PROJECT TITLE: Oilseed and pulse crop evaluation under no-till recrop conditions.

YEAR: 1989

LOCATION: Western Triangle Agricultural Research Center, Conrad.

PERSONNEL:

Project Leader: Gregory D. Kushnak

Cooperators: Jerry Bergman, EARC, Sidney; and Jim Sims, MSU Plant & Soil Science, Bozeman.

OBJECTIVES:

Oilseed and pulse crops in rotation can benefit grain production (soil amelioration, pest cycle disruption, etc.). The production potential of various oilseed and pulse crops has been determined for fallow systems, under average management levels, in the Western Triangle area. This project seeks to determine production potential of these crops under no-till conditions, where they will most likely be grown in rotation with grain; and also to test new crops as they become available.

METHODS:

In 1989, the oilseed trial consisted of 16 safflower varieties and experimental lines, mostly from the MSU safflower breeding program at Sidney; and 8 varieties of Canola. The pulse crop study consisted of 20 types of annual legumes, most of which have only recently been tested in Montana

Both studies were no-till planted into standing stubble from the previous years barley crop. Planting was accomplished with a double-disc no-till plot planter constructed by our Research Center Staff. The double disc openers were supplied by Acra-Plant, Inc., Garden City, KS. Row space was 12 inches. MAP was applied with the seed to provide 51 lbs P_2O_5/a. Ammonium nitrate (34-0-0) was topdressed to provide 60 lbs. N/a to the oilseed only. Herbicides included Roundup for preseeding vegetation control and Hoelon for wild oat control. Planting date was May 15, 1989. Growing season rainfall by month was: May 2.7"; June 2.45"; July 2.09"; and August 4.66". Planting depth was shallow (½ inch) for small seeded types, and deep (1½inch) for large seeded types. Medium sized seed, including safflower, was placed 1-inch deep.

RESULTS:

No-till recrop stands of canola, safflower, and annual legume crops were excellent; and plant growth was heavy due to above average rainfall. Potential canola yields were estimated to be at least twice the multi-year average of 800 lbs/a. However, only 574 lbs/a were recovered at harvest (Table 1). Rainy weather prevented timely harvest, resulting in severe shatter losses (40 to 70%).

Safflower yields were greatly reduced by continuous cool wet weather throughout the filling/ripening period (Table 2). Only the earliest maturing varieties, Saffire and Oker, produced a large percentage of completely developed kernels; but oil contents were still too low for profitable oil processing. The rest of the varieties produced more empty hulls than kernels. This was regarded as unusual, as safflower kernel development has been successful during each of the several previous years of testing at Conrad; with oil contents acceptable in most years.

Data for the annual legumes are presented in Table 3. Legumes producing the greatest amount of plant growth early in the season would conceivably be the most appropriate for use as green manure crops in rotation with cereal grains. This combination of traits would allow "plowdown" earlier in the season, to allow more time for soil moisture recharge throughout the remainder of summer. Entries exhibiting early season production included Austrian W. Pea, NC8-3 Chickling Vetch, Tinga Tangier Flatpea and Semu-Si Feed Pea.

Table 1. Canola variety trial no-till planted into barley stubble, Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Days to Flower	Days to Petal drop	Plant height (inch)	Shatter (%) 1/	Harvested seed yield (lbs/a)
Ex 8905	51	74	36	70	770
Ex 8908	50	74	36	70	696
Westar	52	74	38	70	603
Ex 8906	50	73	36	70	600
Ex 8902	56	77	42	40	569
Ex 8903	56	77	34	40	516
Ex 8907	50	72	36	70	466
Ex 8904	55	79	36	40	373
F-test var.	1.0	1.0	14.8	-	4.10
CV 2	2.59	1.59	1.61	-	10.8
LSD (.05)			1.73		182

Planted May 15, 1989 ; emerge May 26.
Previous crop : barley.
Harvest date : August 30, 1989.
Fertilizer : 11-51-0 with seed + 60 N topdress.
Pest control : Malathion for flea beetles, June 14.

1/ Estimated.

Table 2. Safflower variety trial no-till planted into barley stubble, Conrad 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield (lbs/a) *	Test wt. (lbs/bu)	Oil (%) *	Plant height (in)
85B 3555	451	15.9	9.9	28
83B 1954	623	18.8	20.1	28
85B 1837	421	15.0	12.0	29
85B 3918	338	16.1	12.6	29
85B 4431	711	17.5	13.6	30
85B 4829	338	13.1	7.9	30
87B 1298	753	16.4	9.6	28
87B 1650	382	16.1	9.2	29
87B 4311	354	15.0	8.2	29
S-541	302	13.7	9.6	29
S-208	601	15.0	8.1	29
Finch	780	17.2	8.7	29
Girard	346	14.0	5.9	27
MT 3697	664	16.4	10.2	27
Saffire	1608	24.9	13.3	28
Oker	980	16.6	11.1	28

Planting date : May 15, 1989
Recrop, no-till planted into barley stubble.
* Low yield and oil due to prolong cool, wet weather during seed development; oil is dry weight basis.
Bloom dates : 2nd week of August.
Harvest date : September 27, 1989.
Fertilizer : 11-51-0 with seed + 60 N topdress.

Table 3. Annual legume adaptation trial no-till planted on barley stubble, Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Total plant yield lbs/a *	Canopy height inches	Plant length inches	Harvest date	Bloom date	Seed size
Austrian Winter Pea	5425	13	53	Aug 22	198	L
NC8-3 Chickling Vetch	6710	16	32	Sept 6	188	L
Tinga Tangier Flatpea	5517	17	42	Sept 6	197	L
SEMU-SI Feed Pea	5103	18	43	Aug 22	193	L
Maple Amber Soybean	2035	23	23	Sept 6	208	L
Red Kidney Bean	2808	16	16	Sept 6	206	L
UI 114 Pinto Bean	2832	14	20	Sept 6	207	L
Red Chief Lentil	4725	9	13	Aug 22	190	L
Indianhead Lentil	5305	15	18	Aug 22	202	M
Robinson Snail Medic	1283	7	22	Aug 22	201	M
Paraponto Gamma Medic	2285	7	18	Aug 22	202	M
Mt. Barker Sub Clover	-	5	7	Oct 19	233	M
Bigbee Berseem Clover	-	20	30	Oct 19	226	S
Multicut Berseem Clover	-	20	28	Oct 19	233	S
Common Yellow Sweet Clover	1865	20	27	Oct 19	-	S
Maral Shaftal Clover	-	14	23	Oct 19	213	S
Youchi Arrowleaf Clover	-	13	20	Oct 19	233	S
George Black Medic	3282	9	14	Aug 22	191	S
Jemalong Barrel Medic	1507	4	16	Aug 22	201	S
Nitro Alfalfa	2608	19	19	Oct 19	209	S

Location : Research Center, Conrad, MT
PLanting date : May 15, 1989
Planted no-till, recrop (barley stubble).
Soil moisture at planting : 27 inches moist soil (clay-loam).
Fertilizer : 50 lbs/a 11-51-0 with seed.
* Dry matter, including seed. Data not yet available for clovers.