The 2nd

2nd ANNUAL REPORT

of the

WESTERN TRIANGLE AGRICULTURAL RESEARCH CENTER
Montana Agricultural Experiment Station
Conrad, Montana

1979

1979

Submitted by

Gregory D. Kushnak, Superintendent

MAES Research Report #152

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STATION ACTIVITIES AND DEVELOPMENTS

1979

The completion of the land purchase in January 1979 allowed us to proceed with plans for relocating the Tiber Water building, and most activities for the year centered around the building project. A detailed topographic survey and long range site plan (Fig. 1) were drawn up to lend guidence in establishing a strategic location for the buildings, roadways, and work areas.

Rooms within the building were removed to facilitate moving, and to reduce the cost of moving. The lumber was saved for future building projects.

The architectural firm of Page-Werner and Associates from Great Falls was hired to draw up the specifications for the concrete foundation and moving proceedures. At this point, a great deal of State regulations and procedures slowed the progress to a turtle's pace; but on September 14 the building was rolling down the highway. Zion Construction was the contracter. The actual move took only three working days; and, after some difficulty, the building was on its new foundation at the Research Center. The cost of moving, including the poured foundation, was approximately $21,500. Replacement cost of the structure was nearly $50,000 plus foundation; so it was a bargain.

Driveways were staked out and graded according to the site plan, and gravel was spread in November. (Many thanks to Don and Paul Kronebusch for the use of their blade and loader tractor.)

Work is currently underway to bring Tiber water to the building; but due to the late season, this project may be postponed until next summer.

Future building plans have been submitted as a request to the University's Long Range Building Program. Response to this request is uncertain at this time.

The Research Center land was cropped to barley in 1979, in addition to some research plots. Canada thistle management consisted of Roundup spot treatments (Fall 1978) and Banvel + 2,4-D (Spring 1979). Much work is still needed on the thistle problem.

Thirty shares of irrigation water were purchased from the Pondera Canal and Reservoir Co. for the east half of the Research Center. The total acreage of the Research Center is 75.6 with approximately 65 currently under cultivation. The west half will be maintained as dryland.

The land survey showed that greater than 10 acres on the east and south ends were being utilized by neighbors. The south end has been reclaimed, and the corrected boundry marked with temporary posts. The land east of the canal is currently in pasture, and would be difficult to reclaim at this time without building a fence.

Other activities included many presentations at grower's meetings and research plot tours. One plot tour was held on the Research Center, with over 30 attendees.

An Advisory Board meeting was held December 11, 1978. All of the original Board members are still serving on the committee, and are listed in last year's report. Some members will complete their terms at the end of 1979, and I wish to thank these and the other Board members for the excellent help in keeping the Research Center rolling forward.

WESTERN TRIANGLE RESEARCH CENTER
Advisory Board Meeting

December 11, 1978

Present at the meeting were Martin Burris, Greg Kushnak, Ronald Thaut, Joe DeStaffany, Paul Kronebusch, Jack Baringer, Don Buffington, Karl Ratzburg, Wilson Hodgekiss, Dave Shane, Jerry Swenson, Dale Vermulm, Gary Iverson, Vade Hamma and Darrel Krum.

The meeting was called to order by Chairman DeStaffany.

The minutes of the previous meeting were read and approved as corrected.

Chairman DeStaffany asked Martin Burris to give a financial report. He stated that of the $206,000 appropriated for the two years, $47,236 was spent the first year and that $65,000 was set aside for the land and building. He indicated that $94,000 was left for the current year. This might be used to buy an office building or major piece of equiptment. Burris went on to say that Zion knows the PAR building out east and has estimated a cost of $9,000 to move plus the cost of the footing.

The members discussed buying a cultivator or a field drill.

Kushnak discussed the possibility of touring the plots this summer.

Chairman DeStaffany said that on May 31, the Board of Regents okayed buying the 75 acres. Kushnak then explained the land purchase and the problems encountered. He said the deal wasn't completed yet.

Kushnak said that HEW finally agreed to turn the PAR building over to the experiment station after first not being in favor of doing so. It is valued at $18,000 and must be used for 5 years before ownership is changed.

The use of the building was discussed and the possibility of putting an office inside it was brought up.

Kushnak stated that the money must be used by July 1, so more equiptment will be purchased.

Kushnak next explained the master plan that was drawn up for the station. He showed what would go in the building and where.

Kushnak has sprayed Roundup on the thistle patches and had Denzer summerfallow the land.

Kushnak discussed the equiptment he had and that he would need. Martin Burris gave Kushnak a list of equiptment leased at Bozeman that would soon be available for purchase at a very reasonable price.

Vade Hamma made and Dale Vermulm seconded the motion to buy a loader and blade for the station tractor. Motin carried.

Kushnak then passed out copies of the first annual report of the Western Triangle Research Center which contains the test results from this past year's work. He explained the report and thanked the advisory board for all their help in getting the program going.

Kushnak talked about next year's plots and what they would be. The main thrust would be towards cereal grains and alternate crops but that forage plots would also be put out. He then asked for ideas from the board.

The budget for next year was explained. It will incorporate into MSU's experiment station program as a unit and budgeted as such. Martin Burris estimated that the station's part of the budget would be about $75,000 to $80,000.

The board then discussed increasing the number of advisors on the board. Martin Burris suggested not putting too many nonproducers on the board. Wilson Hodgekiss submitted two names for consideration. They are Pete Ekegren, a John Deere Dealer and Ron Marony, a bank ag representative. Other names presented were Jim Newman, a machenery dealer and Brent Gaylord, the editor of the Prairie Star.

The number of members to be added was discussed as being three of four. Dale Vermulm made and Wilson Hodgekiss seconded the motion to include on the board people such as an implement dealer, an ag represntative, an accountant, and a person from the news media. They would be voting members. Motion carried. Members are reminded to bring names to the next meeting.

The next meeting is scheduled for Monday, March 19, 1979.

Kushnak said that in the future, two meetings a year will be planned.

DeStaffany and Kushnak discussed testifying at Helena for legislative committee hearings involving MSU's experiment station budget. Martin Burris said it was best to have 3 or 4 people there but only one should testify.

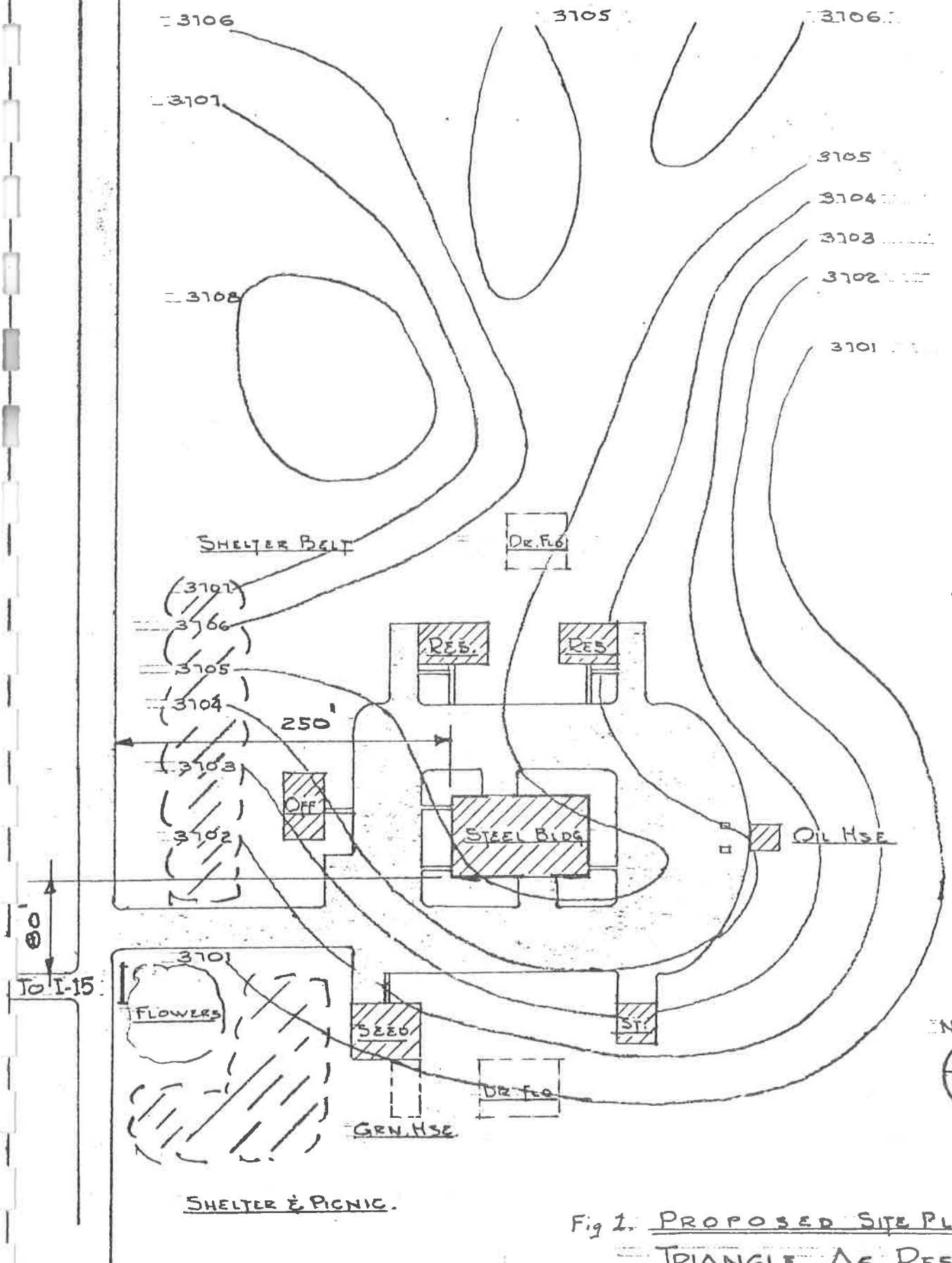
Meeting adjourned at 4:00 p.m.

Paul Kronebusch
Secretary

Equiptment purchased for 1979 are as follows:

1.	Seed distribution units (cones), 2 sets of four-row units, Marvin Berg	$2,200
2.	Hand seed testing screens, 12" x 12" perforated metal, quanity 30, Burrows	410
3.	Gas welding torch kit	80
4.	Integral Disc, John Deere model 100	1,083
5.	Shovel Press Drill, International model 150, 14' x 10", with accessories	5,150
6.	Roto-tiller, Yardman 5 HP rear-tine	535
7.	Refrigerator, General Electric 14 cu. ft.	Granted from Biology Dept.
8.	Chisel Plow, 8' John Deere model 1680 with attached Noble Rod Weeder and Herman Harrows	2,345
9.	Sickle Mower, John Deere model 350	631
10.	Plot Combine, Hege model 125B and accessories	18,806
11.	Air Comprssor, electric, Kellog-American model F201AO	564
12.	Radial Arm Saw, DeWalt model 740	308
13.	Office Desk, Steelcase model 330600-AB	263
14.	Office Chair, Steelcase model T410-311	152

2nd Draft
move approach back to 1st Draft



26' [illegible] around Bldg

Fig 1. PROPOSED SITE PLAN

TRIANGLE AG. RES. STN.

CONRAD MONT.

Scale: 1" = 100' 2/6/79

Drawn by A.V.T.

1979
RESEARCH ACTIVITIES

Acknowledgements: Research trials during 1979 were conducted in cooperation with the USDA-SEA and Plant and Soil Science Department at MSU; and the Cooperative Extension Service. The County Agents were very helpful in lining up cooperators for test plot sites, and in the seeding and harvest of plots. Special thanks is extended to the following: Don Kronebusch, for help in repairing our plot combine; the landowners who provided land for test plots; Cargill, Inc. - Conrad, ConAgra - Cut Bank, Taylor Soil Service - Shelby, Big Sky Seeds, Inc. - Shelby, and Montana Testing Labs - Great Falls for providing fertilizer and seed for the experiments; and Ron Thaut, Research Technition, for his invaluable assistance in conducting research and compiling data for the contents of this report.

1979 Test Plots: Growing conditions for 1979 consisted of an unusually harsh winter, causing extensive winter wheat stand loss; followed by a late spring, and a very dry summer. Most spring crops received less than 1 inch of precipitation for the entire growing season. Abundant soil moisture, however, was available to produce fairly high yeilds.

A few research plots were grown on the Research Center for the first time during 1979. Off-station testing continued at about the same level as the previous year, covering approximately 20 locations.

A list of the 1979 test plots and their locations is presented in Table 1.

Table 1. Research plots grown in the Western Triagle during 1979.

Crop	Experiment	County	Cooperator & Location
Winter wheat	Varieties	Teton	Les Otness, Choteau
	Varieties	Pondera	Ted & Gary Wiest, Brady
	Varieties	Toole	Karl Ratzburg, Ledger
	Nitrogen Rates	Teton	Albert Carlsen
	Sulfur Rates	Teton	Ray Anderson
Spring wheat	Advanced Yield Varieties	Pondera	Station
	Quality Drill Strips	Pondera	Station
	Varieties	Glacier	Jerry Swenson, Cut Bank
	Varieties	Toole	Ray Tomsheck, Ethridge
	Varieties	Toole	Miles Burd, Galata
	Varieties	Teton	Bert Corey, Choteau
	Varieties	Teton	Dennis McOmber, Fairfield
	Sulfur Rates	Toole	Bob Aschim, Sunburst
Barley	Winter Barley Accessions	Pondera	Station
	Quality Drill Strips	Pondera	Station
	Intrastate Varieties	Pondera	Station
	Western Dryland Regional	Pondera	Station
	Western Spring Regional	Pondera	Station
	Varieties	Glacier	Jerry Swenson, Cut Bank
	Varieties	Toole	Ray Tomsheck, Ethridge
	Varieties	Toole	Miles Burd, Galata
	Varieties	Teton	Bert Corey, Choteau
	Nitrogen Rates	Teton	Dennis McOmber, Fairfield
Pulses	Faba & Soybeans, peas	Pondera	Station
	Faba & Soybeans, peas	Glacier	Al Hansen, Cut Bank
	Faba & Soybeans, peas	Toole	Herb Karst, Sunburst
	Faba & Soybeans, peas	Toole	Ray Tomsheck, Ethridge
	Faba & Soybeans, peas	Teton	Gary Oksness, Fairfield
	Faba & Soybeans, peas	Teton	August Loch, Dutton
	Faba beans	Toole	Miles Burd, Galata

Table 1. (Continued)

Crop	Experiment	County	Cooperator & Location
Oilseeds	Several Crops & Varieties	Glacier	Al Hansen, Cut Bank
	Several Crops & Varieties	Toole	Herb Karst, Sunburst
	Several Crops & Varieties	Toole	Ray Tomsheck, Ethridge
	Several Crops & Varieties	Teton	Gary Oksness, Fairfield
	Several Crops & Varieties	Teton	August Loch, Dutton
	Sunflowers	Pondera	Station
	Sunflowers	Toole	Miles Burd
Forages	Sulfur Rates - Alfalfa	Pondera	Joe Broesder, Dupuyer
	Grass Species	Pondera	Pond. Co. Range Group, Dupuyer
Weeds	Roundup on Faba Beans	Pondera	Don Kronebusch, Conrad

TITLE: Winter Wheat Investigations

YEAR: 1979

LOCATION: Western Triangle Agricultural Research Center, Conrad, Montana

PERSONNEL: Gregory D. Kushnak and Ron Thaut, Research Center, Conrad; Allan Taylor, MSU, Bozeman.

Winter wheat variety trials were harvested at 3 locations in 1979; near the communities of Ledger, Brady, and Choteau. At each location, winter-hardiness was a significant factor in how the varieties ranked for yield; and therefore, the results may not reflect those expected in a "normal" year. For example, Centurk had a higher average yield than Winalta and Cheyenne over a four year period. In 1979, Centurk yielded slightly less than the other two varieties.

Norstar, a new variety from Lethbridge, exhibited more winterhardiness than any of the varieties tested. In a variety trial grown near Geraldine, where winter-kill was severe, Norstar had 50% survival; Winalta 10%; and all other varieties completely lost. However, Norstar may not have a yield advantage over Centurk and Cheyenne during normal years, except north of the Hi-Line. Norstar is taller, and produces considerably more straw than Winalta; which may be a significant drawback in wet years.

Redwin, the newly released variety from Montana, yielded about the same as Winalta. Winterhardiness of Redwin was slightly less than Winalta, but greater than Cheyenne. Plant height of Redwin averaged about 4 inches less than Winalta.

Yield and other agronomic data for the 3 locations are presented in Tables 2, 4, and 6; and multiple year summaries in Tables 3 and 5.

Table 2. Winter wheat variety trial grown on dryland fallow northeast of Ledger, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield	Test weight #/bu	Plant Height	Maturity date	% winter survival	% Protein
Sundance	55.4	60.9	37	220	100	11.0
Norstar	54.7	62.5	38	219	100	10.9
MT 77077	54.5	60.8	32	220	100	10.3
Hiplains	49.0	63.7	31	218	100	12.4
Cheyenne	48.3	63.6	35	217	100	11.6
Winoka	46.2	63.4	36	219	100	12.3
Froid	46.1	62.5	38	219	100	10.6
Lancer	45.4	63.7	35	217	100	-
Warrior	45.3	63.0	33	218	100	12.2
MT 7801	43.9	63.5	33	219	100	13.0
Trapper	42.4	63.0	33	218	100	12.4
Roughrider	42.4	63.1	33	219	100	12.7
Winalta	41.8	63.8	36	219	100	11.9
Redwin	41.1	61.3	31	219	100	13.5
Centurk	40.8	63.3	30	216	90	11.7
Crest	37.9	62.8	28	217	80	11.4
Nugaines	34.8	59.8	23	223	80	10.8
Lancota	32.8	62.1	29	219	90	14.7
Vona	28.1	63.4	23	219	60	12.5
Linden	27.3	63.3	25	219	60	12.9
Alpine Barley	0	0	0	0	0	-
Experimental Means:	42.91	62.7	32	219	93	12.0

Cooperator & plot location: Karl Ratzburg, Ledger; Toole Co. T30N, R2E, Sec. 6
Seed Date: 18 September 1978
Harvest Date: 6 August 1979
Previous Crop: Fallow
Fertilizer: 18-46-0 with seed + 34 AN topdress

Table 3. Two-year summary for winter wheat varieties grown northeast of Ledger in Toole County, 1978-1979. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad MT.

Variety	Yield 2 yr. avg.	Test wt. 2 yr. avg.	Height 2 yr. avg.	Protein 2 yr. avg.
Sundance	59.7	61.6	40	10.4
Centurk	55.7	63.7	35	10.8
Hiplains	55.5	63.6	34	11.0
Warrior	54.4	63.3	37	10.9
Cheyenne	53.7	64.0	38	10.6
Winoka	52.5	64.3	39	11.0
Froid	52.5	63.2	41	11.0
Trapper	51.3	63.4	37	11.0
Crest	51.3	63.3	31	11.1
Redwin	50.5	62.8	34	12.1
Winalta	48.4	64.4	39	10.8
Roughrider	46.4	63.3	35	11.9

Location, both years: Karl Ratzburg's, northeast of Ledger.

Table 4. Winter wheat variety trial grown on dryland fallow at Brady, 1979, Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety		Yield bu/a	Test weight #/bu	Plant Height	% Winter survival	% Protein
MT 7801	-	51.4	63.2	28	95	14.2
8885	Cheyenne	51.1	62.6	34	90	14.5
17439	Roughrider	51.0	61.6	32	100	15.4
15075	Centurk	50.8	61.6	29	80	14.2
MT 77077	-	50.1	60.6	29	95	13.3
NA 1316	Rocky	49.4	61.4	27	90	14.8
AT 7759	Norstar	48.7	60.1	32	100	14.9
13547	Lancer	47.9	62.4	34	80	14.0
13190	Warrior	47.7	62.1	31	85	14.5
MT 7216	Redwin	47.3	60.9	27	95	14.5
17262	Hiplains	47.2	62.4	28	80	14.9
14000	Winoka	46.7	62.4	33	95	15.6
13670	Winalta	46.7	62.2	31	95	14.9
13990	Trapper	46.0	62.0	30	90	14.9
15327	Sundance	45.8	58.3	33	100	14.2
13872	Froid	44.4	59.5	34	100	15.1
13968	Nugaines	41.5	55.6	24	80	13.2
17440	Lindon	38.7	63.7	24	60	14.0
13880	Crest	37.8	59.5	28	80	14.5
17389	Lancota *	35.9	61.0	32	80	16.2
-	Vona	32.4	61.5	23	60	13.8
Experimental Means:		45.6	61.2	30	87	14.6

Cooperator: Ted and Gary Wiest, Brady; Pondera Co. T26N, R1W, Sec. 10
Seed Date: 19 September 78
Harvest Date: 3 August 79
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed + 30 N top dressing
*Lancota had 30% of stems broken over.

Table 5. Four year summary for winter wheat varieties grown in Pondera County, 1976-1979. Montana Agr. Expt. Station; Western Triangle Research Center, Conrad, MT.

	4 - Year Average			
Variety	Yield bu/a	Test weight	Plant height	% Protein
Centurk	52.7	62.6	31	12.9
Sundance	51.0	60.6	36	12.4
Hiplains	50.3	62.5	31	13.3
Rocky	49.8	62.3	30	12.9
Cheyenne	49.6	62.8	35	12.7
Lancer	48.8	63.0	34	12.8
MT 77077	48.6	61.2	31	-
Trapper	47.5	62.4	34	13.3
Winoka	47.2	63.7	35	13.2
Norstar	47.2	60.7	34	-
Roughrider	47.0	62.7	34	14.3
Redwin	46.7	62.9	31	13.5
Froid	45.3	61.4	37	13.7
Winalta	45.2	63.1	34	13.1
Warrior	43.8	62.6	33	13.4
Crest	43.4	61.3	30	13.1
Minter	42.7	62.2	36	13.9
Nugaines	41.8	59.4	26	11.6
Lindon	37.5	64.3	26	-
Lancota	34.8	61.6	34	-
Vona	31.4	62.1	24	-

1976 & 1977 - Joe Destaffany, 9 mi. east of Conrad
1978 - Ron Bokma, 2 mi. west of Conrad
1979 - Ted Wiest, 5 mi. east of Brady

Checks for comparable average; Cheyenne & Winalta

Table 6. Winter wheat variety trial grown on dryland fallow northeast of Choteau, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight #/bu	Plant height	% winter survival	% Protein
Norstar	28.5	61.5	33	100	12.3
Warrior	27.8	61.9	25	100	12.1
Winoka	27.7	63.0	27	100	13.1
Hiplains	27.2	61.0	24	90	14.3
Trapper	26.9	61.6	28	95	12.4
Winalta	26.7	61.8	25	100	13.0
Sundance	26.2	58.2	30	100	13.0
Cheyenne	26.1	61.8	27	90	11.8
Centurk	24.9	62.1	22	85	13.3
Roughrider	24.5	60.6	26	100	13.1
Froid	23.9	60.8	30	100	12.6
Lancer	23.8	61.7	23	90	14.5
Lindon	22.1	61.3	24	60	12.1
Centurk-78	21.5	61.6	23	85	13.2
Redwin	21.0	60.8	23	95	14.0
NK-75W239	20.1	58.6	20	85	14.1
Crest-40	19.7	58.2	22	70	12.9
Rocky	19.3	60.6	22	85	13.9
Crest	18.4	59.3	20	70	13.4
Lancota	16.9	58.6	24	70	14.6
Nugaines	15.1	57.1	23	60	12.2
Vona	11.5	61.0	18	40	13.3
Experimental Means:	22.7	60.6	25	85	13.15

Cooperator & location: Les Otness, Choteau; Teton Co. T24N, R4W, Sec. 7
Seed Date: 20 Septenber 1978
Harvest Date: 2 August 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed + 60 N Top dressing

Table 7. Effects of nitrogen rates on dryland Cheyenne winter wheat grown on shallow, gravelly soil north of Choteau, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

#/a Actual* $N-P_2O_5-K_2O$	Yield bu/a	Test weight	% Protein	Plant height
23-58-10	23.3	63.8	11.6	27
43-58-10	25.1	63.7	11.7	28
58-58-10	23.6	63.9	11.5	27
73-58-10	22.6	63.8	11.9	28
103-58-10	22.3	63.8	12.0	27
Experimental means:	23.4	63.8	11.7	27

Cooperator & plot location: Albert Carlson, Choteau; Teton Co. T24N, R5W, Sec. 13
Seed Date: 25 Sept. 78
Harvest Date: 9 August 79
Previous crop: Fallow
*Fertilizer: 125# 18-46-0 (23-58-0 actual) + 10 # K_2O with seed for all treatments; balance of N topdressed on April 17 for respective treatments.

Table 8. Effect of sulfur rates on dryland Centurk winter wheat north of Choteau, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

#/a Actual* $N-P_2O_5-K_2O-S$	Yield bu/a	Test Weight	Plant height	% Protein
10-51-0-0	31.4	63.1	27	9.9
60-51-18-0	36.2	63.3	29	11.2
60-51-18-24	35.9	63.2	28	11.1
60-51-18-48	33.9	62.9	27	11.1
60-51-18-72	36.8	63.4	28	11.7
60-51-18-120	38.1	63.4	28	11.9
60-51-18-240	37.3	63.3	29	11.7
Experimental Means:	35.66	63.2	28	11.2

Cooperator and Location: Ray Anderson, Choteau; Teton Co., T25N, R4W, Sec. 19.
Seed Date: 10 September 1978
Harvest Date: 9 August 1979
Previous Crop: Fallow
*Fertilizer: 93# 11-55-0 (10-51-0 actual) with seed for all treatments; balance of N and S topdressed April 17. Sources: ammonium nitrate; ammonium sulfate; gypsum

TITLE: Sring Wheat Investigations

YEAR: 1979

LOCATION: Western Triangle Agricultural Research Center, Conrad, Montana.

PERSONNEL: Gregory D. Kushnak and Ron Thaut, Research Center, Conrad; F.H. McNeal, SEA, Bozeman.

Spring wheat variety trials were grown at 6 locations in the Western Triangle during 1979. Data for the respective locations are presented in the following tables: Conrad, Tables 9-10; Cut Bank, Table 11; Ethridge, Table 12; Galata, Table 13; Choteau, Tables 14-15; and Fairfield, Table 16. All dryland locations received little or no rainfall during the season, but soil moisture was sufficient in most cases to produce fairly good yields. The irrigated trial at Fairfield was moderatly infested with alfalfa, which may have reduced yields somewhat.

Two newly released varieties from Montana, Marberg and Pondera, yielded approximately equal to Newana at all dryland locations; and were 3 days earlier to mature than Newana. Both varieties are hollow-stemmed semi-dwarfs.

Solar, a private variety from AgsCo, was among the top yielders at all locations; and was the earliest to mature. Milling and baking quality information for Solar are not yet available.

Butte, a new release from North Dakota, yielded higher than Fortuna at most locations; and was about 1 day earlier in maturity than Fortuna. Butte is a standard height variety; and is apparently susceptible to sawflys.

"Welsh" triticale (from Canada) was compared to the commonly grown "419" variety at all locations. Welsh averaged 6 inches shorter in height, 5 days earlier in maturity, and 2 bu/acre less than "419". The slightly lower yield of Welsh would be overshadowed considerably by its earlier maturity and shorter straw, since excessive quantities of straw and late maturity are serious problems with triticale production.

Spelt, a feed crop related to common wheat, was included at all locations. The kernels do not thresh free of the hulls for this crop, and consequently, its test weight is considerably lower than for comman wheat. Yields in terms of bu/acre were quite high at all locations; but on a pounds/acre basis, only a slight advantage over triticale was noted. The spelt heads were very brittle and susceptible to shatter. The variety of spelt tested in these trials was unknown.

Spring wheat quality drill strips for 1979 consisted of 4 entries: MT 7635; MT 7648; MT 7732; and Fortuna.

Table 9. Advanced Yield spring wheat variety trial grown on dryland at the Western Triangle Research Center, Conrad, MT. 1979.

Variety		Yield bu/a	Test weight	Plant height	% Protein
17425	Fieldwin	43.8	61.5	28	10.5
MT 7648	-	42.1	61.0	29	13.1
15326	Rolette durum	40.8	63.4	35	15.2
17682	Butte	39.5	62.4	33	12.9
17282	Crosby durum	39.3	62.2	35	12.7
15892	Ward durum	38.7	62.3	34	12.2
17806	Semidwarf durum	38.0	61.2	27	12.9
17691	Wampum	37.8	60.2	32	11.7
13333	Wells durum	37.5	62.1	35	11.7
MT 749	Pondera	37.2	60.8	28	14.2
MT 7416	Marberg	36.4	59.4	26	14.0
MT 7635	-	35.5	61.0	30	12.7
MT 7834	-	34.8	58.6	30	13.7
17790	Len	34.5	59.8	30	14.0
17749	Coteau	34.4	60.9	31	13.2
MT 7745	-	34.0	60.7	26	11.9
17429	Lew	33.4	61.2	31	14.1
17430	Newana	33.4	60.5	28	12.6
MT 7620	-	33.1	59.7	32	12.8
17791	James	32.3	61.2	29	11.7
10003	Thatcher	32.0	59.9	31	15.4
17761	Powell	30.8	56.5	29	11.7
MT 7741	-	30.4	56.5	27	14.9
MT 7732	-	29.4	58.3	26	14.2
MT 7746	-	29.3	58.8	28	12.1
17738	Eureka	28.2	59.7	34	14.3
13596	Fortuna	28.0	60.5	30	14.1
MT 7819	-	27.5	57.1	25	14.5
MT 766	-	27.3	57.5	33	14.1
MT 7856	-	26.7	57.1	31	13.7
17286	Tioga	26.6	59.3	31	16.1
15930	Olaf	24.5	58.6	28	13.7
-	WS-25	32.1	59.0	25	14.5
Welsh	Triticale	44.9	49.7	32	15.0
419	Triticale	38.3	46.6	31	15.9
	Spelt	46.7	38.9	31	15.9
Experimental Means:		33.7	60.2	30	13.5

Table 9. Continued.

Seed Date: 23 May 1979
Harvest Date: 5 September 79
Previous Crop: Fallow
Fertilizer: 18-46-0

Table 10. Four year averages for yield, test weight, height, and protein of spring wheat varieties grown in Pondera county, 1976-1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield 4 yr. avg.	Test wt. 4 yr. avg.	Height 3 yr. avg.	Protein 4 yr. avg.
Crosby durum	38.5	61.9	35	14.4
Butte	37.1	62.2	33	13.8
Marberg	36.2	59.9	28	14.2
Pondera	35.7	61.5	28	14.0
Wells durum	35.3	61.7	36	13.2
Newana	35.1	61.5	27	13.5
Ward durum	34.6	61.2	34	14.8
Coteau	34.1	61.0	33	13.9
Lew	33.8	61.2	32	14.0
Olaf	33.2	60.1	29	14.2
Rolette durum	33.1	62.5	33	15.5
Tioga	31.6	60.4	33	14.9
Fortuna	31.5	60.9	32	14.6
Thatcher	31.1	59.8	33	14.6
Eureka	30.3	59.1	35	15.3

1976 Charles Skorupa, 11 mi. east of Conrad
1977 Jim Sheble, 5 mi. northwest of Valier
1978 Phil Broesder, 13 mi. west of Conrad
1979 Agr. Research Center, north of Conrad
Checks for comparable average: Newana & Fortuna

Table 11. Spring wheat variety trial grown on dryland north of Cut Bank, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	Maturity date	% protein
Solar	43.2	59.9	27	251	12.6
WS-25	37.9	60.2	30	249	13.3
Marberg	36.8	60.7	28	253	15.7
Wampum	35.9	59.7	30	255	13.8
Prodax	34.9	59.7	27	253	14.2
Pondera	34.6	61.6	29	253	15.5
Len	34.4	61.2	29	252	15.4
Thatcher	32.0	60.0	35	252	16.7
Olaf	31.2	60.2	27	253	15.1
Angus	30.5	60.7	28	253	15.6
Lew	29.3	60.7	33	253	15.8
Newana	28.6	59.8	26	256	15.3
Fielder (white)	28.3	59.5	27	256	12.5
Butte	27.7	60.5	32	251	14.3
Fortuna	22.3	59.3	33	252	15.7
Ward (durum)	21.3	58.4	32	254	17.3
Rolette (durum)	20.6	60.0	35	253	16.8
Spelt	63.3*	40.1	33	254	14.1 (*2539 #/a)
419 Triticale	47.6*	45.2	39	259	12.0 (*2155 #/a)
Welsh Triticale	38.9*	45.7	34	254	15.2 (*1780 #/a)
Experimental Means:	31.1	60.1	30	253	14.8

Cooperator & location: Jerry Swenson, Cut Bank; Glacier Co. T37N, R9W, Sec. 35
Seed Date: 14 May 79; No pre-seeding tillage.
Harvest Date: 10 September 79 (253)
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed.

Table 12. Spring wheat variety trial grown on dryland near Ethridge, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	Sawfly damage %	% protein
Newana	44.4	58.6	27	20	13.8
Fielder (white)	44.2	57.0	25	5	11.2
Solar	44.1	58.3	28	5	13.1
Marberg	43.1	58.2	25	5	14.0
Fortuna	42.7	59.4	32	0	14.4
Pondera	42.5	58.8	29	20	14.6
Lew	42.0	59.8	29	0	14.8
Wampum	40.9	54.4	29	20	13.6
Olaf	40.0	57.4	28	20	14.1
Angus	39.1	59.1	26	10	14.9
Len	38.4	57.8	29	15	15.6
Butte	38.2	58.6	32	20	14.3
Ward durum	36.8	59.5	31	5	16.2
Thatcher	36.7	58.1	35	20	14.9
Rolette durum	35.2	60.9	29	10	16.7
Prodax	34.1	54.7	26	20	13.7
Spelt	56.0*	37.7	32	5	15.5 (*2110 #/a)
419 Triticale	48.1*	44.4	39	5	13.3 (*2137 #/a)
Welsh Triticale	44.2*	45.6	31	20	13.3 (*2014 #/a)
Experimental Means:	40.2	58.2	29	12	14.4

Cooperator & location: Ray Tomsheck, Ethridge; Toole Co. T32N, R4W, Sec. 1.
Seed Date: 4 May 1979
Harvest Date: 23 August 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed.

Table 13. Spring wheat variety trial grown on dryland near Galata, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	Sawfly damage %	% protein	
Fielder (white)	32.5	59.8	22	10	12.4	
Prodax	31.0	57.2	23	5	14.6	
Newana	29.9	61.5	23	10	14.5	
Pondera	29.6	60.7	26	20	15.4	
Solar	29.4	59.8	25	20	15.1	
Angus	29.3	61.0	23	20	14.9	
Marberg	29.2	59.5	25	15	15.5	
Butte	26.4	60.3	27	40	14.6	
Lew	26.2	61.0	24	2	15.6	
Ward durum	24.9	60.7	27	10	17.3	
Len	24.6	60.0	26	40	15.6	
Fortuna	24.0	59.7	27	2	16.2	
Rolette durum	24.0	61.2	26	25	18.0	
Olaf	23.8	59.9	22	40	15.5	
Thatcher	23.6	59.2	28	30	16.8	
Wampum	20.3	57.9	25	50	13.4	
Spelt	39.5*	39.2	26	5	15.9	(*1549 #/a)
419 Triticale	31.1*	48.5	31	20	15.0	(*1509 #/a)
Welsh Triticale	26.6*	47.9	26	20	14.8	(*1272 #/a)
Experimental Means:	26.8	60.0	25	21	15.3	

Cooperator & Location: Miles Burd, Galata; Toole Co. T32N, R3E, Sec. 21.
Seed Date: 3 May 1979
Harvest Date: 20 August 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed.

Table 14. Spring wheat variety trial grown on dryland east of Choteau, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

	Variety	Yield bu/a	Test weight	Plant height	% protein	
AGI	Solar	35.0	57.8	26	14.0	
17268	Fielder (white)	32.1	58.8	25	11.5	
17407	Prodax	32.0	54.7	25	14.5	
17691	Wampum	30.0	56.8	26	14.0	
17744	Angus	29.7	59.1	26	15.1	
17430	Newana	29.4	59.3	25	14.9	
10003	Thatcher	29.3	56.2	31	17.2	
17429	Lew	29.2	59.7	30	15.5	
15892	Ward durum	29.0	59.1	33	16.3	
MT 7416	Marberg	28.9	56.7	26	15.0	
17790	Len	28.4	58.5	27	15.7	
15326	Rolette durum	28.2	61.2	30	17.2	
15930	Olaf	27.4	58.2	29	14.8	
MT 749	Pondera	27.0	59.4	26	14.3	
13596	Fortuna	26.4	58.2	29	16.6	
17681	Butte	21.8	58.3	30	15.0	
Welsh Triticale		35.8*	48.0	31	14.0	(*1720 #/a)
419 Triticale		36.2*	46.8	38	14.3	(*1696 #/a)
Spelt		26.1*	39.5	33	15.7	(*1029 #/a)
Experimental Means:		29.0	58.3	28	15.1	

Cooperator & Location: Bert Corey, Choteau; Teton Co. T25N, R2W, Sec. 30
Seed Date: 17 May 1979
Harvest Date: 29 August 1979
Previous Crop: Fallow
Fertilizer (actual #/a): 11-40-0 with seed + 34 AN topdress.

Table 15. Two year summary for spring wheat varieties grown near Choteau, 1978-1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield 2 yr. avg.	Test wt. 2 yr. avg.	Height 2 yr. avg.	Protein 2 yr. avg.
Lew	37.6	61.4	31	14.4
Fortuna	33.4	60.2	31	15.2
Ward durum	32.9	60.9	33	15.4
Prodax	32.9	57.1	26	13.9
Newana	31.2	60.0	26	13.9
Olaf	30.8	59.2	27	14.5
Rolette durum	30.3	62.3	31	15.9
Thatcher	30.3	58.5	32	15.6

Location, both years: Bert Corey's, east of Choteau.

Table 16. Spring wheat variety trial grown under irrigation near Fairfield, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% protein
Solar	65.4	52.9	31	13.1
Wampum	60.3	55.5	31	12.0
Fielder	59.8	51.6	26	11.0
Marberg	59.7	56.4	31	14.9
Newana	59.3	56.3	29	12.6
Olaf	57.3	53.8	30	14.0
Butte	56.4	58.5	34	15.8
Len	56.3	49.7	31	13.8
Ward durum	51.8	55.8	36	14.6
Prodax	49.9	52.6	29	12.9
Angus	48.0	58.6	29	14.7
Rolette durum	47.5	58.1	35	15.2
Lew	47.4	58.8	31	14.6
Pondera	46.3	59.1	30	14.3
Fortuna	38.8	57.8	26	16.2
Spelt	77.8*	39.4	36	15.3 (*3061 #/a)
Welsh Triticale	58.2*	46.8	31	13.8 (*2724 #/a)
Experimental Means:	53.6	55.7	31	14.0

Cooperator & location: Dennis McComber, Fairfield; Teton Co. T21N, R5W, Sec. 23.
Seed Date: 11 May 1979
Harvest Date: 28 August 1979
Previous Crop: Alfalfa
Fertilizer: 68-50-25 + soil residual 52 NO_3.

Table 17. Recommended spring wheat varieties for district 5 of Montana. 1/

Variety	Plant Type 2/	Year	Recommended Use
Fortuna	ST	1966	Dryland in sawfly areas
Newana	SD	1976	Dryland or irrigated
Olaf	SD	1974	Dryland or irrigated
Thatcher	ST	1934	Dryland or irrigated
Pondera	SD	1980	Dryland or irrigated
Marberg	SD	1980	Dryland or irrigated
Rolette durum	ST	1976	Dryland or irrigated
Ward durum	ST	1974	Dryland
Wells durum	ST	1960	Dryland or irrigated
Crosby durum	ST	1979	Dryland*

1/ District 5 includes the Triangle area.
2/ ST - standard height; SD - semidwarf.
* Straw too weak for irrigation.

Table 18. Effects of sulfur on dryland spring wheat in North Toole County, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

#/a Actual N-P_2O_5-K_2O-S	Yeild bu/a	Test weight	Plant height	% protein
0-50-0-0	24.0	61.2	30	14.6
50-50-0-0	27.8	60.8	30	15.4
50-50-60-0	22.5	60.8	30	15.0
50-50-60-24	26.5	61.4	30	14.4
50-50-60-48	26.8	61.5	30	14.7
50-50-60-120	28.2	61.7	30	14.4
50-50-60-240	27.8	60.8	30	15.6
Experimental Means:	26.2	61.2	30	14.9

Cooperator & Location: Bob Aschim, Sunburst; Toole Co. T37N, R1E, Sec. 19.
Seed Date: mid-May 1979
Harvest Date: 11 September 1979
Previous Crop: Fallow
Fertilizer Sources: ammonium nitrate; ammonium sulfate; gypsum; 0-45-0.
Wheat variety: Fortuna.

TITLE: Barley Investigations

YEAR: 1979

LOCATION: Western Triangle Research Center, Conrad, MT.

PERSONNEL: Gregory D. Kushnak and Ron Thaut, Research Center, Conrad; E. A. Hockett, SEA, and R. F. Eslick, MSU, Bozeman.

Barley variety trials were grown at 5 locations in the Western Triangle during 1979. Data for the respective locations are presented in the following Tables: Conrad, Tables 19-22; Cut Bank, Table 23; Ethridge, Table 24; Galata, Table 25; and Choteau, Tables 26-27. Results of a winter barley survival test are presented in Table 29.

Hector, a 2-row feed barley, was the top yielder at most locations. Kimberly, a possible replacement for Klages in the malting industry, outyielded Klages at all locations; and the malt variety Larker was among the lowest yielders in each test.

Work is underway to improve the agronomic characteristics of Klages. At Conrad, several lines from a Hector/Klages cross produced higher yields and matured earlier than Klages. (Agronomic data for these lines may be found in Tables 19, 20, and 22 under the designation of MT 547- - -.)
Seed of these lines was increased under irrigation at Fairfield, and tests are currently underway to determine of they have retained the malt quality of Klages.

Elrose, a Klages derivative from Saskatchewon, outyielded Klages at Conrad. It is not yet known if American maltsters will accept this variety.

Table 19. Intrastate barley variety trial grown on dryland at the Western Triangle Research Center, Conrad, MT, 1979.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Hector	80.3	51.6	30	89	3	10.5
VDH 15472	75.8	49.5	28	97	1	11.5
MT 547143	72.3	49.7	26	84	5	10.7
Shabet	72.0	48.3	29	72	5	12.1
Klondike	71.3	45.2	34	46	20	12.0
Unitan	71.2	46.9	30	86	7	10.0
UT 1009	71.1	46.6	30	82	5	10.7
Purcell	70.8	50.3	28	88	4	12.3
Steptoe	70.4	46.3	27	90	4	11.3
N25B-40576	69.1	47.3	28	77	6	12.3
VDH 11874	68.8	50.9	27	87	5	11.3
NK 772010	68.6	47.5	29	64	12	12.4
Morex	68.3	47.3	35	80	4	11.3
VDH 13875	68.1	49.4	25	89	4	10.5
N25B-32577	68.1	49.9	27	86	4	12.0
NK 43612	66.9	40.6	28	51	18	11.8
Fairfield	66.9	50.6	30	94	2	11.2
RPB 89676	66.9	47.8	28	94	2	11.4
Piroline	66.7	51.0	29	81	5	12.4
VDH 22872	66.4	49.4	27	81	5	12.6
Menuet	66.2	50.7	27	80	6	12.4
MT 547234 'clark'	65.6	49.9	26	79	5	11.0
Elrose (TR 430)	65.0	51.1	26	78	6	11.9
VDH 27475	64.7	49.9	25	72	6	12.1
NK 761104	64.6	50.0	28	84	5	11.5
NK 1009	64.1	46.8	27	63	13	12.4
MT 574255	63.9	49.8	28	79	6	12.9
Lud	63.5	50.2	26	86	4	11.8
VDH 25773	63.3	49.9	26	74	5	10.8
Cebeco 7523	62.2	48.1	25	83	5	12.5
Summit	61.7	49.9	27	60	12	11.8
Ingrid	61.4	49.6	28	78	6	12.3
RPB 45672	61.3	49.0	29	74	5	11.8

* clark = dryland
Lewis = higher rainfall

Table 19. Continued.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Park	61.2	44.8	33	84	7	13.9
Kimberly	61.1	49.4	30	81	4	12.2
Klages	60.4	47.1	32	79	7	11.0
MT 547123 Lewis	60.0	49.9	26	87	5	11.3
Glenn	58.9	46.6	32	90	4	12.4
VDH 3375	57.6	49.9	26	82	5	11.6
Compana	57.6	48.3	27	93	2	11.7
MT 547354	55.2	48.3	27	68	10	12.9
MT 547276	55.1	46.6	28	52	19	12.9
* WA 11312 Advance	54.8	46.3	29	69	8	12.4
Shonupana	51.1	53.7	26	65	11	12.2
Washonupana	47.3	55.7	27	88	3	13.2
Experimental Means:	64.6	48.8	28	79	6	11.8
C.V.	7.0					
LSD (.10)	10.6					

Location: Station
Seed Date: 23 May 1979
Harvest Date: 29 August 1979
Previous Crop: Fallow
Fertilizer: 18-46-0 with seed.

* [redacted] 6194-63/Blazer

Table 20. Four year summary for barley varieties grown in Pondera County, 1975-1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Steptoe	64.4	46.0	28	91	4	11.6
Hector	64.2	51.4	29	89	4	12.4
Unitan	63.4	47.2	31	83	8	11.7
Piroline	60.0	51.9	28	85	4	14.0
Fairfield	59.0	51.6	28	92	2	13.1
Shabet	58.8	49.5	27	76	6	13.3
Summit	56.8	51.2	26	59	14	13.1
Compana	56.7	49.8	26	94	2	13.5
Klages	54.9	48.8	29	78	8	13.0

1975 Joe DeStaffany, 9 mi. east of Conrad
1976 Charles Skorupa, 11 mi. east of Conrad
1977 Phil Broesder, 13 mi. west of Conrad
1978 Hailed
1979 Station, 9 mi. north of Conrad

Checks for comparable average: Unitan & Hector.

Table 21. Western spring regional barley trial grown on dryland, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
UT 65471	84.6	48.0	29	84	5	11.0
WA 904475	80.5	51.9	28	89	3	11.4
SK 74234	80.3	50.8	26	84	5	12.9
UT 65504	80.0	50.4	28	93	2	11.1
Hector	79.7	50.5	29	89	4	11.2
Unitan	78.8	47.0	31	87	4	10.4
MT 547123 'Lewis'	78.7	51.2	29	88	4	10.7
OR 22113	77.2	49.5	25	79	7	12.8
Steptoe	76.9	46.8	25	95	2	10.1
ID 744302	76.2	47.4	31	84	5	10.1
WA 903775	76.0	51.2	29	91	3	12.1
Morex	75.5	48.7	32	91	2	10.3
MT 547143	75.4	50.1	24	86	5	11.4
CA 71125	74.6	44.5	24	80	7	11.0
MT 547276	74.4	47.9	27	87	5	10.1
WA 895375	73.5	51.0	25	91	3	10.6
MT 547234 'Clark'	73.3	49.7	27	86	4	11.8
WA 913575	72.7	50.9	25	78	5	11.6
Compana	72.6	49.7	26	98	1	12.2
OR 741209	72.4	46.7	23	80	5	11.4
WA 11312 Advance	71.9	46.6	24	77	6	12.0
OR 74226	71.1	44.0	22.1	64	14	12.7
OR 182	70.9	50.7	23	93	2	10.0
UT 11399	70.9	46.1	30	86	5	13.2
ID 723633	70.7	50.2	26	86	4	10.8
Klages	70.5	48.7	28	87	4	10.8
Trebi	69.5	47.0	28	91	2	10.6
CA 71223	69.3	37.8	23	68	13	11.2
OR 74206	67.1	42.5	25	66	13	13.0
Larker	66.8	49.4	33	84	5	11.3
ID 731959	66.5	42.5	20	77	8	12.4
Experimental Means:	74.1	48.1	27	84	5	11.4
C.V.	5.8					
LSD (.10)	10.1					

Table 21. Continued.

Location: Station
Seed Date: 23 May 1979
Harvest Date: 29 August 1979
Previous Crop: Fallow
Fertilizer: 18-46-0 with seed.

Table 22. Western dryland regional spring barley trial, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Galt	74.1	47.6	31	68	10	12.6
WA 895375	70.8	50.2	25	87	3	11.5
ID 711767	70.8	49.2	28	80	5	11.2
MT 547123 Lewis	70.5	50.2	26	89	4	11.2
Hector	70.3	51.4	28	91	3	11.3
Munsing	70.2	50.8	22	93	2	10.5
Steptoe	69.1	46.4	26	93	3	10.9
MT 547234 Clark	68.6	48.7	26	85	4	12.4
Unitan	67.8	46.8	30	88	4	10.4
MT 547255	67.6	50.5	27	92	3	11.1
WA 904475	67.4	50.9	27	83	5	11.8
ID 744302	67.2	46.1	28	85	6	9.2
ND 265431	65.8	50.4	26	96	1	12.4
MT 547354	63.0	49.2	25	83	6	12.5
Compana	57.0	49.4	26	97	1	11.7
Experimental Means:	68.0	49.2	27	87	4	11.4
C.V.	5.9					
LSD (.10)	9.5					

Location: Station
Seed Date: 23 May 1979
Harvest Date: 29 August 1979
Previous Crop: Fallow
Fertilizer: 18-46-0 with seed.

Table 23. Barley variety trial grown on dryland fallow north of Cut Bank, 1979. Montana Agr. Expt. Station, Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Kimberly	68.4	49.2	27	88	12	14.7
Unitan	68.2	42.7	30	87	6	12.6
Steptoe	66.8	41.5	28	89	5	12.0
Summit	66.7	49.2	28	90	4	12.3
Shabet	65.9	46.8	29	82	7	14.5
Hector	64.2	49.3	27	91	4	12.9
Purcell	63.3	47.7	28	94	3	14.0
Piroline	63.2	48.3	28	88	5	14.5
Fairfield	60.6	49.3	28	95	3	15.0
Larker	59.5	43.2	31	85	5	14.0
Compana	57.0	45.9	28	94	2	14.7
Morex	56.3	46.3	32	91	4	13.3
Klages	49.6	48.0	28	91	3	14.2
Experimental Means:	62.3	46.6	29	89	6	13.7
C.V.	5.18					
LSD (.10)	7.71					

Cooperator & Location: Jerry Swenson, Cut Bank; Glacier Co. T37N, R9W, Sec. 35.
Seed Date: 14 May 1979
Harvest Date: 10 September 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed.
No pre-seeding tillage.

Table 24. Barley variety trial grown in dryland fallow at Ethridge, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Shabet	69.2	45.5	23	30	33	13.1
Hector	61.9	46.2	25	59	14	13.8
Fairfield	60.8	46.3	22	63	12	13.0
Purcell	59.8	47.5	21	70	7	13.8
Kimberly	59.6	45.5	23	41	24	15.2
Steptoe	58.5	43.7	23	86	5	11.3
Summit	57.3	45.9	24	53	16	12.6
Unitan	56.0	44.9	22	70	9	12.1
Compana	55.4	45.6	19	92	2	13.1
Morex	54.8	43.3	26	68	10	13.4
Piroline	52.0	49.1	24	76	6	14.0
Klages	51.2	44.0	24	28	37	14.0
Larker	46.9	44.7	23	67	11	14.0
Experimental Means:	56.7	45.4	23	61	15	13.3
C.V.	6.57					
LSD (.10)	9.04					

Cooperator & Location: Ray Tomsheck, Ethridge; Toole Co. T32N, R4W, Sec. 1
Seed Date: 4 May 1979
Harvest Date: 23 August 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed

Table 25. Barley variety trial grown on dryland fallow north of Galata, 1979. Montana Agr. Expt. Station, Western Triange Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Hector	43.6	49.8	22	78	6	
Compana	43.0	46.6	17	89	5	
Shabet	42.8	46.3	20	51	14	
Fairfield	42.0	49.3	19	80	6	
Summit	42.0	49.0	18	59	12	
Unitan	41.4	45.7	19	70	10	
Kimberly	41.3	49.4	19	64	11	
Steptoe	41.3	44.8	19	85	6	
Piroline	39.1	49.1	20	71	8	
Klages	38.6	47.8	22	63	10	
Purcell	36.8	47.6	18	71	8	
Morex	33.1	47.1	21	65	9	
Larker	31.3	47.7	19	70	10	
Experimental Means:	39.8	47.7	20	70	9	

Cooperator & Location: Miles Burd, Galata; Toole Co. T32N, R3E, Sec. 21.
Seed Date: 3 May 1979
Harvest Date: 20 August 1979
Previous Crop: Fallow
Fertilizer: 11-48-0 with seed.

C.V. 4.88
LSD (.10) 4.64

Table 26. Barley variety trial grown on dryland fallow east of Choteau, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Hector	60.4	49.4	29	78	9	12.8
Steptoe	58.3	46.1	26	87	5	11.5
Fairfield	57.8	50.1	28	87	5	13.4
Piroline	57.6	49.6	26	74	7	13.5
Shabet	56.2	48.5	27	60	10	12.1
Unitan	55.3	45.6	27	67	10	11.5
Summit	54.6	48.7	25	59	15	12.9
Purcell	51.2	46.8	24	68	11	14.9
Compana	50.5	47.2	25	81	5	14.4
Kimberly	48.3	49.4	26	62	11	13.3
Morex	48.1	47.3	26	72	6	13.6
Klages	47.5	49.0	25	65	12	13.5
Larker	44.3	47.7	27	68	12	13.9
Experimental Means:	53.3	48.2	26	72	9	13.2
C.V.	4.81					
LSD (.10)	6.23					

Cooperator & Location: Bert Corey, Choteau; Teton Co. T25N R2W, Sec. 30
Seed Date: 17 May 1979
Harvest Date: 29 August 1979
Previous Crop: Fallow
Fertilizer (actual #/a): 11-48-0 with seed + 34 AN topdress.

Table 27. Three-year summary for barley varieties grown on dryland east of Choteau, 1977-1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

	Three-year Average					
Variety	Yield bu/a	Test weight	Plant height	% plump	% thin	% protein
Hector	66.8	51.7	29	85	6	13.3
Steptoe	64.7	45.4	28	90	5	11.8
Kimberly	63.5	52.1	29	77	7	12.8
Unitan	63.3	46.0	31	78	8	12.3
Shabet	63.1	48.7	29	74	8	13.1
Summit	62.9	51.0	27	68	12	13.2
Fairfield	60.3	51.5	28	90	4	13.5
Piroline	58.7	51.1	28	79	8	13.7
Compana	58.6	48.3	26	89	4	13.6
Klages	55.5	50.6	83	78	8	13.5

Location, all 3 years: Bert Corey's, east of Choteau.

Table 28. Recommended spring barley varieties for Montana.

Cultivar	Year	Areas and use recommended**
Compana	1941	Dryland in all district except 1; feed
Unitan	1959	Irrigated and dryland in all districts; feed
Dekap	1962	Dryland in all districts except 1; feed
Ingrid	1963	Irrigated land in districts 1 and 3; feed
Piroline	1967	Irrigated land in all districts except 6; and dryland in all districts; feed and malting
Erbet	1971	Irrigated and dryland in all districts where early maturity is desirable; feed
Shabet	1971	Irrigated or dryland in higher rainfall areas in all districts; malting and feed
Steptoe	1973	Irrigated and dryland in all districts; feed
Hector	1974	Dryland in all districts except 1; feed
Vireo*	1974	Irrigated land or dryland in higher rainfall areas in all districts; feed
Georgie*	1974	Irrigated land or dryland in higher rainfall areas in all districts; feed
Lud*	1975	Irrigated land in all districts; feed
Summit*	1975	Irrigated and dryland in all districts; feed
Purcell	1976	Irrigated and dryland in District 1
Stepford*	1977	Irrigated and dryland in all districts; hay
Horseford		Dryland in all districts except 3; hay
Menuet*	1979	Irrigated or dryland in higher rainfall areas with long growing season; feed
Lewis (547123)	1981	Irrigated or high rainfall (HI), all districts; Feed with malt potential.
clark (547234)	1981	Dryland, all districts; Feed & malt potential.

Table 34 (continued). Recommended spring barley varieties for Montana.

* Private variety and protected under the Plant Variety Protection Act.

** District 1 Northwestern Montana
District 2 Southwestern Montana
District 3 Southeastern Montana
District 4 Central Montana, including Cascade County
District 5 Northern Montana, including Triangle Area
District 6 Northeastern Montana

Table 29. Winter barley accessions from Korea showing greater than zero-percent winter survival in 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Accession*	Degree of survival %
73125-B-41-1-5 Samheung/Dueksandong	80
73125-B-41-2-2 Samheung/Dueksandong	20
73126-B-166-1-4 Samheung/Yuan	20
73129-B-18-11-2 Samheung/Olbori	20
Olbori	40
Kangbori	40

Seed Date: 5 October 1978
*Only survivors out of 476 accessions tested.

Table 30. Effects of nitrogen rates on irrigated Klages barley at Fairfield, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

#/a Actual* $N-P_2O_5-K_2O$	Yield bu/a	Test weight	% plump	% thin	% protein
49-23-0	61.0	51.2	87	5	9.1
89-23-0	91.0	51.3	89	4	9.2
129-23-0	86.7	48.7	73	11	10.4
169-23-0	100.8	50.8	86	6	11.7
Experimaental Means:	84.9	50.5	84	6.5	10.1

Cooperator & Location: Dennis McOmber, Fairfield; Teton Co. T21N, R5W, Sec.23.
Seed Date: 11 May 1979
Harvest Date: 28 August 1979
Previous Crop: Barley
*Fertilizer: 96# 18-46-0 with seed for all treatments; balance of N topdressed 11 May for respective treatments.

TITLE: Pulse Crop Investigations

YEAR: 1979

LOCATION: Western Triangle Research Center, Conrad, Montana

PERSONNEL: Greg Kushnak and Ron Thaut, Research Center, Conrad.

Increased prices for protein sources and frequent demands for alternate crops has led us to investigate the adaptation of several protein crops for the Triangle Area. Fababeans, soybeans, field peas, and lentils were tested at several dryland locations in the Western Triangle during 1979. Data for the respective locations are presented in the following Tables: Ethridge, Table 31; Cut Bank, Table 32; Sunburst, Table 33; Galata, Table 34; and Dutton, Table 35. All locations received little or no rainfall during the growing season, but soil moisture reserves were near capacity at seeding time.

Fababeans: Dryland fababean yields for 1979 were somewhat lower than those obtained the previous year; rarely exceeding 1100 #/a. Rooting depths on dryland were 3.5 to 4 feet, indicating the plants were unable to make full use of soil moisture reserves. Although wilting was not observed, moisture stress was reflected by reduced plant heights.

A 2-year fababean summary is presented in Tables 36 & 37. Precipitaion was unusually high during the first year (1978), and the resulting high yields were most likely a rare occurance for the Triangle. It is suggested that fababean production in the Triangle be limited to irrigated conditions, or areas receiving greater than 17" of annual precipitation.

Research data from irrigated fababeans in the Triangle are not available; but growers in the area reported yields of 2000 to 4000 #/a. These yields were not as high as anticipated, largely due to late seeding and a lack of irrigation during the latter part of the growing season. Most of the irrigation problems were from side-roll wheel lines, which were incapable of maneuvering in the 6-foot high crop stands.

Aside from high moisture requirements, fababeans appear to be well adapted to the cool growing season of the Triangle Area. Frost tolerance and required length of growing season are comparable to that of barley; and lodging resistance is excellent. Plant height on dryland is sufficient if moisture is abundant.

Crude protein content of the beans averages 30%, which could make the crop a suitable replacement for soybean meal. Animal nutritionists are currently investigating the extent that unprocessed fababeans can be incorporated into feed rations.

Soybeans: Two early maturing varieties of soybeans were seeded at the various locations; but cool soil temperatures reduced germination, causing poor stands. Later seeding dates would probably produce better stands. Data were obtained from Ethridge and Dutton only (Tables 31 & 35). The variety BD-21117 matured by August 31, and was considered early enough for the Triangle Area. Plant heights for both varieties, however, were too short for mechanical harvest; suggesting that soybeans would require irrigation in this area.

Field peas: Austrian winter peas (spring seeded) greatly outproduced faba-beans at all locations except Dutton. The peas at Dutton were damaged by spray drift. This was the second year of evaluation for Austrian peas, and the crop appears to be well adapted to dryland in the Triangle. The only undesirable trait observed was the prostrate growth habit, and harvest operations would probably require the use of a pea-bar (lifter) attachment.

Lentils: Lentils were not consistently successful in producing high yields. The only respectable yields were from the Ethridge location, where the lentils averaged approximately 1200 #/a. Plant heights, however, were much too short for mechanical harvest. Lentils might prove satisfactory under irrigated conditions if the ground is not rocky, and if herbicides were available for the crop.

Table 31. Pulse crop varieties grown on dryland near Ethridge, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop	Variety	Yield #/a	Test weight #/bu	Height (inches) low-est pod	Height (inches) high-est pod	Height (inches) Plant tip	Maturity date
Fababeans	Windsor	1413	54.5	5	11	19	29 Aug.
	Diana	1359	66.3	8	15	24	18 Aug.
	Ackerperle	1038	65.7	8	13	24	23 Aug.
	Petite	999	64.3	4	10	18	13 Aug.
	Minnesota #1	873	61.1	9	16	26	27 Aug.
Austrian W. Peas	Fenn	2040	64.1	prostrate growth			18 Aug.
Lentils	Tekoa	1283	57.1	0	12	12	20 Aug.
	Laird	1190	56.3	0	16	16	27 Aug.
Soybeans*	BD-21117	291*	57.3	0	13	15	31 Aug.
	X-005	144*	56.8	0	13	16	17 Sept.

Cooperator & Location: Ray Tomsheck, Ethridge; Toole Co. T32N, R4W, Sec. 1
Herbicide: Tolban, 1 qt./a preplant incorporated.
Seed Treatment: Fababean bacterial inoculant, Fababeans only.
Fertilizer: 11-48-0 with seed
Seed Date: 4 May 1979
Seed Rate: 1.5 seeds/sq. ft. for beans; 2.5 seeds/sq. ft. for peas; 3.5 seed/sq. ft. for lentils.
Row Space: 12 inches
*Soybeans suffered a 70% stand loss due to cold soil and subsequint poor germination.

Lentils too short for conventional harvest machinery.

Fababean 1st bloom: Windsor & petite, 20 June; other varieties, 28 June.

Table 32. Pulse crop varieties grown on dryland north of Cut Bank, 1979. Montana Agr. Ept. Station, Western Triangle Research Center, Conrad, MT.

Crop & Variety	Yield #/a	Test weight #/bu	Height (inches) Lowest pod	Highest pod	Plant tip
Fababeans					
Ackerperle	1131	65.6	10	17	21
Diana	864	66.2	9	14	21
Minnesota #1	714	65.9	7	17	20
Petite	642	64.2	0	7	10
Austrian W. Peas					
Fenn	1443	63.9	prostrate growth		
Lentils	lost to weeds and dry soil				
Soybeans	lost to cold soil				

Cooperator & Location: Al Hansen, Cut Bank; Glacier Co. T35N, R9W, Sec. 4
Seed Treatment: Fababeans inoculated with Fababean Bacterial Inoculant.
Fertilizer: 11-48-0 with seed
Seed Date: 14 May 1979
Seed Rate: Beans 1.5 seeds/aq.ft.; peas 3.5/sq. ft.; lentils 3.5/sq. ft.
Row Space: 12 inches
Harvest Date: 10 September 1979
Growing Season Precipitation: 1 inch.

Table 33. Pulse crop varieties grown on dryland near Sunburst, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop & Variety	Yield #/a	Test weight #/bu	Height (inches) lowest pod	highest pod	plant tip
Fababeans					
Ackerperle	1056	65.8	10	15	26
Petite	1053	63.5	5	11	15
Diana	909	66.6	9	16	24
Minnesota #1	831	67.0	10	16	24
Austrian W. Peas					
Fenn	1566	65.3	prostrate growth		
Lentils					
Tekoa	897	64.2	-	-	-
Laird	744	63.2	-	-	-

Cooperator & Location: Herb Karst, Sunburst; Toole Co. T37N R1E, Sec. 19
Seed Treatment: Fababean Bacterial Inoculant, Fababeans only.
Fertilizer 11-48-0 with seed.
Seed Date: 15 May 1979
Seed Rate: Beans 1.5 seeds/ sq. ft.; Peas 2.5 seed/sq. ft.; lentils 3.5 seed/sq.ft.
Row Space: 12 inches
Harvest Date: 11 September 1979

Table 34. Faba bean yield trial grown on dryland near Galata, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield #/a	Test weight #/bu	Height (inches)* lowest pod	highest pod	plant tip
Diana	661	63.6	7	15	20
Ackerperle	627	63.8	9	14	19

Cooperator & Location: Miles Burd, Galata; Toole Co. T32N, R3E, Sec. 21
Seed Treatment: Fababeans Bacterial Inoculant
Fertilizer: 11-48-0 with seed
Seed Date: 3 May 1979
Seed Rate: 1.5 seeds/sq. ft.
Row Space: 12 inches
Harvest Date: 20 August 1979
Nodulation: Nodules were 1 cm in size by 12 June, when plants were 3-5 inches tall.
*Heights probably too short for mechanical harvest.

Table 35. Pulse crop varieties grown on dryland near Dutton, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop & Variety	Yield #/a	Test weight #/bu	Height (inches) lowest pod	highest pod	plant tip
Fababeans					
Diana	1101	64.9	8	21	23
Ackerperle	1074	64.0	7	15	22
Petite	1002	64.9	2	11	15
Windsor	762	57.3	7	12	19
Minnesota #1	636	65.5	7	19	21
Austrian W. Peas					
Fenn	804	63.8	prostrate growth		
Soybeans*					
BD-21117	336*	56.3	1	14	14
X-005	276*	60.2	1	14	15
Lentils					
Tekoa	lost to herbicide drift				
Laird	lost to herbicide drift				

Cooperator & Location: August Loch, Dutton; Teton Co. T24N, R2E, Sec. 12
Seed Treatment: Fababean Bacterial Inoculant, Fababeans only.
Fertilizer: 11-48-0 with seed (100#)
Seed Date: 16 May 1979
Seed Rate: Beans 1.5 seed/sq. ft.; peas 2.5 seed/sq. ft.; lentils 3.5 seeds/sq. ft.
Row Space: 12 inches
*Soybeans suffered a 60% stand loss due to cold soil and subsequent poor germination.

Fababean plant tips slightly deformed during early growth by herbicide drift.

Fababeans starting to flower July 6, some Blister Beetles feeding on leaves and flower buds. Sprayed with Malathion.

Harvest Date: 28 September 1979

Crop & Variety	Root depth feet	Water use inches
Fababeans		
Diana	4	4.2
Ackerperle	4	4.8
Petite	3	3.8
Windsor	3	2.6
Minnesota #1	3	3.4
Soybeans	3	1.2

Table 36. Two-year yield summary of fababean varieties grown at several dryland locations in the Triangle Area, 1978-1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

	Yield in lbs./acre									
	1978				1979					
Variety	Dutton	Conrad*	Chinook	Chester	Dutton	Ethridge	Cut Bank	Sunburst	Galata	Average
Diana	2675	1628	1402	778	1101	1359	864	909	661	1264
Ackerperle	2925	1250	1089	832	1074	1038	1131	1056	627	1225
Petite	2200	1430	-	-	1002	999	642	1053	-	-
Maxime	2390	1316	857	776	-	-	-	-	-	-
Foec Nevyje	2733	1214	1208	577	-	-	-	-	-	-
Minnesota #1	-	-	-	-	636	837	714	831	-	-

*Recrop at Conrad.

Table 37. Two-year summary for height, maturity, protein, and test weight of Fababeans grown at several dryland locations in the Triangle Area. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Height (inches) lowest pod	Height (inches) plant tip	Maturity (days)	% protein	Test weight
Diana	8.0	24.4	106	31.8	66.1
Ackerperle	8.2	24.8	111	29.6	65.4
Petite	2.8	14.6	101	30.1	64.2
Minnesota #1	7.8	24.4	115	-	65.0

TITLE: Oilseed Investigations

YEAR: 1979

LOCATION: Western Triangle Research Center

PERSONNEL: Greg Kushnak and Ron Thaut, Research Center, Conrad; Jerry Bergman, Research Center, Sidney, MT.

Sunflowers, safflower , crambe, rape, mustard and flax were evaluated at several dryland locations in the Western Triangle over a 3-year period from 1977 to 1979. Data for 1979 are presented in the following tables: Ethridge, Table 38; Cut Bank, Table 39; Sunburst, Table 40; Galata, Table 41; and Dutton, Table 42. Little or no precipitation was received during the 1979 growing season, but unusually high amounts of stored soil moisture produced high yields at most locations.

Sunflowers: Of the various oil seed crops tested, sunflowers produced the highest yields at all locations; ranging from 1000 to 2200 lbs./acre for the earlier maturing, adapted varieties. This is consistent with tests from the previous 2 years.

We have noticed a decline in yield when plant populations exceeded 19,000 plants/acre; and suggest a population of 15,000 to 18,000 plants/acre for dryland sunflowers in the Triangle. It is therefore advisable that a corn-planter be used to insure proper seed distribution.

Sunflowers have shown exceptional drought tolerance, fair resistance to hail storms, and good market potential. Relative to other oil crops tested, sunflowers appear to be the most reliable for dryland in the Triangle Area.

Safflower: Safflower produced fairly good yields and test weights in 1979; but in previous years, test weights and oil contents were far below market standards. Growing season temperatures are apparently not warm enough during most years in the western and northern areas of the Triangle to produce acceptable safflower quality.

Crambe: Crambe was generally a very high yielder in each of the 3 years of testing; and appeared, agronomically, a fairly easy crop to produce (more so than mustard). Markets for this crop have not been developed.

Flax: Flax yields were very high at some locations; and on the average comparable to yields obtained in eastern Montana and western North Dakota. The market value of flax is not too encouraging at this time.

Mustard & Rape: Yields of mustard and rape have been erratic, indicating these crops are more sensitive to environmental fluctuations. Some of the problems encountered were: flea beetles; high susceptibility to herbicide drift; insufficient seedbed moisture for shallow seeding; and hot, dry conditions during bloom stage. Rape appeared much more vulnerable to high temperatures than mustard; and was more successful in the northwestern part of the Triangle.

Table 38. Oilseed crop varieties grown on dryland near Ethridge, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop/Variety*	Yield #/a	Test weight #/bu	Plant height inches	Maturity date	% oil
Sunflower					
CG-205	1774	30.1	49	18 Sept.	49.6
MF 700-0M	1488	27.0	46	20 Sept.	44.7
894	1382	28.2	46	20 Sept.	48.2
Sigco **	1302	28.4	45	28 Sept.	48.0
CG-204	1265	30.6	46	20 Sept.	48.1
Peredovik	1068	24.3	43	29 Sept.	46.6
Safflower					
S-208	1008	41.5	23	29 Sept.	40.9
Crambe	1269	19.2	36	25 Aug.	22.0
Rape					
Torch	885	46.3	28	17 Aug.	37.7
Candle	876	48.5	28	17 Aug.	40.4
Midas	825	46.1	34	21 Aug.	40.7
Tower	624	45.9	33	21 Aug.	40.8
Brown Mustard					
Blaze	1152	50.1	38	17 Aug.	35.5
Culbertson	1035	49.5	34	17 Aug.	33.0
Oriental Mustard					
Culbertson	1245	50.2	33	17 Aug.	37.8
Leth. 22A	1194	51.9	36	17 Aug.	37.1
Domo	1056	49.7	33	17 Aug.	38.3
Yellow Mustard					
Yellow-2	1221	54.3	26	13 Aug.	28.0
Culbertson	1218	54.6	21	13 Aug.	37.4
Sabre	1092	53.6	20	13 Aug.	29.5
Flax					
Noralta	984	54.3	19	26 Aug.	42.5
Wishek	924	53.6	19	26 Aug.	42.5
Linott	780	53.5	18	27 Aug.	42.9
Dufferin	774	53.5	19	30 Aug.	43.9
Culbert	606	52.8	20	26 Aug.	43.6

Table 38 (continued). Oilseed crop varieties.

Cooperator & Location: Ray Tomsheck, Ethridge; Toole Co. T32N, R4W, Sec. 1
Herbicide: Tolban, 1 qt./a preplant incorporated
Fertilizer: Flax, 5-24-0 with seed; other crops, 11-48-0
Seed Date: 4 May 1979
Seed Rate: Sunflowers 15000 plts./acre; Rape, brown & orient. mustard 8 #/a; yellow mustard 15 #/a; Flax 40 #/a
Row Space: Sunflowers 24"; other crops 12"

* CG = Cargill, MF = Master Farmer, 894 = USDA

** Sigco variety designation unknown; earlier maturing lines are available from Sigco.

Table 39. Oilseed crop varieties grown on dryland north of Cut Bank, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop/Variety*	Yield #/a	Test weight #/bu	% oil
Sunflower			
894	1101	25.5	44.9
MF 700-OM	1047	27.7	45.6
CG 204	1038	24.5	45.6
CG 205	963	29.3	49.9
B 2001	687	26.9	46.8
B 2002	531	25.7	48.6
Safflower			
S-208	744	35.7	32.4
Crambe	633	25.5	25.3
Rape			
Torch	594	51.1	39.8
Tower	264	47.4	39.3
Candle	222	50.4	40.4
Yellow Mustard			
Yellow-2	1002	53.8	28.0
Brown Mustard			
Culbertson	966	53.3	35.0

Cooperator & Location: Al Hansen, Cut Bank; Glacier Co. T35N, R9W, Sec. 4
Fertilizer: 11-48-0 with seed
Seed Date: 14 May 1979
Seed Rate: Sunflowers 15000 plts/acre; Rape, brown & orient. mustard 8 #/a; yellow mustard 15 #/a
Row Space: Sunflowers 24"; ; other crops 12"
Harvest Date: Sunflowers & Safflower 3 October; other crops 10 September
Growing season precipitation: 1 inch

* 894 = USDA; MF = Master Farmer; CG = Cargill; B = Rancher Brand

Table 40. Oilseed crop varieties grown on dryland near Sunburst, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop/Variety*	Yield #/a	Test weight #/bu	% oil
Sunflower			
CG 205	1761	28.6	53.1
894	1125	28.8	50.1
CG 204	1110	28.4	48.9
MF 700-OM	925	29.5	50.2
B 2001	687	29.3	53.5
B 2002	666	29.9	53.2
Safflower			
S-208	1136	40.6	38.5
Crambe	1719	26.4	28.0
Flax			
Culbert	777	52.8	41.8
Linott	690	52.3	41.3
Mustard	Lost to Flea Beetles		
Rape	Lost to Flea Beetles		

Cooperator & Location: Herb Karst, Sunburst; Toole Co. T37N, R1E, Sec. 19
Fertilizer: Flax 5-24-0 with seed, other crops 11-48-0
Seed Date: 15 May 1979
Seed Rate: Sunflowers 15000 plts/acre; Flax 40 #/a
Row Space: Sunflowers 24"; other crops 12"
Harvest Date: Sunflowers & Safflower 3 October; other crops 11 September 1979

Table 41. Sunflower yield trial grown on dryland near Galata, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Variety	Yield #/a	Test weight #/bu	% oil
Cargill 205	2094	29.9	48.7
894	1634	26.9	—
Cargill 204	1182	26.5	42.5

Cooperator & Location: Miles Burd, Galata; Toole Co. T32N, R3E, Sec. 21
Fertilizer: 11-48-0 with seed
Seed Date: 3 May 1979
Seed Rate: 15000 plts/acre
Row Space: 24"
Harvest Date: 3 October 1979

Table 42. Oilseed crop varieties grown on dryland near Dutton, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Crop/Variety*	Yield #/a	Test weight #/bu	Plant height inches	Root depth feet	Water use inches	% oil
Sunflower						
CG 205	2190	28.4	-			48.8
Sigco	1857	28.5	-			47.1
MF 700-OM	1503	27.2	-	5	6.9	45.9
894	1449	29.8	-			48.4
Peredovik	1362	29.9	-	6	4.8	48.1
CG 204	1248	24.8	-			46.7
Safflower						
S-208	1272	43.0	-	7	8.0	42.1
Crambe	453**	24.7	27			34.3
Flax						
Dufferin	1002	52.1	20			44.2
Noralta	993	51.9	20			42.8
Wishek	936	52.2	20			42.8
Linott	867	53.5	21	4	3.7	43.2
Culbert	795	52.9	19			42.7
Yellow Mustard	Partially lost to herbicide drift					
Brown Mustard	Completely lost to herbicide drift					
Oriental Mustard	Completely lost to herbicide drift					
Argentine Rape	Completely lost to herbicide drift					
Turnip Rape	Completely lost to herbicide drift					

Cooperator & Location: August Loch, Dutton; Teton Co. T24N, R2E, Sec. 12
Fertilizer: Flax 50# 11-48-0 with seed; other crops 100# 11-48-0
Seed Date: 16 May 1979
Seed Rate: Sunflowers 15000 plts/acre; Rape, brown & oriental mustard 8 #/a; Yellow mustard 15 #/a; Flax 40 #/a
Row Space: Sunflowers 24"; other crops 12"
Harvest Dates: Sunflowers & Safflower 11 October; other crops 28 September 1979

* CG = Cargill; MF = Master Farmer; Sigco variety designation unknown.
** All crops except flax were somewhat "spraddled" by herbicide drift and the more suseptible crops may have lost considerable yield.

Table 42. Continued. Oilseed crop varieties, Dutton.

*** Yellow mustard was partially tolerant to spray drift and yielded approx. 350 #/acre. Other mustards and rapes were completely lost.

TITLE: Evaluation of Roundup herbicide for weed control in emerged fababeans.

YEAR: 1979

LOCATION: Western Triangle Research Center, Conrad, MT.

PERSONNEL: Greg Kushnak and Ron Thaut, Agr. Research Center, Conrad, MT.

Introduction: This experiment arose out of a past experience whereby we mistakenly allowed Roundup spray to drift onto a fababean nursery, and observed no crop injury. This opened the questions "how tolerant are fababeans to Roundup?" and "could we control annual grassy weeds and perennial weeds in emerged fababeans with Roundup?". In addition, the wet conditions during the Spring of 1979 caused many growers to abandon the idea of using soil incorporated herbicides for fababeans. Subsequently, some bean fields became heavily infested with wild oats and other weeds later in the season; and emergency treatments were being sought.

Results: Four rates of Roudup ranging from 0.5 to 3 quarts/acre were applied to irrigated fababeans heavily infested with wild oats. All of the Roundup treatments were considered too harsh on the crop (Table 43). Yields were not taken, but the lowest rate (0.5 qt/a) reduced blossom numbers by 50%. Since Roundup at 0.5 qt/a approaches the minimum effective rate for even the most susceptible weeds, it is concluded that most or all weed species cannot be controlled in emerged fababeans without serious crop injury.

Table 43. Evaluation of Roundup herbicide for wild oat control in fababeans, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Rate quarts/acre	W. oat kill %	% beans killed	Observations, July 16
0.5	90	0	Beans short & weak, but recovering; 50% bloom reduction, 2nd crop wild oats emerging.
1.0	100	15	Surviving beans stunted, recovering very little, 80% bloom reduction; 2nd crop of wild oats emerging.
1.5	100	45	Surviving beans severly stunted; no regrowth or recovery; 2nd crop of wild oats emerging.
3.0	100	85	Surviving beans severely stunted; have not grown since date of treatment; 2nd crop of wild oats emerging.

Cooperator & Location: Don Kronebusch, north of Conrad.
Date of Treatment: 21 June 1979
Air Temperature: 65F, no clouds or wind
Soil: wet to surface
Wild Oats: 15 plts/sq. ft.; 7" tall, tillering
Beans: 5" tall
Plot size: 10 x 20 feet
Volume: 15 gpa, 6503 nozzles, 10' spray boom
Pressure: 35 psi

Table 44. Yield of irrigated alfalfa during initial year of application of phosphorus and sulfur west of Valier, 1979. Montana Agr. Expt. Station, Western Triangle Research Center, Conrad, MT.

Actual lbs/acre $N-P_2O_5-K_2O-S$	Dry matter yield, Tons/acre first cutting	second cutting	Total
0-0-0-0	1.49	2.00	3.49
0-100-60-0	1.52	1.91	3.43
0-200-60-0	1.82	2.06	3.88
0-400-60-0	2.01	2.20	4.21
0-200-60-30	1.56	1.90	3.46
0-200-60-60	1.53	1.84	3.37
0-200-60-120	1.86	1.84	3.70
0-200-60-360	1.73	1.97	3.70
0-200-0-60	1.25	1.31	2.56
150-200-60-0	1.98	2.35	4.33

Cooperator & Location: Joe Broesder, Dupuyer; Pondera Co. T29N, R8W, Sec. 11
Seeding date: Spring 1978
Fertilizer application: 16 April 1979
Harvest Dates: 1st cut 27 June 1979; 2nd cut
Phophorus Source: 0-45-0
Sulfur source: Gypsum, 18% S
Nitrogen Source: 34-0-0

Soil Analyis: pH = 7.3; NO_3-N = 2 ppm; N = 8 #/a; K = 212 ppm; phosphorus $NaHCO_3$ Bray = 7 ppm; Sorp Phos = 234; sulfur = 26; salt hazard = .72 mmhos; soil text. = CL; suggested recommendation = 30-150-60-0.

*Nodules were slightly more abundant when S increased from 30 #/a.

Sorp 234 means you need 234 # P_2O_5 to reach % yield.
Rec rate of 150 is the level considered economical.
30 N rec is just to accomodate the use of 11-55-0 since 0-45-0 is not used.
Sulfur = 26 means S is high & no response is expected.
(< 10 for S would be low, & response would be expected.)