOP/CERCO, H-308   | 60.51         | 53.80             | 29.72a           | 25.00          |
| ORF75336         | YMH/MCD/2/T.SPELTA/3  | 59.66         | 50.15b            | 27.66            | 22.50          |
| WA 7217          | VPM/MOS 951/2*BRB     | 59.29         | 50.50             | 26.48            | 7.50           |
| WA 7529          | LUKE/VH67375//VPM/MO  | 59.05         | 54.08             | 26.28            | 30.00          |
| OR 845           | HYSLOP/YAYLA//63-11   | 58.89         | 55.53a            | 27.26            | 20.00          |
| OR 7996          | HYS/YAYLA/WA4995/3/C  | 58.86         | 49.10b            | 30.31a           | 22.50          |
| FV 1             | KALSUP                | 58.75         | 54.75             | 26.08            | 45.00a         |
| CI 13740         | MORO                  | 58.30         | 49.53b            | 29.53a           | 30.00          |
| ORCW8521         | TJB259-83/3/CD/P101/  | 57.95         | 54.05             | 31.30a           | 22.50          |
| WA 7216          | V77254, OASIS/WA63621 | 57.39         | 52.40             | 29.53a           | 12.50          |
| WA 7437          | FAHA/CI13645/2*CH/A   | 57.16         | 54.60             | 25.10            | 57.50a         |
| ID 0330          | NEELY SPN//SPN (A79   | 56.79         | 53.65             | 26.87            | 22.50          |
| ORCW8421         | FJB 847/1543/YMH/63-  | 56.60b        | 52.55             | 28.74            | 15.00          |
| CI 17917         | TRES (WA 6698)        | 56.55b        | 54.27             | 27.95            | 22.50          |
| CI 17419         | DAWS                  | 56.10b        | 55.70a            | 25.98            | 40.00a         |
| CI 17596         | STEPHENS              | 54.79b        | 54.60             | 26.48            | 32.50          |
| WA 7528          | FARO/BRB//WA6581, VDO | 53.66b        | 53.55             | 24.11b           | 32.50          |
| WA 7432          | VPM1/MOS//CERCO/3/L   | 53.46b        | 47.98b            | 22.83b           | 25.00          |
| ORCW8519         | 6720-10//YAMHILL/HY   | 53.00b        | 52.30             | 27.56            | 20.00          |
| ORFW 301         | DAWS/SM4//MDM//SM11,  | 52.75b        | 51.23             | 26.28            | 20.00          |
| ID 0329          | NEELY/SPN//SPN (A79   | 50.95b        | 54.47             | 25.69            | 30.00          |
| WA 7433          | MARIS HUNTSMAN/VH07   | 50.93b        | 50.10             | 25.39            | 37.50a         |
| ORCW8416         | NORTENO/YAMHILL//67   | 50.69b        | 52.23             | 27.26            | 20.00          |
| ORCW8522         | RMN 73-71/TORIM       | 47.51b        | 55.03             | 26.38            | 35.00          |
| CI 13968         | NUGAINES              | 41.69b        | 51.15             | 25.49            | 27.50          |
| OR 8270          | MCD/ROMANIAN/OR7141,  | 41.44b        | 47.40b            | 24.41b           | 27.50          |
| ORCW8517         | TJB801-12795/STEPHE   | 41.10b        | 51.78             | 29.33a           | 27.50          |
| CI 1442          | KHARKOF               | 40.33b        | 52.03             | 39.96a           | 20.00          |
| ORCW8314         | 7C/CNO/CAL/3/YMH      | 39.16b        | 44.90b            | 26.48            | 20.00          |
| CI 11755         | ELGIN                 | 31.48b        | 48.80b            | 31.40a           | 60.00a         |

|            |        |        |         |       |
|------------|--------|--------|---------|-------|
| $\bar{X}$  | 54.65  | 52.35  | 27.55   | 26.51 |
| F value 2/ | 5.00** | 8.71** | 16.39** | 1.65* |
| C.V.%      | 6.55   | 1.60   | 2.73    | 23.92 |
| L.S.D.     | 10.05  | 2.35   | 2.11    | 23.92 |

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



Table 5. Agronomic data from the Intrastate Winter Wheat Nursery grown on the Northwestern Agricultural Research Center, Kalispell, MT in 1987.  
Date planted: September 16, 1986 Date Harvested: July 31, 1987

| VARIETY                     | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Heading<br>Date | Height<br>(In) | %<br>Smut | Lodg<br>angle | Lodg<br>% |
|-----------------------------|---------------|-------------------|-----------------|----------------|-----------|---------------|-----------|
| CI 13968 NUGAINES           | 108.95        | 60.60             | 154.50          | 34.28b         | .00       | .00           | .00       |
| CI 17902 WINRIDGE 1/        | 101.43        | 60.83             | 155.25          | 44.52          | .12       | .50           | 5.00      |
| MT 8508 CST//FRD1628/OLESE  | 99.96         | 62.90             | 149.75b         | 44.03          | .37       | .00           | .00       |
| MT 8107 CST//FRD/OLESEN/3/  | 97.25         | 62.10             | 149.50b         | 42.26          | .50       | .50           | 18.75     |
| QT 1359 HYBRITECH           | 95.17         | 62.13             | 148.25b         | 42.26          | .75       | .00           | .00       |
| CI 17727 WESTON             | 93.84         | 63.10             | 149.75n         | 46.00          | .00       | 1.00          | 27.25     |
| NA 1316 ROCKY               | 93.08         | 61.85             | 150.00b         | 41.86          | .37       | .00           | .00       |
| MT 79121 UT755079/CST56//TX | 92.95         | 59.95             | 145.00b         | 36.84b         | .25       | .00           | .00       |
| MT 8039 LCO/FRD//NE69559/W  | 92.35         | 59.85             | 150.75b         | 38.61b         | .37       | .00           | .00       |
| MT 79125 UT755079/CST56//TX | 92.05         | 60.13             | 149.75b         | 36.54b         | .25       | .50           | 12.50     |
| MT 85107 CST//FRD1650/OLESE | 91.69         | 61.90             | 148.25b         | 39.99b         | .50       | .00           | .00       |
| MT 85111 CST//FRD1650/OLESE | 91.04         | 62.43             | 148.75b         | 31.03b         | .37       | .00           | .00       |
| MT 7810 FRD/WNK//MT6928/TD  | 90.73         | 60.22             | 153.25b         | 38.12b         | .12       | .00           | .00       |
| RH RODEO                    | 90.39b        | 61.60             | 147.75b         | 36.84b         | .37       | .00           | .00       |
| MT 79123 UT755079/CST56//TX | 90.04b        | 60.40             | 145.75b         | 36.15b         | .25       | .00           | .00       |
| MT 7951 LANCOTA/WNK//NE685  | 89.93b        | 61.85             | 148.75b         | 38.61b         | .12       | .00           | .00       |
| NA 200 HAWK                 | 89.85b        | 62.28             | 147.75b         | 37.92b         | .88a      | .00           | .00       |
| MT 8029 TX65A1268/FRD//YTD  | 89.63b        | 60.85             | 149.25b         | 38.61b         | .12       | .00           | .00       |
| MT 8599 CST//FRD1628/OLESE  | 89.46b        | 59.73             | 148.75b         | 43.54          | .25       | .00           | .00       |
| CI 15075 CENTURK            | 89.14b        | 62.03             | 148.75b         | 38.71b1        | .12       | .50           | 22.50     |
| MT 8030 TX65A268/FRD//YTD-  | 88.80b        | 61.78             | 149.75b         | 37.63b         | .12       | .00           | .00       |
| NA 201 ARCHER               | 88.70b        | 59.83             | 150.00b         | 35.16b         | .50       | .00           | .00       |
| MT 8502 ID745101/LCO        | 88.54b        | 61.15             | 152.75b         | 36.05b         | .37       | .00           | .00       |
| PI491533 NORWIN             | 87.94b        | 61.33             | 153.25b         | 29.06b         | .12       | .00           | .00       |
| MT 85203 NE701137/TX65A1503 | 87.71b        | 62.05             | 152.75b         | 26.30b         | .25       | .00           | .00       |
| RH78W296 BIGHORN            | 87.41b        | 60.68             | 152.75b         | 34.57b         | .00       | .00           | .00       |
| MT 8003 REDWIN SELN         | 87.21b        | 60.95             | 153.75          | 43.64          | 1.25a     | .00           | .00       |
| MT 85109 CST//FRD1650/OLESE | 87.14b        | 61.93             | 148.50b         | 39.20b         | .12       | .00           | .00       |
| CI 17860 NEELEY             | 85.69b        | 62.03             | 154.00          | 41.27          | .50       | .00           | .00       |
| MT 7811 FRD/WNK//MT6928/TD  | 85.58b        | 60.90             | 152.00b         | 39.10b         | .12       | .00           | .00       |
| MT 8046 LCO/FRD//NE 69559/  | 85.55b        | 61.78             | 150.50b         | 37.33b         | .63       | .00           | .00       |
| RH845496 RH 845496          | 85.44b        | 61.00             | 154.25          | 43.83          | .37       | .00           | .00       |
| RH845504 RH 845504          | 85.05b        | 61.52             | 151.25b         | 47.08          | .75       | .00           | .00       |
| MT 80194 YG882458/*6WN      | 84.70b        | 60.90             | 153.75          | 40.88          | 1.25a     | .00           | .00       |
| MT 85131 CST//FRD1655/OLESE | 83.64b        | 59.20             | 148.50b         | 38.32b         | .50       | .00           | .00       |
| MT 85151 CST//FRD1628/OLESE | 83.29b        | 62.55             | 148.25b         | 40.78          | .50       | .00           | .00       |
| CI 17844 REDWIN             | 83.08b        | 60.57             | 152.25b         | 44.03          | .12       | .00           | 1.00      |
| MT 8562 CST//FRD1628/OLESE  | 81.88b        | 59.85             | 148.25b         | 37.73b         | .50       | .00           | .00       |
| QT 1281 HYBRITECH           | 81.53b        | 58.78             | 150.75b         | 40.19          | .50       | .50           | 24.75     |
| CI 8885 CHEYENNE            | 81.19b        | 61.28             | 152.75b         | 48.07          | .25       | 2.00a         | 66.00a    |
| PI491532 CREE               | 80.51b        | 60.81             | 152.50b         | 45.31          | .63       | 2.00a         | 57.25a    |
| CI 13872 FROID              | 80.34b        | 60.52             | 154.00          | 43.64          | .75       | 2.25a         | 74.25a    |
| NA 0001 THUNDERBIRD-        | 80.27b        | 62.35             | 146.25b         | 38.51b         | .63       | .00           | .00       |
| RH 1035 RH 1035             | 80.05b        | 61.58             | 145.50b         | 38.91b         | 1.00a     | .00           | .00       |
| CI 17735 NORSTAR            | 79.13b        | 61.00             | 158.00a         | 48.36          | .50       | .75           | 18.75     |
| ND 8002 CTK//FRD/7759-19    | 79.09b        | 61.25             | 155.00          | 44.52          | .25       | .25           | 2.50      |
| RH845457 RH 845457          | 78.86b        | 60.70             | 150.00b         | 44.33          | 1.00a     | .00           | .00       |

Table 5. (Cont'd) 1987 Intrastate Winter Wheat Nursery

| VARIETY                     | Yield<br>Bu/A | Test Wt<br>Lbs/Bu | Heading<br>Date | Height<br>(In) | %<br>Smut | Lodg<br>angle | Lodg<br>% |
|-----------------------------|---------------|-------------------|-----------------|----------------|-----------|---------------|-----------|
| MT 85202 NE701137/TX65A1503 | 78.24b        | 60.92             | 152.75b         | 43.64          | .37       | .00           | .00       |
| MT 85145 CST//FRD1655/OLESE | 78.09b        | 61.13             | 152.75b         | 42.55          | .37       | .00           | .00       |
| MT 85104 CST//FRD1650/OLESE | 77.88b        | 61.05             | 153.50b         | 43.14          | .37       | .00           | .00       |
| MT 8576 CST//FRD1628/OLESE  | 77.35b        | 61.55             | 153.75          | 42.16          | .75       | .00           | .00       |
| CI 13190 WARRIOR            | 76.91b        | 61.28             | 151.00b         | 47.97          | 1.12a     | 1.50a         | 32.25a    |
| MT 80203 YGSS2458/6*WN      | 76.64b        | 60.95             | 154.00          | 40.48          | .25       | .00           | .00       |
| NA 362-5 AGRIPRO            | 76.43b        | 62.52             | 148.00b         | 31.32b         | .50       | .00           | .00       |
| MT 85126 CST//FRD1655/OLESE | 75.59b        | 60.83             | 152.75b         | 41.86          | .50       | .00           | .00       |
| CI 17439 ROUGHRIDER         | 75.04b        | 61.70             | 153.50b         | 46.89          | 2.00a     | 2.00a         | 41.00a    |
| MT 8585 CST//FRD1628/OLESE  | 74.59b        | 60.15             | 153.00b         | 42.06          | .37       | .00           | .00       |
| RH845455 RH 845455          | 74.49b        | 61.08             | 150.00b         | 37.43b         | .12       | .00           | .00       |
| MT 8519 CST//FRD1628/OLESE  | 74.47b        | 61.35             | 153.00b         | 42.16          | .63       | .00           | .00       |
| CI 13670 WINALTA            | 69.99b        | 61.68             | 151.75b         | 46.39          | .50       | .00           | .00       |
| ND 7687 AGASSIZ             | 67.15b        | 61.65             | 153.75          | 47.08          | .50       | .00           | .00       |

|           |        |       |         |        |        |        |        |
|-----------|--------|-------|---------|--------|--------|--------|--------|
| $\bar{X}$ | 85.05  | 61.32 | 151.05  | 40.42  | .48    | .23    | 6.62   |
| F value   | 4.08** | 1.45* | 19.99** | 6.89** | 2.09** | 3.79** | 3.05** |
| C.V.%     | 4.56   | 1.73  | .40     | 3.87   | 52.76  | 23.24  | 41.07  |
| L.S.D.    | 10.83  | 2.95  | 1.70    | 4.37   | .70    | .80    | 26.06  |

1/ Check variety for comparison

2/ F value for variety comparison

\*\* Indicates statistical significance at the .05 probability level

a/ Values significantly greater than the check at the .01 level

b/ Values significantly less than the check at the .01 level



Table 6. Agronomic data compiled from the three offstation winter wheat trials of 1987. Yield ( Bu/A ).

| CI or<br>State # | VARIETY          | YIELD BUSHEL PER ACRES |       |        | $\bar{X}$<br>YIELD |
|------------------|------------------|------------------------|-------|--------|--------------------|
|                  |                  | STILL                  | LAKE  | RAVA.  |                    |
| CI 17902         | WINRIDGE 1/      | 56.73                  | 43.32 | 15.45  | 38.5               |
| CI 17860         | NEELEY           | 56.48                  | 44.05 | 21.57  | 40.7               |
| MT 8030          | TX65A268/FRD//YT | 53.53                  | 45.50 | 12.72  | 37.3               |
| MT 8039          | LCO/FRD//NE69559 | 53.42                  | 39.25 | 24.62a | 39.1               |
| NA 200           | HAWK             | 51.73                  | 45.45 | 6.40b  | 34.5               |
| CI 15075         | CENTURK          | 50.98                  | 33.22 | 10.57  | 31.6               |
| CI 8885          | CHEYENNE         | 50.83                  | 40.77 | 25.02a | 38.9               |
| CI 17727         | WESTON           | 50.43                  | 46.03 | 14.23  | 36.9               |
| CI 17844         | REDWIN           | 50.38                  | 37.33 | 18.97  | 35.6               |
| NA 1316          | ROCKY            | 48.35                  | 38.17 | 7.82   | 31.4               |
| MT 8003          | REDWIN SELN      | 48.33                  | 38.57 | 22.15  | 36.4               |
| CI 13670         | WINALTA          | 47.82                  | 40.18 | 14.27  | 34.1               |
| CI 17735         | NORSTAR          | 47.43                  | 45.40 | 18.20  | 37.0               |
| NA 0001          | THUNDERBIRD      | 45.88                  | 37.75 | 7.57b  | 30.4               |
| PI491532         | CREE             | 44.78                  | 42.12 | 15.82  | 34.2               |
| NA 201           | ARCHER           | 33.97                  | 42.57 | 4.33b  | 26.9               |
| PI491533         | NORWIN           | 32.50                  | 44.33 | 18.70  | 31.8               |

|                    |       |       |        |
|--------------------|-------|-------|--------|
| EXPERIMENTAL MEANS | 48.45 | 44.41 | 15.20  |
| F TEST FOR VAR. 2/ | 1.25  | .68   | 5.62** |
| S.E. $\bar{X}$     | 5.91  | 4.42  | 2.68   |
| C.V. 2:            | 12.19 | 10.68 | 17.66  |
| LSD (0.05)         | 17.02 | 12.74 | 7.73   |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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

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

Table 7. Agronomic data compiled from the three offstation winter wheat trials of 1987. Test weights ( lbs/bu ).

| CI or<br>State # | VARIETY          | Test weights - Lbs/Bu |        |       | $\bar{X}$<br>Test wt |
|------------------|------------------|-----------------------|--------|-------|----------------------|
|                  |                  | Still                 | Lake   | Raval |                      |
| CI 17902         | WINRIDGE 1/      | 56.10                 | 58.37  | 61.50 | 58.7                 |
| CI 17860         | NEELEY           | 56.77                 | 60.50a | 60.50 | 59.3                 |
| MT 8030          | TX65A268/FRD//YT | 57.20                 | 61.27a | 60.00 | 59.5                 |
| MT 8039          | LCO/FRD//NE69559 | 55.30                 | 59.17  | 59.50 | 58.0                 |
| NA 200           | HAWK             | 58.77a                | 60.10a | 61.80 | 60.2                 |
| CI 15075         | CENTURK          | 57.60a                | 58.27a | 60.50 | 58.8                 |
| CI 8885          | CHEYENNE         | 57.60a                | 59.17  | 62.50 | 59.8                 |
| CI 17727         | WESTON           | 58.43a                | 61.03a | 62.00 | 60.5                 |
| CI 17844         | REDWIN           | 58.03a                | 60.90a | 61.00 | 60.0                 |
| NA 1316          | ROCKY            | 57.60a                | 58.57  | 58.50 | 58.2                 |
| MT 8003          | REDWIN SELN      | 57.10                 | 61.17a | 61.50 | 59.9                 |
| CI 13670         | WINALTA          | 59.03a                | 61.00a | 60.50 | 60.2                 |
| CI 17735         | NORSTAR          | 57.37a                | 60.70a | 60.30 | 59.5                 |
| NA 0001          | THUNDERBIRD      | 58.60a                | 59.67a | 61.80 | 60.0                 |
| PI491532         | CREE             | 57.87a                | 60.00a | 60.80 | 59.6                 |
| NA 201           | ARCHER           | 55.10                 | 59.50a | 60.00 | 58.2                 |
| PI491533         | NORWIN           | 58.47a                | 61.43a | 61.00 | 60.3                 |

|                    |        |       |     |
|--------------------|--------|-------|-----|
| EXPERIMENTAL MEANS | 57.47  | 60.05 | 0.0 |
| F TEST FOR VAR. 2/ | 7.49** | 9.52  | 0.0 |
| S.E. X             | .42    | .34   | 0.0 |
| C.V. 2:            | .72    | .57   | 0.0 |
| LSD (0.05)         | 1.20   | .99   | 0.0 |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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

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



Table 8. Agronomic data compiled from the three offstation winter wheat trials of 1987. Height ( Inches ).

| CI or<br>State # | VARIETY          | Plant Height ( Inches ) |        |       | $\bar{X}$<br>Height |
|------------------|------------------|-------------------------|--------|-------|---------------------|
|                  |                  | Still                   | Lake   | Raval |                     |
| CI 17902         | WINRIDGE 1/      | 36.2                    | 29.40  | 16.93 | 27.5                |
| CI 17860         | NEELEY           | 32.3b                   | 28.22  | 14.44 | 25.0                |
| MT 8030          | TX65A268/FRD//YT | 30.3b                   | 28.48  | 15.22 | 24.7                |
| MT 8039          | LCD/FRD//NE69559 | 32.9b                   | 28.48  | 21.26 | 27.5                |
| NA 200           | HAWK             | 30.4b                   | 24.80b | 12.34 | 22.5                |
| CI 15075         | CENTURK          | 33.9b                   | 23.62b | 16.01 | 24.5                |
| CI 8885          | CHEYENNE         | 34.5                    | 35.04a | 21.78 | 30.4                |
| CI 17727         | WESTON           | 35.3                    | 30.84  | 19.42 | 28.5                |
| CI 17844         | REDWIN           | 32.8b                   | 32.02  | 16.54 | 27.1                |
| NA 1316          | ROCKY            | 34.6                    | 27.03  | 13.25 | 25.0                |
| MT 8003          | REDWIN SELN      | 32.5b                   | 32.15  | 17.85 | 27.5                |
| CI 13670         | WINALTA          | 35.4                    | 35.30a | 15.75 | 28.8                |
| CI 17735         | NORSTAR          | 38.3a                   | 40.03a | 18.90 | 32.4                |
| NA 0001          | THUNDERBIRD      | 30.3b                   | 26.51  | 12.07 | 23.0                |
| PI491532         | CREE             | 33.7b                   | 33.86a | 15.22 | 27.6                |
| NA 201           | ARCHER           | 27.2b                   | 24.28b | 11.68 | 21.1                |
| PI491533         | NORWIN           | 20.6b                   | 22.44b | 14.96 | 19.3                |

|                    |      |       |       |
|--------------------|------|-------|-------|
| EXPERIMENTAL MEANS | 32.4 | 29.56 | 16.10 |
| F TEST FOR VAR. 2/ | 34.8 | 19.88 | 2.40  |
| S.E. X             | 0.0  | 1.07  | 1.94  |
| C.V. 2:            | 2.10 | 3.61  | 12.08 |
| LSD (0.05)         | 1.97 | 3.07  | 5.60  |

1/ Check variety

2/ F value for variety comparison

\*\* Indicates statistical significance at the .01 level of probability

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

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

PROJECT TITLE: Dwarf Bunt Tillage Study

YEAR/PROJECT: 1987/756 Small Grain Production

PROJECT PERSONNEL: Leader - Vern R. Stewart, Todd K. Keener, Northwestern Agricultural Research Center, Kalispell, MT.

#### SUMMARY:

Dwarf bunt (*Tilletia controversa* Kuhn) infection levels were low this year and percent smut ratings were not above 1.6% for any tillage practice. Yields were slightly below those of the previous year and were significantly higher in the conventional and minimum tillage plots.

#### RESEARCH METHODS:

Five tillage techniques are evaluated in the dwarf bunt tillage study. They are two conventional tillage practices involving fall versus spring plowing, a minimum tillage technique, a local technique using shallow discing tools, and a no-till procedure. The plots were planted after fall seedbed preparation was completed. The variety Hawk was used in 1987 because of its susceptibility to TCK smut. The first year's yields from this test were obtained in August of 1984. The second, third, and fourth year measurements were taken in August also of 1985, 1986, and 1987 respectively.

#### RESULTS:

With dwarf bunt infection levels down again this year it was difficult to make evaluations on the effect of tillage on disease level. Smut levels of 1.6% and 1.5% were found in the conventional tillage II and minimum tillage plots respectively. Yields, test weights, plant and head counts were all lower than previous years due to low plant populations. Yield data was not obtained from the no-till plots due to severe infestations of downy brome and jointed goatgrass. Yields were significantly higher in all other treatments when compared to the Claridge technique.

#### FUTURE PLANS:

The fifth 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



Table 1. ( Cont'd ) Description of tillage techniques

## 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 Melroe drill ( no-till drill )

Table 2. Agronomic data from the TCK Tillage study grown on the Oscar Buller farm in 1984, 1985, 1986, and 1987 in Kalispell, MT.

| Tillage Technique | 1984  | Yield 1985 | Bushel / Acre 1986 | 1987   | $\bar{X}$ |
|-------------------|-------|------------|--------------------|--------|-----------|
| Conventional I    | 40.0a | 42.1a      | 73.6               | 62.0a  | 54.4      |
| Conventional II   | 29.7a | 47.7a      | 86.6a              | 58.1a  | 40.8      |
| Minimum Tillage   | 26.9a | 21.6       | 64.3               | 50.5a  | 40.8      |
| Claridge Tech.    | 29.8a | 41.4a      | 85.6a              | 40.7   | 49.4      |
| No-Till           | 11.1  | 25.2       | -----              | -----  | 18.2      |
| $\bar{X}$         | 27.5  | 35.6       | 77.5               | 52.8   |           |
| F                 | 4.33* | 49.6**     | 3.65*              | 18.2** |           |
| C.V.%             | 18.28 | 4.58       | 7.51               | 4.17   |           |
| L.S.D.            | 18.07 | 5.32       | 15.18              | 7.62   |           |

\* Indicates statistical significance at the .05 level of probability

\*\* Indicates statistical significance at the .01 level of probability

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

Table 3. Agronomic data from the TDK Tillage study grown on the Oscar Buller farm in 1984, 1985, 1986, and 1987 in Kalispell, MT.

| Tillage<br>Technique | Test weights Lbs/Bu |      |      | $\bar{X}$ |
|----------------------|---------------------|------|------|-----------|
|                      | 1985                | 1986 | 1987 |           |
| Conventional I       | 58.3                | 62.3 | 59.0 | 59.9      |
| Conventional II      | 56.8                | 61.9 | 60.2 | 59.6      |
| Minimum Tillage      | 56.7                | 59.8 | 59.1 | 58.5      |
| Claridge Tech.       | 55.6                | 61.8 | 58.6 | 58.7      |
| No-Till              | 54.3                | ---- | ---- | 54.3      |
| $\bar{X}$            | 56.3                | 61.4 | 59.2 | 59.0      |
| F                    | 1.32                | 2.82 | .526 |           |
| C.V.%                | 2.33                | 1.10 | 1.57 |           |
| L.S.D.               | NS                  | NS   | NS   |           |

Table 4. Agronomic data from the TDK Tillage study grown on the Oscar Buller farm in 1984, 1985, 1986, and 1987 in Kalispell, MT.

| Tillage<br>Technique | Head counts per 3 feet of row |       |      |      | $\bar{X}$ |
|----------------------|-------------------------------|-------|------|------|-----------|
|                      | 1984                          | 1985  | 1986 | 1987 |           |
| Conventional I       | 49.5a                         | 40.8  | 45.2 | 19.2 | 38.7      |
| Conventional II      | 42.8a                         | 49.2a | 49.4 | 19.8 | 40.3      |
| Minimum Tillage      | 26.8                          | 29.0  | 41.7 | 20.7 | 29.6      |
| Claridge Tech.       | 34.2                          | 52.1a | 48.6 | 17.7 | 38.2      |
| No-Till              | 19.6                          | 38.5  | ---- | ---- | 29.1      |
| $\bar{X}$            | 34.57                         | 41.9  | 46.2 | 19.3 |           |
| F                    | 6.89*                         | 3.24* | .58  | .566 |           |
| C.V.%                | 17.23                         | 12.17 | 10.1 | 8.70 |           |
| L.S.D.               | 18.94                         | 16.23 | NS   | NS   |           |

\* Indicates statistical significance at the .05 level of probability  
 a/ Values significantly greater than the check at the .05 level



Table 5. Agronomic data from the TCK Tillage study grown on the Oscar Buller farm in 1984, 1985, 1986, and 1987 in Kalispell, MT.

| Tillage Technique | 1984 | Smut counts per 3 feet of row |      |      | $\bar{X}$ |
|-------------------|------|-------------------------------|------|------|-----------|
|                   |      | 1985                          | 1986 | 1987 |           |
| Conventional I    | 2.3  | 1.4                           | .4   | 0    | 1.37      |
| Conventional II   | 3.2  | 3.3                           | .5   | .3   | 1.83      |
| Minimum Tillage   | 1.3  | .3                            | .3   | .3   | .63       |
| Claridge Tech.    | 6.7  | .2                            | .2   | 0    | 1.8       |
| No-Till           | 1.4  | 0                             | ---- | ---- | .7        |
| <hr/>             |      |                               |      |      |           |
| X                 | 3.03 | 1.04                          | .38  | .17  |           |
| F                 | 2.40 | ----                          | .29  | .66  |           |
| C.V.%             | 46.1 | ----                          | 70.1 | .66  |           |
| L.S.D.            | NS   | ----                          | NS   | NS   |           |

Table 6. Agronomic data from the TCK Tillage study grown on the Oscar Buller farm in 1984, 1985, 1986, and 1987 in Kalispell, MT.

| Tillage Technique | 1984 | % Smut per 3 feet of row |      |       | $\bar{X}$ |
|-------------------|------|--------------------------|------|-------|-----------|
|                   |      | 1985                     | 1986 | 1987  |           |
| Conventional I    | 4.6  | 3.4                      | 1.0  | 0     | 2.25      |
| Conventional II   | 7.5  | 6.8a                     | 1.1  | 1.6   | 4.25      |
| Minimum Tillage   | 6.0  | 1.1                      | .8   | 1.5   | 2.35      |
| Claridge Tech.    | 19.6 | 4.5                      | .5   | 0     | 6.15      |
| No-Till           | 7.1  | 0                        | ---- | ----  | 6.15      |
| <hr/>             |      |                          |      |       |           |
| X                 | 8.96 | 3.15                     | .8   | .8    |           |
| F                 | 2.46 | 3.55*                    | .21  | .57   |           |
| C.V.%             | 48.5 | 45.5                     | 44.2 | 152.9 |           |
| L.S.D.            | NS   | 4.68                     | NS   | NS    |           |

\* Indicates statistical significance at the .05 level of probability  
 a/ Values significantly greater than the check at the .05 level

YEAR/PROJECT: 1987/755 Forage Crop Investigations

PROJECT PERSONNEL: Leader - Leon E. Welty  
Research Specialist - Louise S. Prestbye

Irrigated Alfalfa Variety Trial - Seeded 1984

Twenty-five alfalfa varieties (seven with Verticillium wilt resistance) were seeded in April 1984. Two hundred and sixty pounds of P<sub>2</sub>O<sub>5</sub> (0-44-0) were disked down prior to seeding. In fall of 1986, 88 lbs/a P<sub>2</sub>O<sub>5</sub>, 100 lbs/a K<sub>2</sub>O and 50 lbs/a S were applied. Eptam and 2,4-DB were used to control weeds during the establishment period. A dormant application of Sencor was applied in fall of 1986 to control broadleaf and grassy weeds (primarily quackgrass, bluegrass and dandelion). Total forage yields for the 4-year period ranged from 21 T/A to 25.5 T/A. Verticillium wilt was present in the nursery in 1985, caused minor yield reductions in 1986 and severely reduced yields in 1987. Of the top yielding varieties in 1987, six had some degree of resistance to Verticillium wilt. Baker, which was not reported to have resistance had the fourth highest yields in 1987. Maxim's Verticillium resistance seemed to break down in 1987. Of the seven varieties with resistance, three were especially productive, DK-135, Oneida VR and Arrow.

Dryland Alfalfa Variety Trial - Seeded 1984

A duplicate nursery of the one just discussed was seeded on dryland in 1984. Fertilizer and herbicide applications were the same as for the irrigated nursery. Yields for the four year period ranged from 16 T/A to 17.9 T/A, approximately 6 T/A less than the irrigated nursery. A few plants had Verticillium wilt in 1987, but the disease did not reduce yields. There were no significant yield differences among varieties in any year of the experiment.

Dryland Alfalfa Variety Trial - Seeded 1980

Seventeen varieties were established on dryland in 1980. One hundred and thirty pounds of P<sub>2</sub>O<sub>5</sub> were disked down prior to seeding. Fertilizer applications since the year of seeding were as follows: fall 1981 - 52 lbs/a P<sub>2</sub>O<sub>5</sub>; spring 1984 - 90 lbs/a P<sub>2</sub>O<sub>5</sub>, 50 lbs/a K<sub>2</sub>O, 40 lbs/a S; fall 1986 - 88 lbs/a P<sub>2</sub>O<sub>5</sub>, 120 lbs/a K<sub>2</sub>O, 50 lbs/a S. Eptam and 2,4-DB were used the seeding year. Dormant applications of Sencor were applied in 1984 and 1986. Total yields for the eight year period ranged from 24 T/A (Ranger) to 31 T/A (Vancor). Four varieties, Vancor, Thor, Spredor II and Armor produced over 30 T/A. Yields in 1987 ranged from 4.69 T/A (Ranger) to 6.20 T/A (Baker). Some Verticillium wilt is showing up in this nursery and I expect will significantly reduce stands in 1988.



### Irrigated Alfalfa Variety Trial - Seeded 1985

Eight varieties representing a range of winterhardiness from non-hardy (southern varieties) to very hardy (northern varieties) were established in 1985. Fertilizer and herbicide applications were similar to the previous variety trials. Total yields for the three-year period ranged from 11 T/A for Cuf 101 (most non-dormant variety) to 14.5 T/A for Saranac AR (hardy northern variety). Yields in 1987 ranged from 4.6 T/A to 6.2 T/A for the same two varieties. Surprisingly, the non-dormant varieties were surviving the winters at Kalispell. This is due to adequate snow cover, I am sure. The non-dormant varieties are weak in the spring - poorer stands and less vigorous but seem to recover by mid-growing season. It is just a matter of time until the non-dormants freeze out. Also, Verticillium wilt is showing up in the nursery which will probably confound the winterhardiness test.

### Irrigated Alfalfa Variety Trial - Seeded 1986

Sixteen new varieties, most with resistance to Verticillium wilt, Phytophthora root rot and stem nematode were chemically established in 1986. One hundred and eighty pounds of  $P_2O_5$  were disked down prior to seeding. Imidan was applied on July 2 for alfalfa weevil control in 1986. Excalibur and Verta+ yielded over 4 T/A in 1986. In 1987, all varieties yielded over 7 T/A and Excalibur yielded more than 8 T/A. Many of the new varieties yielded significantly more than Vernal and Ladak-65. Some Verticillium wilt was evident in non-resistant varieties in 1987.

### Cereal Forage Trial

Oat, barley, wheat and triticale were evaluated for forage production in 1985, 1986 and 1987. Generally, oats produced more dry matter but had lower protein than the other cereal forages. A new hooded Betzes (Haybet) produced more forage than other barleys. Welsh triticale produced the least forage in 1986, but was comparable in production to Ridawn barley and Monida oats in 1987. Generally, it takes about 75-85 days from planting for the cereal forages to reach the milk dough stage.

## 1984 INTRASTATE ALFALFA YIELD TRIAL - IRRIGATED - KALISPELL, MT

| VARIETY                                    | 1987 YIELDS - t/a |         |         | TOTAL |
|--------------------------------------------|-------------------|---------|---------|-------|
|                                            | 1ST CUT           | 2ND CUT | 3RD CUT |       |
| DK-135 *                                   | 2.82              | 2.51    | 2.81    | 8.14  |
| ONEIDA VR *                                | 2.73              | 2.51    | 2.72    | 7.96  |
| ARROW *                                    | 2.71              | 2.16    | 2.69    | 7.56  |
| BAKER                                      | 2.68              | 2.18    | 2.48    | 7.34  |
| WL 316 *                                   | 2.68              | 2.24    | 2.39    | 7.31  |
| COMMANDOR *                                | 2.60              | 2.10    | 2.20    | 6.89  |
| WRANGLER *                                 | 2.46              | 1.92    | 1.88    | 6.26  |
| ADVANTAGE                                  | 2.68              | 1.95    | 1.58    | 6.20  |
| DK-120                                     | 2.42              | 1.86    | 1.81    | 6.08  |
| LADAK 65                                   | 2.41              | 1.68    | 1.87    | 5.96  |
| 526                                        | 2.40              | 1.80    | 1.68    | 5.87  |
| IROQUOIS                                   | 2.32              | 1.88    | 1.58    | 5.78  |
| PHYTOR                                     | 2.64              | 1.83    | 1.31    | 5.78  |
| MAXIM *                                    | 2.26              | 1.90    | 1.49    | 5.65  |
| BEAVER                                     | 2.33              | 1.73    | 1.57    | 5.62  |
| MOHAWK                                     | 2.51              | 1.71    | 1.38    | 5.60  |
| DECATHLON                                  | 2.16              | 1.78    | 1.63    | 5.57  |
| SPECTRUM                                   | 2.11              | 1.78    | 1.64    | 5.53  |
| JUBILEE                                    | 2.12              | 1.87    | 1.53    | 5.51  |
| 532                                        | 2.25              | 1.76    | 1.50    | 5.51  |
| CHALLENGER                                 | 2.37              | 1.72    | 1.42    | 5.51  |
| NY 8302                                    | 2.35              | 1.79    | 1.35    | 5.49  |
| VERNAL                                     | 2.08              | 1.69    | 1.40    | 5.16  |
| DRUMMOR                                    | 2.10              | 1.57    | 1.12    | 4.79  |
| THOR                                       | 2.04              | 1.52    | 1.20    | 4.76  |
| LSD(0.05)                                  | 0.33              | 0.27    | 0.30    | 0.76  |
| F-VALUE                                    | 0.00              | 0.00    | 0.00    | 0.00  |
| CV (S/MEAN)                                | 9.8%              | 10.1%   | 11.9%   | 8.8%  |
| Harvest Date                               | 6/11              | 7/20    | 9/23    |       |
| * Varieties that have Vert wilt resistance |                   |         |         |       |

## NOTES

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Planting Date: 4/24/84

Previous crop: Fallow

Fertilizer: Spring 1984 - 260 lbs/a P205

Fall 1986 - 88 lbs/a P205, 100 lbs/a K20, 50 lbs/a S

Seeding rate: 10 lbs PLS/a

Herbicides: 1984 - Eptam + 2,4-DB

10/14/86 - Sencor - 1 lb AI/a

10/20/87 - Sencor - 1 lb AI/a

Crop year precipitation: 21.97 inches



## 1984 INTRASTATE ALFALFA YIELD TRIAL - IRRIGATED - KALISPELL, MT

| VARIETY     | YIELDS - t/a |      |      |      | TOTAL |
|-------------|--------------|------|------|------|-------|
|             | 1984         | 1985 | 1986 | 1987 |       |
| DK-135 *    | 4.06         | 6.76 | 6.56 | 8.14 | 25.52 |
| ONEIDA VR * | 3.72         | 6.93 | 6.10 | 7.96 | 24.71 |
| ARROW *     | 4.02         | 6.74 | 6.17 | 7.56 | 24.49 |
| WL 316 *    | 3.60         | 6.94 | 6.06 | 7.31 | 23.91 |
| BAKER       | 3.94         | 6.44 | 6.01 | 7.34 | 23.73 |
| 526         | 4.04         | 7.32 | 6.08 | 5.87 | 23.31 |
| COMMANDOR * | 3.78         | 6.66 | 5.98 | 6.89 | 23.31 |
| ADVANTAGE   | 3.89         | 6.87 | 5.81 | 6.20 | 22.77 |
| IROQUOIS    | 3.81         | 6.98 | 5.88 | 5.78 | 22.45 |
| MAXIM *     | 4.01         | 6.87 | 5.87 | 5.65 | 22.40 |
| DECATHLON   | 3.97         | 7.03 | 5.78 | 5.57 | 22.35 |
| DK-120      | 3.78         | 6.61 | 5.87 | 6.08 | 22.34 |
| 532         | 3.66         | 7.11 | 5.78 | 5.51 | 22.06 |
| SPECTRUM    | 4.07         | 7.02 | 5.42 | 5.53 | 22.04 |
| WRANGLER *  | 3.70         | 6.37 | 5.71 | 6.26 | 22.04 |
| PHYTOR      | 3.83         | 6.45 | 5.90 | 5.78 | 21.96 |
| CHALLENGER  | 4.04         | 6.79 | 5.60 | 5.51 | 21.94 |
| MOHAWK      | 3.92         | 6.83 | 5.54 | 5.60 | 21.89 |
| DRUMMOR     | 4.43         | 6.76 | 5.87 | 4.79 | 21.85 |
| NY 8302     | 3.70         | 6.96 | 5.61 | 5.49 | 21.76 |
| LADAK 65    | 3.63         | 6.10 | 5.61 | 5.96 | 21.30 |
| THOR        | 4.07         | 6.76 | 5.56 | 4.76 | 21.15 |
| JUBILEE     | 3.86         | 6.28 | 5.41 | 5.51 | 21.06 |
| VERNAL      | 3.76         | 6.49 | 5.60 | 5.16 | 21.01 |
| BEAVER      | 3.49         | 6.17 | 5.68 | 5.62 | 20.96 |
| LSD(0.05)   | 0.34         | 0.47 | 0.44 | 0.76 |       |
| P-VALUE     | 0.00         | 0.00 | 0.00 | 0.00 |       |
| CV (S/MEAN) | 6.20         | 4.90 | 5.35 | 8.8% |       |

\* Varieties that have vert wilt resistance

## NOTES

-----  
Planting date: 4/24/84

Previous crop: Fallow

Fertilizer: Spring 1984 - 260 lbs/a P205

Fall 1986 - 88 lbs/a P205, 100 lbs/a K20, 50 lbs/a S

Seeding rate: 10 lbs PLS/a

Herbicides: 1984 - Eptam + 2,4-DB

10/14/86 & 10/20/87 - Sencor - 1 lb AI/a

Crop year precipitation: 21.97 inches

1984 INTRASTATE ALFALFA YIELD TRIAL - DRYLAND - KALISPELL, MT

| VARIETY      | 1987 YIELDS - T/A |         |         | TOTAL |
|--------------|-------------------|---------|---------|-------|
|              | 1ST CUT           | 2ND CUT | 3RD CUT |       |
| 526          | 3.82              | 2.20    | 1.91    | 7.93  |
| MOHAWK       | 3.73              | 2.27    | 1.92    | 7.92  |
| COMMANDOR *  | 3.45              | 2.35    | 1.97    | 7.76  |
| DECATHLON    | 3.70              | 2.12    | 1.90    | 7.72  |
| DK-120       | 3.69              | 2.16    | 1.83    | 7.67  |
| NY 8302      | 3.60              | 2.24    | 1.83    | 7.66  |
| WL 316 *     | 3.50              | 2.32    | 1.84    | 7.66  |
| THOR         | 3.65              | 2.18    | 1.82    | 7.64  |
| 532          | 3.53              | 2.21    | 1.85    | 7.59  |
| BEAVER       | 3.76              | 2.13    | 1.67    | 7.56  |
| DK-135 *     | 3.44              | 2.13    | 1.90    | 7.47  |
| PHYTOR       | 3.46              | 2.12    | 1.88    | 7.46  |
| WRANGLER *   | 3.54              | 2.03    | 1.86    | 7.42  |
| ARROW *      | 3.43              | 2.09    | 1.90    | 7.42  |
| DRUMMOR      | 3.34              | 2.20    | 1.86    | 7.40  |
| LADAK 65     | 3.67              | 2.08    | 1.65    | 7.40  |
| VERNAL       | 3.52              | 2.12    | 1.70    | 7.34  |
| BAKER        | 3.58              | 1.96    | 1.79    | 7.33  |
| SPECTRUM     | 3.22              | 2.15    | 1.96    | 7.33  |
| ADVANTAGE    | 3.47              | 2.07    | 1.77    | 7.31  |
| MAXIM *      | 3.43              | 2.12    | 1.76    | 7.31  |
| CHALLENGER   | 3.38              | 2.09    | 1.84    | 7.30  |
| JUBILEE      | 3.22              | 2.10    | 1.96    | 7.28  |
| IROQUOIS     | 3.41              | 2.11    | 1.75    | 7.27  |
| ONEIDA VR *  | 3.25              | 2.12    | 1.84    | 7.21  |
| LSD(0.05)    | 0.31              | 0.25    | 0.28    | 0.65  |
| P-VALUE TRTS | 0.00              | 0.53    | 0.80    | 0.71  |
| CV (SE/MEAN) | 3.12              | 4.07    | 5.45    | 3.06  |
| Harvest Date | 6/18              | 7/29    | 9/30    |       |

\* Varieties that have Vert wilt resistance

NOTES:

Fertilizer: Spring 1984 - 260 lbs/a P205  
Fall 1986 - 88 lbs/a P205, 100 lbs/a K20,  
50 lbs/a S

Herbicides: 1984 - Eptam + 2,4-DB  
10/14/86 - Sencor - 1 lb AI/a  
10/20/87 - Sencor - 1 lb AI/a

Crop year precipitation (Sept.1986-Aug.1987): 21.97 in.



## 1984 INTRASTATE ALFALFA YIELD TRIAL - DRYLAND - KALISPELL, MT

| VARIETY      | 1984          | 1985 | 1986 | 1987 | TOTAL |
|--------------|---------------|------|------|------|-------|
|              | -----t/a----- |      |      |      |       |
| 532          | 1.20          | 4.96 | 5.31 | 7.59 | 17.86 |
| WL 316 *     | 1.12          | 4.88 | 5.28 | 7.66 | 17.82 |
| THOR         | 1.16          | 4.87 | 5.13 | 7.64 | 17.64 |
| MOHAWK       | 1.14          | 4.62 | 5.09 | 7.92 | 17.63 |
| WRANGLER     | 1.23          | 4.88 | 5.21 | 7.42 | 17.51 |
| DK-135 *     | 1.18          | 4.60 | 5.18 | 7.47 | 17.25 |
| DK-120       | 1.15          | 4.57 | 5.00 | 7.67 | 17.24 |
| 526          | 1.07          | 4.46 | 4.84 | 7.93 | 17.23 |
| IROQUOIS     | 1.09          | 4.58 | 5.36 | 7.27 | 17.21 |
| SPECTRUM     | 1.19          | 4.60 | 5.27 | 7.33 | 17.20 |
| COMMANDOR *  | 1.10          | 4.47 | 4.90 | 7.76 | 17.13 |
| DECATHLON    | 1.12          | 4.59 | 4.78 | 7.72 | 17.09 |
| MAXIM *      | 1.10          | 4.48 | 5.29 | 7.31 | 17.08 |
| ADVANTAGE    | 1.19          | 4.62 | 5.13 | 7.31 | 17.06 |
| JUBILEE      | 1.23          | 4.63 | 5.12 | 7.28 | 17.03 |
| DRUMMOR      | 1.25          | 4.76 | 4.86 | 7.40 | 17.02 |
| ARROW *      | 1.04          | 4.46 | 5.07 | 7.42 | 16.95 |
| BEAVER       | 1.20          | 4.32 | 4.96 | 7.56 | 16.84 |
| VERNAL       | 1.15          | 4.32 | 5.13 | 7.34 | 16.79 |
| PHYTOR       | 1.17          | 4.22 | 4.97 | 7.46 | 16.65 |
| BAKER        | 1.23          | 4.50 | 4.79 | 7.33 | 16.62 |
| LADAK 65     | 1.28          | 4.15 | 4.93 | 7.40 | 16.48 |
| NY 8302      | 1.06          | 4.09 | 4.53 | 7.66 | 16.28 |
| CHALLENGER   | 1.16          | 4.32 | 4.54 | 7.30 | 16.16 |
| ONEIDA VR *  | 1.02          | 4.21 | 4.71 | 7.21 | 16.13 |
| LSD(0.05)    | 0.16          | 0.55 | 0.65 | 0.65 |       |
| P-VALUE TRTS | 0.15          | 0.10 | 0.48 | 0.71 |       |
| CV(SE/Mean)  | 4.9%          | 4.3% | 4.6% | 3.1% |       |

\* Varieties that have Vert Wilt resistance

## NOTES:

Fertilizer: Spring 1984 - 260 lbs/a P205  
 Fall 1986 - 88 lbs/a P205, 100 lbs/a K20,  
 50 lbs/a S

Herbicides: 1984 - Eptam + 2,4-DB  
 10/14/86 - Sencor - 1 lb AI/a  
 10/20/87 - Sencor - 1 lb AI/a

Crop year precipitation (Sept.1986-Aug.1987): 21.97 inches

DRYLAND ALFALFA VARIETY TRIAL - SEEDED 1980 - KALISPELL, MT

| VARIETY      | 1987 YIELDS - T/A |         |         | TOTAL |
|--------------|-------------------|---------|---------|-------|
|              | 1ST CUT           | 2ND CUT | 3RD CUT |       |
| BAKER        | 3.05              | 1.30    | 1.85    | 6.20  |
| ARMOR        | 2.83              | 1.59    | 1.63    | 6.04  |
| VANCOR       | 2.75              | 1.34    | 1.74    | 5.82  |
| LADAK-65     | 3.20              | 1.18    | 1.36    | 5.74  |
| ANCHOR       | 2.79              | 1.48    | 1.37    | 5.63  |
| CASCADE      | 2.61              | 1.36    | 1.64    | 5.61  |
| WL 220       | 2.63              | 1.31    | 1.54    | 5.48  |
| SPECTRUM     | 2.72              | 1.26    | 1.49    | 5.47  |
| SUPER 721    | 2.62              | 1.32    | 1.42    | 5.36  |
| THOR         | 2.81              | 1.27    | 1.28    | 5.36  |
| CLASSIC      | 2.76              | 1.07    | 1.46    | 5.29  |
| SPREDOR II   | 3.02              | 1.14    | 1.13    | 5.28  |
| VERNAL       | 2.72              | 1.28    | 1.28    | 5.28  |
| PERRY        | 2.85              | 1.10    | 1.29    | 5.24  |
| RAIDOR       | 2.45              | 1.17    | 1.37    | 4.99  |
| MARATHON     | 2.41              | 1.10    | 1.33    | 4.83  |
| RANGER       | 2.38              | 1.08    | 1.24    | 4.69  |
| LSD (0.05)   | 0.23              | 0.35    | 0.41    | 0.83  |
| P-VALUE TRTS | 0.00              | 0.19    | 0.07    | 0.06  |
| CV (SE/MEAN) | 3.01              | 9.73    | 10.07   | 5.38  |

FERTILIZER: Spring 1980 - 132 lbs/a P205

Fall 1981 - 52 lbs/a P205

Spring 1984 - 90 lbs/a P205, 50 lbs/a K20, 40 lbs/a S

Fall 1986 - 88 lbs/a P205, 120 lbs/a K20, 50 lbs/a S

HERBICIDES: 1980 - Eptam + 2,4-DB

Fall 1984, 1986, 1987 - Sencor - 1 lb AI/a



DRYLAND ALFALFA VARIETY TRIAL - SEEDED 1980 - KALISPELL, MT

| VARIETY      | YIELDS - T/A |      |      |      |      |      |      |      | TOTAL |
|--------------|--------------|------|------|------|------|------|------|------|-------|
|              | 1980         | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |       |
| VANCOR       | 1.81         | 4.48 | 2.51 | 2.98 | 3.41 | 5.59 | 4.44 | 5.82 | 31.04 |
| THOR         | 1.99         | 4.73 | 2.75 | 2.71 | 3.32 | 5.17 | 4.42 | 5.36 | 30.45 |
| SPREDOR II   | 1.52         | 4.74 | 2.48 | 3.19 | 3.55 | 5.22 | 4.28 | 5.28 | 30.26 |
| ARMOR        | 1.79         | 4.14 | 2.34 | 2.91 | 3.12 | 5.36 | 4.49 | 6.04 | 30.19 |
| ANCHOR       | 1.70         | 4.53 | 2.68 | 2.65 | 3.05 | 5.04 | 4.56 | 5.63 | 29.84 |
| LADAK-65     | 1.48         | 4.29 | 2.81 | 3.31 | 3.19 | 4.76 | 4.26 | 5.74 | 29.84 |
| SPECTRUM     | 1.80         | 4.63 | 2.69 | 2.80 | 3.07 | 4.93 | 3.93 | 5.47 | 29.32 |
| CASCADE      | 1.86         | 3.90 | 2.42 | 2.67 | 3.09 | 5.52 | 4.24 | 5.61 | 29.31 |
| BAKER        | 1.81         | 4.07 | 2.30 | 2.61 | 3.01 | 5.04 | 4.26 | 6.20 | 29.30 |
| RAIDOR       | 1.84         | 4.40 | 2.40 | 2.86 | 3.33 | 5.43 | 3.93 | 4.99 | 29.18 |
| SUPER 721    | 1.45         | 3.99 | 2.44 | 2.85 | 3.00 | 5.35 | 4.21 | 5.36 | 28.65 |
| WL 220       | 1.69         | 4.02 | 2.01 | 2.46 | 3.40 | 4.99 | 4.06 | 5.48 | 28.11 |
| VERNAL       | 1.79         | 4.09 | 2.62 | 2.32 | 2.97 | 4.82 | 4.03 | 5.28 | 27.92 |
| PERRY        | 1.67         | 4.06 | 2.38 | 2.43 | 3.18 | 4.79 | 3.86 | 5.24 | 27.61 |
| CLASSIC      | 1.74         | 3.78 | 2.05 | 2.83 | 2.81 | 4.84 | 4.09 | 5.29 | 27.43 |
| MARATHON     | 1.66         | 4.07 | 2.39 | 2.44 | 2.86 | 4.52 | 3.53 | 4.83 | 26.30 |
| RANGER       | 1.34         | 3.38 | 2.32 | 2.34 | 2.41 | 4.20 | 3.50 | 4.69 | 24.18 |
| LSD(0.05)    |              | 0.49 | 0.72 | 0.61 | 0.92 | 1.26 | 0.86 | 0.83 |       |
| P-VALUE TRTS |              | 0.00 | 0.73 | 0.08 | 0.78 | 0.78 | 0.49 | 0.06 |       |
| CV(s/mean)   |              | 8.3  | 20.8 | 15.8 | 20.9 | 17.5 | 14.7 | 10.8 |       |

FERTILIZER: Spring 1980 - 132 lbs/a P205  
 Fall 1981 - 52 lbs/a P205  
 Spring 1984 - 90 lbs/a P205, 50 lbs/a K20, 40 lbs/a S  
 Fall 1986 - 88 lbs/a P205, 120 lbs/a K20, 50 lbs/a S

HERBICIDES: 1980 - Eptam + 2,4-DB  
 Fall 1984, 1986, 1987 - Sencor - 1 lb AI/a

## 1985 WESTERN REGIONAL ALFALFA YIELD TRIAL - IRRIGATED KALISPELL, MT

| VARIETY      | 1987 YIELDS - T/A |         |         | TOTAL |
|--------------|-------------------|---------|---------|-------|
|              | 1ST CUT           | 2ND CUT | 3RD CUT |       |
| MESILLA      | 1.99              | 1.75    | 2.49    | 6.23  |
| SARANAC AR   | 2.22              | 1.68    | 2.28    | 6.17  |
| VERNAL       | 2.36              | 1.63    | 2.00    | 5.99  |
| RANGER       | 2.14              | 1.72    | 2.06    | 5.92  |
| SPREDOR II   | 2.33              | 1.37    | 1.90    | 5.60  |
| LAHONTAN     | 1.65              | 1.64    | 1.91    | 5.20  |
| MDAPA 69     | 1.50              | 1.66    | 1.82    | 4.98  |
| CUF 101      | 1.18              | 1.58    | 1.87    | 4.62  |
| LSD(0.05)    | 0.25              | 0.21    | 0.27    | 0.44  |
| P-VALUE TRTS | 0.00              | 0.03    | 0.00    | 0.00  |
| CV (SE/MEAN) | 4.35              | 4.30    | 4.46    | 2.67  |
| Harvest Date | 6/2               | 7/13    | 9/23    |       |

Planting Date: 5/8/85

Previous Crop: Fallow

Fertilizer: 180 lbs/a P205

Seeding Rate: 12 lbs PLS/a

Herbicide: Eptam - 4 lbs AI/a preplant

Insecticide: Imidan - 1 lb. AI/a



## 1985 WESTERN REGIONAL ALFALFA YIELD TRIAL - IRRIGATED - KALISPELL, MT

| VARIETY     | 1985          | 1986 | 1987 | TOTAL |
|-------------|---------------|------|------|-------|
|             | -----t/a----- |      |      |       |
| SARANAC AR  | 3.04          | 5.36 | 6.17 | 14.57 |
| VERNAL      | 2.59          | 5.20 | 5.99 | 13.78 |
| MESILLA     | 2.62          | 4.82 | 6.23 | 13.67 |
| RANGER      | 2.61          | 4.85 | 5.92 | 13.38 |
| SPREDOR II  | 2.26          | 4.92 | 5.60 | 12.78 |
| MOAPA 69    | 2.59          | 3.89 | 4.98 | 11.46 |
| LAHONTAN    | 2.12          | 3.95 | 5.20 | 11.27 |
| CUF 101     | 2.68          | 3.96 | 4.62 | 11.26 |
| LSD(0.05)   | 0.46          | 0.62 | 0.44 |       |
| P-VALUE     | 0.02          | 0.00 | 0.00 |       |
| CV (S/MEAN) | 12.2%         | 9.0% | 5.3% |       |

Planting Date: 5/8/85

Previous Crop: Fallow

Fertilizer: Spring 1985 - 180 lbs/a P205

Fall 1987 - 53 lbs/a P205, 60 lbs/a K20,  
20 lbs/a S

Seeding Rate: 12 lbs PLS/a

Herbicide: Eptam + 2,4-DB

Fall 1986 &amp; 1987 - Sencor - 1 lb. AI/a

Insecticide: Imidan - 1 lb. AI/a 7/2/86

## 1986 INTRASTATE ALFALFA YIELD TRIAL - IRRIGATED - KALISPELL, 1987

| VARIETY      | MT# | HARVEST 1     | HARVEST 2 | HARVEST 3 | TOTAL |
|--------------|-----|---------------|-----------|-----------|-------|
|              |     | -----t/a----- |           |           |       |
| EXCALIBUR    | 178 | 2.75          | 2.33      | 3.06      | 8.14  |
| BLAZER       | 173 | 2.81          | 2.20      | 2.89      | 7.90  |
| SPARTA       | 174 | 2.76          | 2.15      | 2.96      | 7.87  |
| VERTA +      | 175 | 2.79          | 2.08      | 2.99      | 7.85  |
| ELEVATION    | 172 | 2.81          | 2.13      | 2.88      | 7.81  |
| EXP. 339     | 176 | 2.83          | 2.11      | 2.86      | 7.80  |
| THOR         | 1   | 2.86          | 2.13      | 2.80      | 7.78  |
| SPREDOR II   | 128 | 2.87          | 2.07      | 2.83      | 7.76  |
| CENTURION    | 177 | 2.78          | 2.15      | 2.81      | 7.73  |
| ANSTAR       | 180 | 2.57          | 2.14      | 2.95      | 7.65  |
| SURPASS      | 181 | 2.65          | 2.11      | 2.87      | 7.62  |
| VERNAL-K *   | 188 | 2.84          | 2.09      | 2.69      | 7.61  |
| WL 83-2      | 185 | 2.58          | 2.04      | 3.00      | 7.61  |
| APOLLO II    | 183 | 2.63          | 2.17      | 2.81      | 7.60  |
| THOROBRED    | 179 | 2.74          | 2.02      | 2.78      | 7.54  |
| WL 225       | 184 | 2.59          | 2.03      | 2.91      | 7.54  |
| AP 45        | 182 | 2.74          | 2.13      | 2.68      | 7.54  |
| NY 8413      | 187 | 2.64          | 2.18      | 2.70      | 7.52  |
| LADAK 65-K * | 190 | 2.87          | 1.96      | 2.54      | 7.37  |
| BAKER-K *    | 189 | 2.66          | 1.95      | 2.76      | 7.37  |
| WL 316       | 144 | 2.56          | 2.10      | 2.70      | 7.36  |
| LADAK 65     | 2   | 2.79          | 2.00      | 2.55      | 7.34  |
| NY 8412      | 186 | 2.59          | 2.02      | 2.67      | 7.28  |
| VERNAL       | 8   | 2.71          | 1.97      | 2.56      | 7.23  |
| BAKER        | 123 | 2.54          | 1.82      | 2.77      | 7.12  |
| LSD(0.05)    |     | 0.18          | 0.17      | 0.19      | 0.40  |
| P-VALUE TRTS |     | 0.00          | 0.00      | 0.00      | 0.00  |
| CV (SE/MEAN) |     | 2.31          | 2.98      | 2.42      | 1.87  |

Seeded 4/30/86

Seeding rate: 10 lbs/a

Fertilizer: Spring 1986 - 180 lbs/a P205

Fall 1987 - 120 lbs/a K20, 110 lbs/a P205,  
45 lbs/a S

\* 100 lbs/a K20 applied in spring of 1987

Herbicides: Eptam, + 2,4-DB - 4 lbs AI/a - 4/29/86

Sencor - 1 lb AI/a - 10/20/87

Crop year precipitation: 21.97 inches



## 1986 INTRASTATE ALFALFA YIELD TRIAL - IRRIGATED KALISPELL

| VARIETY      | VERT. WILT<br>RESIS. | YIELDS |                       | Total |
|--------------|----------------------|--------|-----------------------|-------|
|              |                      | 1986   | 1987<br>-----t/a----- |       |
| EXCALIBUR    | R                    | 4.12   | 8.14                  | 12.26 |
| VERTA +      | R                    | 4.13   | 7.85                  | 11.98 |
| SPARTA       | R                    | 3.88   | 7.87                  | 11.75 |
| EXP. 339     | R                    | 3.94   | 7.80                  | 11.74 |
| THOR         | S                    | 3.85   | 7.78                  | 11.63 |
| ELEVATION    | MR                   | 3.77   | 7.81                  | 11.58 |
| CENTURION    | R                    | 3.85   | 7.73                  | 11.58 |
| BLAZER       | ---                  | 3.63   | 7.90                  | 11.53 |
| APOLLO II    | MR                   | 3.81   | 7.60                  | 11.41 |
| WL 83-2      | R                    | 3.78   | 7.61                  | 11.39 |
| SPREDOR II   | S                    | 3.57   | 7.76                  | 11.33 |
| ANSTAR       | ---                  | 3.66   | 7.65                  | 11.31 |
| SURPASS      | R                    | 3.66   | 7.62                  | 11.28 |
| WL 225       | R                    | 3.64   | 7.54                  | 11.18 |
| NY 8413      | HR                   | 3.65   | 7.52                  | 11.17 |
| THOROBRED    | ---                  | 3.59   | 7.54                  | 11.13 |
| NY 8412      | HR                   | 3.85   | 7.28                  | 11.13 |
| VERNAL-K *   | S                    | 3.52   | 7.61                  | 11.13 |
| BAKER-K *    | S                    | 3.65   | 7.37                  | 11.02 |
| WL 316       | R                    | 3.61   | 7.36                  | 10.97 |
| AP 45        | R                    | 3.37   | 7.54                  | 10.91 |
| LADAK 65-K * | S                    | 3.36   | 7.37                  | 10.73 |
| VERNAL       | S                    | 3.47   | 7.23                  | 10.70 |
| BAKER        | S                    | 3.55   | 7.12                  | 10.67 |
| LADAK 65     | S                    | 3.27   | 7.34                  | 10.61 |
| LSD (0.05)   |                      | 0.26   | 0.40                  |       |
| P-VALUE TRTS |                      | 0.00   | 0.00                  |       |
| CV (SE/MEAN) |                      | 2.52   | 1.87                  |       |

Seeded 4/30/86

Seeding rate: 10 lbs/a

Herbicide: Eptam + 2,4-DB

Sencor - 1 lb AI/a - 10/20/87

Fertilizer: Spring 1986 - 180 lbs/a P205

Fall 1987 - 120 lbs/a K20, 110 lbs/a P205,  
45 lbs/a S

\* 100 lbs/a K20 applied in spring of 1987

Insecticide: Imidan - 1 lb AI/a - 7/2/86 for weevil control

Crop year precipitation: 23.23 inches - 1986, 21.97 inches - 1987

## CEREAL FORAGE TRIAL - IRRIGATED

KALISPELL, MONTANA

| VARIETY              | HEIGHT<br>-inches- | HEADING<br>-days- | YIELD<br>-lbs/a- |
|----------------------|--------------------|-------------------|------------------|
|                      |                    | *                 |                  |
| HOODED BETZES barley | 35                 | 63                | 8680             |
| LEWIS barley         | 39                 | 63                | 8486             |
| OTANA oats           | 46                 | 63                | 7934             |
| GALLATIN barley      | 37                 | 62                | 7820             |
| FORTUNA wheat        | 44                 | 62                | 7694             |
| RIDAWN barley        | 40                 | 64                | 7380             |
| WELSH triticales     | 46                 | 62                | 7280             |
| MONIDA oats          | 43                 | 63                | 7200             |
| NEWANA wheat         | 35                 | 64                | 7120             |
| HORSFORD barley      | 34                 | 59                | 7026             |
| LSD(0.05)            | 3                  | 1                 | 1019             |
| P-VALUE TRTS         | 0.00               | 0.00              | 0.51             |
| CV(s/mean)           | 4.7%               | 1.1%              | 7.7%             |

## NOTES

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Planting date: 4/13/87

Seeding rate: 96 lbs/a

Maximum summer temperature: 95 F on 7/28

Crop year precipitation: 21.97 inches

Fertilizer: 80 lbs N/a + 50 lbs P/a

\* Day 63 = 6/15/87



## CEREAL FORAGE TRIAL

KALISPELL 1985-87

IRRIGATED

| VARIETY              | -----YIELD - lbs/a----- |      |      | TOTAL |
|----------------------|-------------------------|------|------|-------|
|                      | 1985                    | 1986 | 1987 |       |
| Otana oats           | 6870                    | 4500 | 7934 | 19310 |
| Monida oats          | 6836                    | 4697 | 7206 | 18740 |
| Hooded Betzes barley | 5257                    | 3551 | 8686 | 17490 |
| Lewis barley         | 4330                    | 3549 | 8484 | 16360 |
| Gallatin barley      | 4330                    | 3607 | 7816 | 15750 |
| Fortuna wheat        | 4035                    | 2996 | 7691 | 14720 |
| Ridawn barley        | 3598                    | 3714 | 7377 | 14690 |
| Horsford barley      | 4122                    | 3760 | 6320 | 14200 |
| Newana wheat         | 3097                    | 3192 | 7124 | 13410 |
| Welsh triticales     | -----                   | 2929 | 7280 | ----- |
| LSD(0.05)            | 667                     | 1154 | 1019 | 1305  |
| P-VALUE TRTS         | 0.00                    | 0.07 | 0.51 | 0.00  |
| CV(s/mean)           | 8.2                     | 18.4 | 4.5  | 4.7   |

YEAR/PROJECT: 1987/758 Miscellaneous and Pulse Crop Investigations

PROJECT PERSONNEL: Leader - Leon E. Welty  
Research Specialist - Louise S. Prestbye

Dryland Dry Pea Trial

Ten varieties of dry peas were seeded on April 15. Fifty pounds of  $P_2O_5/A$  were applied post emergence. Fargo was applied for wild oat control. Average yield for the nursery was approximately 2000 lbs/a. Trapper and Columbian were the highest yielding varieties. Yields ranged from 1500 to 3000 lbs/a.

Dryland Lentil Trial

Ten varieties of lentil were seeded on April 15. Fifty pounds of  $P_2O_5/a$  were applied post emergence. Fargo was applied for wild oat control. Excellent stands were obtained for all varieties. Yields ranged from 2100 lbs/a (LC360038) to 3150 lbs/a (Brewer). Brewer, which should be a replacement for Chilean 78, yielded 8% more than Chilean 78.

Winter Rape National Variety Trial

Twenty-four winter rape varieties were seeded on fallow on August 14, 1986. Prior to seeding, Treflan (one-half lb ai/a) was applied for weed control. No fertilizer was applied in fall of 1986 because excess N can decrease winterhardiness. Seventy-five lbs N/a were applied on April 14, 1987. Winter survival ranged from 18% (Bienvenu) to 85% (Arabella). It took about a 60% survival to have an adequate stand in 1987. Yields ranged from 2200 lbs/a (RBR US-3) to 4000 lbs/a (Semu 1063/83 and Tandem).



DRYLAND WESTERN REGIONAL DRY PEA YIELD TRIAL KALISPELL 1987

| VARIETY     | 1/<br>EMERG<br>days | STAND<br>% | 2/<br>1ST FLOWER<br>days nodes | HT<br>in | 3/<br>MAT<br>days | YIELD<br>lbs/a | SEED<br>#/lb |
|-------------|---------------------|------------|--------------------------------|----------|-------------------|----------------|--------------|
| Trapper     | 14                  | 80         | 59 12                          | 28       | 90                | 3060           | 2587         |
| Columbian   | 13                  | 91         | 48 8                           | 25       | 92                | 2675           | 3019         |
| Alaska 81   | 14                  | 86         | 50 8                           | 31       | 89                | 2417           | 2612         |
| Umatilla    | 13                  | 90         | 55 12                          | 21       | 89                | 2076           | 3010         |
| PS210713    | 14                  | 93         | 55 10                          | 14       | 88                | 1938           | 2823         |
| Latah       | 13                  | 91         | 51 9                           | 31       | 85                | 1844           | 2752         |
| PS210716    | 14                  | 91         | 52 10                          | 27       | 90                | 1763           | 2800         |
| PS210132    | 13                  | 95         | 50 8                           | 29       | 88                | 1758           | 2992         |
| Flavanda AF | 14                  | 91         | 54 12                          | 18       | 88                | 1713           | 2613         |
| PS310525    | 13                  | 91         | 52 12                          | 29       | 91                | 1526           | 2700         |
| LSD(0.05)   | 1                   | 6          | 1 1 6                          | 2        |                   | 395            | 731          |
| P-VALUE     | 0.01                | 0.00       | 0.00 0.00 0.00                 | 0.00     |                   | 0.00           | 0.90         |

Seeding date: 4/15/87

1/ day 13 = 4/28/87

2/ day 52 = 6/6/87

3/ day 86 = 7/10/87

Fertilizer: 50 lbs P205/A

Herbicides: Fargo

Precipitation Sept.1986 - Aug.1987 : 21.97 inches

DRYLAND WESTERN REGIONAL LENTIL YIELD TRIAL KALISPELL, MT 1987

| VARIETY    | EMERG<br>days 1/ | STAND<br>% | 1st BL<br>days 2/ | HT<br>in | MAT<br>days 3/ | YIELD<br>lbs/a | SEED<br>#/lb |
|------------|------------------|------------|-------------------|----------|----------------|----------------|--------------|
| Brewer     | 12               | 85         | 55                | 15       | 98             | 3160           | 8015         |
| Chilean 78 | 11               | 88         | 57                | 15       | 101            | 2927           | 7387         |
| WA256112   | 12               | 86         | 55                | 14       | 95             | 2735           | 11060        |
| Emerald    | 12               | 86         | 59                | 15       | 106            | 2594           | 8512         |
| Giza 9     | 12               | 86         | 57                | 12       | 99             | 2505           | 7743         |
| LC360183   | 11               | 91         | 59                | 13       | 100            | 2348           | 9156         |
| Red Chief  | 10               | 90         | 55                | 14       | 102            | 2338           | 7768         |
| Laird      | 11               | 91         | 63                | 18       | 107            | 2327           | 7660         |
| LC360184   | 11               | 90         | 55                | 13       | 100            | 2258           | 8621         |
| LC360038   | 11               | 93         | 57                | 15       | 104            | 2132           | 7913         |
| LSD (0.05) | 1                | 4          | 1                 | 1        | 3              | 543            | 2668         |
| P-VALUE    | 0.00             | 0.01       | 0.00              | 0.00     | 0.00           | 0.01           | 0.25         |

Seeding date: 4/15/87

1/ Day 10 = 4/25/87

2/ Day 55 = 6/9/87

3/ Day 100 = 7/24/87

Fertilizer: 50 lbs P205/A

Herbicides: Fargo

Precipitation: Sept. 1986 - Aug. 1987 -- 21.97 inches



## WINTER RAPE SEED NATIONAL VARIETY TRIAL - KALISPELL 1986-87

| VARIETY      | 9/11/86    | ---4/2/87--- | VIGOR<br>(1-5) | MIDBLOOM<br>days | HEIGHT<br>inches | MATURITY<br>days | YIELD<br>lbs/a |
|--------------|------------|--------------|----------------|------------------|------------------|------------------|----------------|
|              | STAND<br>% | STAND<br>%   |                |                  |                  |                  |                |
| Semu 1063/83 | 94         | 83           | 3              | 265              | 55               | 337              | 4078           |
| Tandem       | 96         | 84           | 3              | 266              | 53               | 338              | 4007           |
| Darmor       | 95         | 74           | 3              | 266              | 51               | 338              | 3958           |
| Arabella     | 94         | 85           | 4              | 265              | 55               | 337              | 3760           |
| Ariana       | 94         | 76           | 3              | 266              | 56               | 340              | 3491           |
| RBR US-2     | 98         | 84           | 3              | 261              | 54               | 337              | 3278           |
| Jet Neuf     | 96         | 70           | 3              | 264              | 49               | 336              | 3269           |
| Cobra        | 93         | 78           | 3              | 264              | 56               | 339              | 3269           |
| Ceres        | 98         | 54           | 1              | 264              | 57               | 350              | 3237           |
| SV0238       | 95         | 71           | 3              | 266              | 52               | 340              | 3194           |
| Dwarf Essex  | 96         | 70           | 3              | 264              | 54               | 339              | 3082           |
| SV0263       | 96         | 74           | 1              | 263              | 50               | 338              | 2997           |
| Glacier      | 98         | 83           | 4              | 265              | 56               | 341              | 2953           |
| Mitre        | 99         | 65           | 3              | 263              | 47               | 341              | 2910           |
| Rubin        | 95         | 65           | 2              | 267              | 54               | 340              | 2876           |
| RBR US-1     | 95         | 90           | 3              | 261              | 74               | 334              | 2765           |
| Santana      | 96         | 53           | 2              | 264              | 54               | 341              | 2629           |
| SV0214       | 96         | 69           | 2              | 266              | 51               | 378              | 2627           |
| SV0253       | 100        | 24           | 1              | 265              | 53               | 343              | 2608           |
| Cascade      | 100        | 83           | 3              | 261              | 50               | 336              | 2604           |
| Bridger      | 97         | 80           | 2              | 262              | 51               | 316              | 2546           |
| Bienvenu     | 98         | 18           | 1              | 261              | 43               | 341              | 2336           |
| NPZ-51       | 93         | 69           | 3              | 266              | 57               | 342              | 2276           |
| RBR US-3     | 96         | 81           | 3              | 259              | 54               | 342              | 2213           |
| LSD(0.05)    | 5          | 19           | 1              | 21               | 12               | 3                | 904            |
| P-VALUE      | 0.10       | 0.00         | 0.00           | 0.15             | 0.01             | 0.00             | 0.00           |

## NOTES:

Seeding Date: 8/14/87 (8/19/86 for RBR-US varieties)  
 Fertilizer: 75 lbs/a N on 4/14/87  
 Pesticides: Cygon - 4 lbs AI/a - 5/8/87 for flea beetle contro  
 Treflan - 1/2 lb AI/a  
 Harvest Date: 8/10/87

\* Day 262 = 5/3/87 (5/8/87 for RBR-US varieties)

\*\*Day 316 = 6/26/87 (7/1/87 for RBR-US varieties)