1991 Golden Plains Area Agricultural Handbook

Colorado State University Cooperative Extension

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Colorado State University

Cooperative Extension
Colorado State University
Golden Plains Area
Reply to Akron, Colorado

January 1991

Dear Cooperator,

Information printed in this handbook would not be possible without the continued support and cooperation of crop and livestock producers in the area as well as the ag related industry. The result of the supportive relationship between Cooperative Extension, crop and livestock producers and the ag related industry is presented on the following pages.

This material was prepared by Colorado State University Cooperative Extension personnel in Phillips, Washington, Yuma and Kit Carson Counties in addition to Cooperative Extension personnel located at Colorado State University, Fort Collins, Colorado.

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Sincerely,

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CONTROL OF ALFALFA INSECTS BAY FARM, FORT COLLINS, COLORADO 1990

Frank Peairs, Jeff Brase, Jeff Rudolph, and Wendy Meyer
CSU Department of Entomology

PRODUCT, LBS ACTIVE INGREDIENT/ACRE	ALFALFA WEEVIL LARVAE/180° SWEEP* 1 WEEK	2 WEEKS	3 WEEKS	WEEVIL ADULTS PER 180° SWEEP* 1 WEEK	2 WEEKS	3 WEEKS	APHIDS PER 180° SWEEP* 1 WEEK	2 WEEKS	3 WEEKS
CAPTURE 2E, 0.02	2.50 EF	19.75 D	13.25 E	1.50 B	16.25	10.00	0.00	15.50 AB	29.75 BC
ICIA 0321 1E, 0.025	4.00 EF	56.50 CD	31.75 E	0.50 B	9.25	6.00	0.75	11.50 AB	23.75 C
PENNCAP M (C), 0.75 + POUNCE 3.2E, 0.10	9.30 CDE	39.50 CD	33.03 DE	0.75 B	12.25	4.24	0.00	8.00 AB	59.14 AB
ASANA XL, 0.02	6.50 CDE	26.50 CD	52.25 CDE	8.50 A	22.25	6.75	0.00	4.00 B	44.00 ABC
PENNCAP M (S), 0.75	9.25 CDE	52.25 BCD	61.00 CD	1.00 B	13.50	8.25	1.25	27.00 AB	99.50 A
FURADAN 4F, 0.50	0.25 F	16.75 D	67.50 CD	1.25 B	21.25	9.00	0.25	15.50 AB	69.00 AB
DURSBAN 200CC, 0.75	5.50 DEF	31.00 CD	90.75 BCD	0.75 B	9.75	6.00	0.25	12.25 AB	64.50 AB
LORSBAN 4E, 0.75	9.50 CDE	30.75 CD	104.50 BCD	4.25 AB	17.75	5.75	0.00	19.25 AB	65.75 AB
PENNCAP M (C), 0.75	35.00 CDE	97.25 BCD	112.75 CDE	1.00 B	13.50	3.75	2.00	23.50 AB	56.50 AB
AMBUSH 2E, 0.20	79.96 BC	267.49 ABC	113.36 BCD	3.08 AB	21.92	6.57	2.99	17.67 AB	49.14 AB
LORSBAN 4E, 0.75 + COC*	7.25 CDE	91.25 BCD	113.75 BCD	1.75 AB	12.00	4.50	0.50	24.25 AB	76.50 AB
DURSBAN 200CC, 0.50	20.25 CD	69.00 BCD	127.75 BCD	2.75 AB	11.25	5.50	0.25	18.00 AB	56.25 AB
LORSBAN 4E, 0.50 + COC*	19.50 CD	61.25 BCD	158.25 BC	3.75 AB	15.75	4.25	1.00	7.00 AB	91.00 AB
LORSBAN 4E, 0.50	115.86 AB	349.01 AB	355.27 AB	4.13 AB	9.80	2.92	2.63	32.32 A	85.99 AB
UNTREATED	255.25 A	636.75 A	583.50 A	4.75 AB	9.25	2.50	3.50	40.75 A	101.75 A

* Means in the same column followed by the same letter are not statistically different (SNK, p = 0.05).

CONTROL OF ALFALFA INSECTS, 1990, BAY FARM, FORT COLLINS, COLORADO - Treatments were applied on May 23, 1990 with a CO2 sprayer calbrated to deliver 26.6 gallons at 30 psi through four 8006 nozzles mounted on a handheld boom. Plots were 12 x 25 feet and were arranged in four replicates of a randomized complete block design. Analysis of variance was performed on (log + 1) transformed alfalfa weevil larvae and aphid counts, while a (sqrt + 0.5) transformation was used for alfalfa weevil adult counts. Untransformed means are presented in the table, along with results of the SNK (p = 0.05) multiple range test performed on the transformed data.

Crop height was ca. 1.5 ft at the time of application. The crop, cv 'Ranger' was planted in the fall of 1985. Soil type is a clay loam.

Precounts averaged 5.5 alfalfa weevil larvae, 0.6 alfalfa weevil adults, and 0.3 aphids (mostly pea aphids) per 180° sweep. All treatments except the low rate of Lorsban 4E had significantly fewer weevil larvae at all sample dates and no treatments had more aphids than the untreated control in any sample date. There was no pattern to adult weevil control at the first sample date, although treatment effects were statistically significant. Treatments did not significantly affect weevil adult numbers at the second and third sample dates.

Pests: Alfalfa weevil, Hypera postica
Pea aphid, Acyrthosiphum pisum
Crop: Alfalfa, Medicago sativa 'Ranger'
Stand Age: 5th year
Herbicide: None
Insecticide use: Site of insecticide tests for 4 previous years

CONTROL OF WESTERN CORN ROOTWORM LARVAE
EARL JESSE FARM, AKRON, COLORADO
MAY-JULY, 1990

Stan Pilcher, Golden Plains Area Extension Entomologist
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Part I.

TREATMENT	OZ PROD/1000'	PLACEMENT*	IOWA 1-6 DAMAGE RATING**
COUNTER 15G	8 OZ	IF	1.7 C
COUNTER 15G	8 OZ	TB	1.9 C
AC 301467 20PG	5.1 OZ	IF	2.0 C
COUNTER 15G	8 OZ	B	2.0 C
AC301467 20PG	6 OZ	B	2.0 C
DYFONATE I	6 OZ	TB	2.2 C
FORTRESS 5G	6 OZ	IF	2.3 C
AZTEC 2.1G	6.7 OZ	B	2.5 C
FURADAN 15G	8 OZ	B	2.5 C
THIMET 20G	6 OZ	B	2.8 BC
HOLDEM 20G	8 OZ	B	2.9 BC
LORSBAN 15G	8 OZ	B	2.9 BC
FORTRESS 5G	6 OZ	B	3.0 BC
HOLDEM 20G	6 OZ	B	3.0 BC
FORCE 1.5G	8 OZ	TB	3.0 BC
FURADAN 4F	2.4 FL OZ	B	3.9 AB
UNTREATED	-		4.2 A

Part II.

TREATMENT	OZ PROD/1000'	PLACEMENT*	IOWA 1-6 DAMAGE RATING**
FURADAN 4F	2.4 FL OZ		
BASAL			1.9 B
FURADAN 15G	8 OZ	OW	2.1 B
FURADAN 15G	8 OZ		
BASAL			2.3 B
COUNTER 15G	8 OZ	OW	2.4 B
COUNTER 15G	6 OZ	OW	2.4 B
THIMET 20G	6 OZ	OW	2.4 B
FURADAN 4F	2.4 FL OZ	OW	2.6 B
UNTREATED			4.0 A

* B = Applied as 7' band over row at planting, TB = T-band at planting, IF = applied in furrow at planting, OW = Applied over the whorl at cultivation, BASAL = Applied to base of plant at cultivation.

** Means followed by the same letter are not statistically different (SNK, p = 0.05).

CORN ROOTWORM TEST, JESSE FARM, AKRON, COLORADO, MAY-JULY 1990: Planting time treatments were applied on May 8, 1990, while cultivation treatments were applied on June 19, 1990. Each plot consisted of one 50 ft row. Plots were arranged in four replicates of a randomized complete block design. Granular insecticides were applied with electrical modified Wintersteiger meters mounted on a two-row John Deere Maxi-Merge planter. In-furrow applications were accomplished by directing a drop tube into the seed furrow. T-band applications were made with a 4 in. John Deere spreader located between the disk openers and the press wheel. Banded applications were done with 6 in. Gandy spreader held 2 in. to 4 in. above the seed furrow and located between the press wheel and the incorporation tines. Cultivation applications were made with 6 in. Gandy spreaders held 1 in. to 2 in. above the plant and were incorporated with a KMC rolling cultivator. Applications were made at 1.8 mph. Liquid applications were made with a CO2 powered sprayer calibrated to apply 23.3 gpa through 2 LF6 nozzles at 30 psi.

Treatments were evaluated on July 12, 1990 by digging 5 consecutive plants from each plot, washing the roots and rating the damage on the Iowa 1-6 scale (1 = no noticeable feeding damage and 6 = three or more full nodes of roots destroyed).

Most treatments worked well. Rootworm pressure was significant but not severe, with both untreated control rating a 4.0 or higher. Of the planting time treatments (Table Part I), only Furadan 4F, 2.4 fl oz/1000 row ft was statistically similar to the untreated control. All cultivation treatments (Table Part II) were significantly less damaged than the untreated control.

Yields in 8 untreated and 8 Counter 15G plots were compared. Untreated corn yields were 221.6 bushels/acre and treated corn yields were 240.4 bushels/acre @ 15.5% moisture. This is a 11.2% (t=test, p=0.0916) yield reduction, similar to that observed in the 1988 and 1989 tests.

Pest:	Western corn rootworm, Diabrotica virgifera
Crop:	Field Corn, Zea mays, 'Pioneer 3475'
Planting Date:	May 8, 1990
Plant Population:	28,000
Soil Type:	Platner Loam, O.M. 1.6, pH 7.5
Fertilization:	210 N, 38 P2O5, 15 K, 19 S, 3 Zn
Herbicide:	Prowl 2 pints, Marksmen 2 pints, Bladex 0.5 lb ai/ac
Insecticide History:	No previous insecticide
Field History:	Field corn 11 consecutive years
Cultivation Treatments:	June 19, 1990, 10-12 inch corn

CONTROL OF WESTERN CORN ROOTWORM ADULTS WELD COUNTY, COLORADO JULY-AUGUST, 1990

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Table 1. Treatment schedule for fields in adult western corn rootworm control study.

FIELD	GROWER	DATES	1ST TREATMENT*	2ND TREATMENT*
1 W	D SEEWALD	7/24, 8/15	DIMETHOATE 4E, 0.50; PENNCAP M, 0.25	PENNCAP M, 0.25
1 E	D SEEWALD	7/24, 8/15	DIMETHOATE 4E, 0.50; PENNCAP M, 0.25	-
2 W	D SEEWALD	7/24, 8/15	DIMETHOATE 4E, 0.50; PENNCAP M, 0.25	-
2 E	D SEEWALD	7/24, 8/15	DIMETHOATE 4E, 0.50; PENNCAP M, 0.25	PENNCAP M, 0.25
3 W	HERGERT	7/7, 8/15	COMITE, 1.64	-
3 E	HERGERT	7/7, 8/15	COMITE, 1.64	PENNCAP M, 0.25
4 W	S SEEWALD	7/30, 8/15	DIMETHOATE 4E, 0.50	-
4 E	S SEEWALD	7/30, 8/15	DIMETHOATE 4E, 0.50	PENNCAP M, 0.25
5 W	GREGERSON	7/30, 8/15	COMITE, 1.64; PENNCAP M, 0.25	-
5 E	GREGERSON	7/30, 8/15	COMITE, 1.64; PENNCAP M, 0.25	PENNCAP M, 0.25

* Product, lbs active ingredient/acre

Table 2. Western corn rootworm adults, number of mite infested leaves, and number of mite damaged leaves in fields treated for western corn rootworm adults.

FIELD	WCR ADULTS/PLANT 8 AUG	WCR ADULTS/PLANT 22 AUG	MITE-INFESTED LEAVES/PLANT 8 AUG	MITE-INFESTED LEAVES/PLANT 22 AUG	MITE-DAMAGED LEAVES/PLANT 8 AUG	MITE-DAMAGED LEAVES/PLANT 22 AUG
1 W	0.65	0.05	4.30	5.40	2.50	3.40
1 E	0.30	0.95	4.65	5.65	3.05	4.05
2 W	0.80	2.20	8.40	8.45	7.10	7.05
2 E	0.55	0.00	7.55	8.00	6.90	7.00
3 W	0.40	0.75	3.85	3.15	2.75	2.15
3 E	0.45	0.15	4.05	4.20	2.90	2.55
4 W	0.55	0.30	8.50	7.90	7.35	6.70
4 E	0.40	0.00	7.05	8.10	5.75	6.45
5 W	0.40	0.15	6.70	7.85	4.85	6.70
5 E	0.20	0.10	8.35	9.05	7.30	8.25

CONTROL OF WESTERN CORN ROOTWORM ADULTS, WELD COUNTY, COLORADO, JULY-AUGUST, 1990: Five fields were treated in July for control of western corn rootworm adults and/or spider mites (see Table 1). Half of each field was retreated with Penncap M, 0.25 lbs ai/acre on August 15 for further control of western corn rootworm adults. Applications were made by Ray Edmiston, Aerial Sprayers, Inc., Longmont, CO. The aircraft was a Cessna 188B Ag Wagon, 40 ft wingspan and 30 ft boom. It was calibrated to apply 1 gallon per acre spray volume at 110 mph airspeed, 30 psi and 60 ft swath width through 24 Christopher (#4) flood tip nozzles.

Treatments provided good control of western corn rootworm adults. There was no noticeable "flaring" of mites by any of the treatments. This is the initiation of a long term study of western corn rootworm management by adult control. Fields will be assessed for larval damage in July, 1991 and further adult treatments will be made. This approach to rootworm management could reduce the potential contamination of groundwater by rootworm soil insecticides. A concern is that foliar insecticides applications for control of rootworm adults might provoke outbreaks of corn spider mites.

Pests:	Western corn rootworm, Diabrotica virgifera Banks grass mite, Oligonychus pratensis
Crop:	Field Corn, Zea mays, several varieties
Planting Dates:	May, 1990
Herbicide:	Variable
Field History:	At least 2 years field corn
Soil:	N/A
Insecticide History:	Variable

CONTROL OF SECOND GENERATION EUROPEAN CORN BORER WITH CHEMIGATED INSECTICIDES DRYDEN FARM, WRAY, COLORADO and MCCASLAND FARMS LAIRD, COLORADO 1990

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Shawn Watson, CSU Technician

Table 1. Chemigated insecticides for control of second generation European corn borer. McCasland Farms, Laird, CO. 1990.

TREATMENT, LBS AI/AC	ECB LARVAE IN 40 PLANTS		PERCENT CONTROL
CAPTURE 2E, 0.08 (S)	12.0 ± 1.2	B	89
CAPTURE 2E, 0.08 (N)	13.3 ± 2.6	B	88
UNTREATED CONTROL	110.7 ± 21.8	A	-

Table 2. Chemigated insecticides for control of second generation European corn borer. Dryden Farms (L-2), Wray, CO. 1990.

TREATMENT	ECB LARVAE IN 40 PLANTS		PERCENT CONTROL
CAPTURE 2E, 0.08 LBS AI/ACRE	31.7 ± 3.7	B	85
DIPEL ES,1 QT/ ACRE	62.3 ± 13.4	B	71
UNTREATED CONTROL	217.7 ± 14.2	A	_

Table 3. Chemigated insecticides for control of second generation European corn borer. Dryden Farms (L-1), Wray, CO. 1990.

TREATMENT	ECB LARVAE IN 40 PLANTS		PERCENT CONTROL
LORSBAN 4E, 1.0 LBS + 1 QT CROP OIL	21.0 ± 0.	C	62
DIPEL ES, 1 QUART	33.3 ± 3.0	BC	40
JAVELIN WG, 1.5 LBS	35.3 ± 9.5	BC	36
JAVELIN WG, 1.0 LBS	50.0 ± 1.5	AB	10
UNTREATED CONTROL	55.3 ± 5.6	A	

CONTROL OF SECOND GENERATION EUROPEAN CORN BORER WITH CHEMIGATED INSECTICIDES, DRYDEN FARM, WRAY, COLORADO, 1989. Experiment 1 (McCasland Farms): Capture was applied once at two different application dates August 13, 1990 and August 20, 1990 to determine efficacy differences as related to timing. The first application was made when 25 to 35% of the plants showed egg masses and 50% of the egg masses were black head stage. Very few egg masses were hatched. The second application date showed 40 to 60% of the plants with egg masses and 50% of these egg masses hatched with the remaining 50% white through black head stage. both application dates gave equal control. This field also had Banks Grass Mite and Two Spotted Mites. Control of both mite species was excellent.

Currently, Capture is not registered for use in Colorado. However, this insecticide-miticide offers both second generation ECB control and mite control. The 0.08 lb. ai/ac rate appears to offer an extended ECB control period.

A Neptune Hydro Tube Model 562 injection pump was used to inject the insecticide. The system was designed by Agri-Inject of Yuma, Colorado. It incorporates a calibration tube and an in-line anti-syphon valve.

The application was made with a Valley Sprinkler utilizing low angle Rainbird nozzles. The Capture was applied with 0.75 inches of water.

Experiment 2 (Dryden Farm L-2): This experiment involved two insecticides, replicated three times. The insecticides were chemigated on August 20-22, 1990. Forty-five to sixty percent of the plants showed egg masses with 50% of the egg masses hatched or in the black head stage. The check areas averaged 5.44 larvae per plant.

Both two spotted mite and Banks grass mite were present in the field. The Capture treatments controlled the mites. However, the Dipel treatments allowed the predators to give equal control.

The insecticides were applied through a Lockwood sprinkler equipped with Senninger 360 nozzles utilizing a chemigation system designed by Gleason Dryden incorporating a nurse tank, calibration tube, nylon threaded couplings, nylon hoses, in-line anti-back syphon valve and a Pulsa Feeder Hydracone R-1 metering pump. The Capture was applied with 0.75 inches of water and the Dipel was applied with 0.30 inches of water.

Experiment 3 (Dryden Farm L-1): Three insecticides, replicated three times, were chemigated on August 17 and 18. On August 17, 60 to 70% of the plants showed egg masses with 55% of the egg masses in the black head stage or hatched. The application was made with a Lockwood sprinkler equipped with 180 degree spray nozzles. A Neptune Hydro-Tube model 562 pump was used to inject the insecticides. The system, designed by Agri Inject of Yuma, Colorado incorporated two stainless steel nurse tanks, a calibration tube and an in-line anti-syphon check valve.

The Lorsban + oil was injected in a one to one ratio, the Dipel ES was mixed with water in a one to one ratio, and the Javelin WG (a wettable granule) was mixed with two quarts water per acre. All applications were made with 0.33 inches of water. It rained 0.50 inch on August 17 three hours after the application of the first replication.

Then we received another 0.40 inch rain on August 19 four to five hours after the completion of the last plot. Prior experiences with Dipel has shown reduced control if rain occurs immediately following application. As a result, the rains might account for the reduced control with Dipel and Javelin.

Dipel and Javelin are microbial insecticides containing viable spores and/or endotoxin of Bacillus thuringiensis.

The European corn borer moth flight second generation continued through the entire month of August up to September 20th. The peak moth flight at the Dryden Farm light trap occurred between August 7 and August 18, 1990.

Treatments were evaluated on September 28-29, 1990, by dissecting four groups of ten plants per plot. Each plant was split lengthwise from the flag leaf to the first root node. The ear tip was cut off and the shank was split. All larvae (third instar and larger) and pupae were counted.

Dryden Farms L-2

European Corn Borer:	Ostrinia nubilalis (Hubner)
Corn, Field:	Zea mays - Payco 687 and Pioneer 3475
Planting Date:	April 27, 1990
Plant Population:	31,000
Soil Type:	pH - 7.1; O.M. - 1.5
Herbicide:	8 pints Prowl and 1.5 lbs. Attrex
Insecticide History:	Pounce .05 lb ai/ac, July 30, 1990
Field History:	Field corn 10 consecutive years

McCasland Farms

European Corn Borer:	Ostrinia nubilalis (Hubner)
Corn, Field:	Zea mays - Payco 687
Planting Date:	May 1, 1990
Plant Population:	32,000
Soil Type:	Valiant; pH - 7.2; O.M. - .0
Herbicide:	Bicep 2 quarts/acre
Insecticide History:	Pounce 0.15 lb ai/ac, June 10, 1990
Field History:	Field corn 9 consecutive years

Dryden Farms L-1

European Corn Borer:	Ostrinia nubilalis
Corn Field:	Zea mays, Pioneer 3475
Planting Date:	April 26, 1990
Plant Population:	31,000
Soil Type:	Ogallala Sandy Loam; pH - 7.1; O.M. - 1.1
Insecticide History:	Penncap M, July 27, 1990
Field History:	Field corn 10 consecutive years

CONTROL OF CORN SPIDER MITES WITH HAND-APPLIED TREATMENTS RUDOLPH FARM, FORT COLLINS, COLORADO 1990

Susan Miller, Graduate Research Assistant
Frank Peairs, Cooperative Extension Specialist
CSU Department of Entomology,

TREATMENT, LBS AI/ACRE**	PRECOUNT ±SE	1 WEEK COUNT ±SE (CHANGE*)		3 WEEK COUNT ±SE (CHANGE*)		5 WEEK COUNT ±SE (CHANGE*)	
CAPTURE 2E, 0.08 + CYGON 400, 0.50	4.5 ± 1.3	0.3 ± 0.2	(-4.2 BC)	1.6 ± 1.2	(-2.9 C)	3.5 ± 1.7	(-1.0 B)
CAPTURE 2E, 0.08	6.5 ± 1.2	0.2 ± 0.1	(-6.3 C)	1.9 ± 1.4	(-4.6 BC)	4.9 ± 2.2	(-1.6 B)
CAPTURE 2E, 0.06 + CYGON 400, 0.50	2.9 ± 1.9	0.3 ± 0.1	(-2.6 ABC)	8.6 ± 7.7	(5.7 ABC)	10.4 ± 7.9	(7.4 AB)
CYGON 4E, 0.50	1.8 ± 0.8	0.2 ± 0.1	(-1.6 AB)	6.0 ± 4.5	(4.2 ABC)	12.2 ± 7.8	(10.4 AB)
ASANA 0.033 + CYGON 400, 0.50	3.9 ± 1.6	0.2 ± 0.1	(-3.7 ABC)	7.9 ± 2.8	(4.0 ABC)	14.4 ± 3.3	(10.5 AB)
CAPTURE 2E, 0.04 + CYGON 400, 0.50	2.7 ± 0.8	0.2 ± 0.2	(-2.5 ABC)	11.5 ± 9.4	(8.8 ABC)	17.4 ± 12.1	(14.8 AB)

Table continued next page.

Table continued.

TREATMENT, LBS AI/ACRE**	PRECOUNT ±SE	1 WEEK COUNT ±SE (CHANGE*)		3 WEEK COUNT ±SE (CHANGE*)		5 WEEK COUNT ±SE (CHANGE*)	
COMITE, 1.6 (July 13)	2.6 ±1.4	2.6 ±1.0	(0.0 A)	12.5 ±3.6	(9.9 AB)	18.9 ±5.2	(16.3 AB)
COMITE, 2.4	4.5 ±1.6	1.3 ±0.3	(-3.1 ABC)	12.5 ±5.7	(8.1 ABC)	21.6 ±8.0	(17.1 AB)
MICROTHIOL, 10.0 (July 13)	2.5 ±0.6	2.0 ±0.7	(-0.5 AB)	13.6 ±6.6	(11.1 ABC)	21.7 ±8.8	(19.2 AB)
MICROTHIOL, 10.0	3.5 ±1.0	4.0 ±1.6	(0.4 A)	12.9 ±9.0	(9.4 ABC)	22.1 ±16.3	(18.5 AB)
PENNCAP M, 0.50 + MICROTHIOL, 6.4	4.5 ±1.4	2.4 ±1.2	(-2.1 AB)	17.0 ±1.2	(12.5 A)	24.3 ±2.6	(19.8 A)
UNTREATED	2.2 ±0.9	2.0 ±0.1	(-0.2 A)	14.8 ±3.1	(12.7 A)	27.8 ±6.1	(25.6 A)
MICROTHIOL 6.4 LBS (July 13, August 9, August 23)	1.8 ±0.5	1.9 ±0.4	(0.1 A)	17.3 ±5.4	(15.5 A)	30.2 ±8.0	(28.4 A)
ASANA 0.033	6.0 ±1.5	5.5 ±2.4	(-0.5 AB)	21.1 ±5.5	(15.1 A)	32.2 ±7.8	(26.2 A)
PENNCAP M, 0.50 + MICROTHIOL, 6.4 (second application on August 23)	6.0 ±1.7	3.1 ±0.2	(-2.9 AB)	21.2 ±6.0	(15.2 A)	32.8 ±7.9	(26.8 A)

* CHANGE = Differences from precount were analyzed with ANOVA after transformation with either square root + 0.5 (1 week) or log + 1 (3 and 5 weeks) method. Untransformed means are presented. Means followed by the same letter are not statistically different, (SNK, p = 0.05).

** (Applied August 9, unless noted otherwise)

CONTROL OF CORN SPIDER MITES WITH HAND-APPLIED TREATMENTS, RUDOLPH FARM, FORT COLLINS, COLORADO, 1990: Each treatment consisted of 4 replicated plots that were each 50 ft. x 4 rows (30 inch centers). Plots were evaluated by counting all adult female mites on 3 leaves (the ear leaf, the 2nd leaf above and the 2nd leaf below the ear leaf) from each of 5 plants/plot for a total of 15 leaves/plot. Applications were made using a handheld CO2 powered sprayer calibrated to deliver 23.0 gpa at 30 psi with 2 LF6 nozzles mounted on a 30 in. boom. Unless indicated in the table, treatments were made on August 9. The field population of spider mites consisted of 100% Banks grass mite throughout the season.

Spider mite densities were low throughout the test period. Additional Banks grass mites were introduced into the field on August 2 and August 15 via infested leaves gathered from nearby naturally infested fields. Only Capture 2E, 0.08 + Cygon 400, 0.50 and Capture 2E, 0.08 had significantly fewer mites than the untreated control at 5 weeks after treatment as measured by the difference between actual counts and the corresponding precounts. There were no significant synergistic interactions observed with any of the pyrethroid/Cygon 400 combinations. More treatment differences might have been observed under greater mite densities. Mites were counted in several treatments at 7 weeks post treatment, but densities were too low to analyze since most of the population had already moved to their overwintering sites.

Pests:	Banks grass mite, Oligonychus pratensis
Crop:	Field Corn, Zea mays, Pioneer 3732
Planting Date:	May 10, 1990
Herbicide:	Eradicane
Field History:	10 years field corn
Soil:	N/A
Insecticide History:	None

WESTERN BEAN CUTWORM ECONOMICS IN FIELD CORN PRODUCTION CODY FARM, BURLINGTON, COLORADO 1990

Stan Pilcher, Golden Plains Area Extension Entomologist
Frank Peairs, CSU Cooperative Extension Entomology Specialist
Jeff Rudolph, CSU Technician

INFESTATION LEVEL	BUSHELS/ACRE @ 12%	SHELLING %
NO WESTERN BEAN CUTWORM	151.1 A	84.23 A
WESTERN BEAN CUTWORM INFESTATION RESULTING FROM 6-10% PLANTS WITH EGG MASSES	147.2 A	81.64 B
100% WESTERN BEAN CUTWORM INFESTED EARS	136.8 B	83.51 A

WESTERN BEAN CUTWORM ECONOMICS IN FIELD CORN PRODUCTION, CODY FARM, BURLINGTON, COLORADO, 1990: As part of the Colorado State University Pest Management Survey Program the economic insect pests, corn spider mites, and predators are scouted on a weekly basis on two of Bill Cody's fields. On one of the fields, weekly scouting reports recorded that 6 to 10% of the plants had egg masses or egg mass fragments during a three week period. On August 23, 1990 four groups of 50 ears revealed that 50% of the ears averaged 1.1 larvae per ear.

On July 19, 1990 the average plant had Banks grass mites up 5.5 leaves with an average of 17 predators per plant. The predators consisted on Insidious Flower bugs - Orius insidiosus (Say), Lacewing - Chrysopa spp., Stethorus spp., predatory mite - primarily Amblyseius fallacis (Garman), and predatory thrips. As a result the field was not treated for Western bean cutworm. By August 23, 1990 the average number of mite infested leaves had increased to 8.9. However, the predators contained them at this level and eventually a fungal mite disease provided total control. The upper 10 leaves stayed green and functional throughout the remainder of the growing season.

To determine the economic impact of Western bean cutworm, 17.5 feet of row was hand harvested in 4 different quarters of the field. Fifty to seventy percent of the ears were damaged by Western bean cutworm larvae. The results are represented in the table as "Western bean cutworm infestation resulting from 6-10% plants with egg masses." It yielded 147.2 bushels per acre with a shelling percent of 81.64.

Eight ear counts showed an average of 25 ears in 17.5 feet of row. Thus 25 undamaged ears were harvested in each quarter of the field. The table shows the results, "No Western Bean Cutworm; and 151.2 bushels per acre with a shelling percentage of 84.23. Then 25 ears were hand harvested with Western bean cutworm damage from the same four quarters of the field. The ears that were selected showed extensive visual damage. The results expressed in the table "100% Western Bean Cutworm Infested Ears" yielded 136.8 bushels per acre with a 83.51 shelling percentage.

The results indicate a non-significant yield difference of 3.90 bushels per acre between "No Western Bean Cutworm" and "Western Bean Cutworm Infestations Resulting From 6-10% Plants With Egg Masses." Even though this is not statistically significant, a 3.90 bushel per acre yield increase would offset the control cost and be profitable. However, this information suggests that if mites are present (up 3 or 5 leaves) and predators are relatively numerous the application of an insecticide to control Western bean cutworm would have probably made it necessary to control the mite. Then the yield difference would not offset the control cost of both Western bean cutworm and Banks grass mite.

In summary, this study indicates that the economic threshold for Western bean cutworm control should consider the mite and predator population. If mites are present on the lower 3 to 5 leaves with predators the economic threshold might be raised slightly above 8%.

However, the 1989 data showed a 15.40 bushel per acre yield difference with 49 larvae per 50 ears. This resulted from a 15% egg mass infestation. The 1990 data indicated a 14.30 yield difference with 1.1 larvae per ear. Also there is probably a difference in larval survival some years. Another variable might be variety dependent. A fast maturing variety might sustain less feeding damage.

Crop:	Field corn; North half - Pioneer 3578; South half - Pioneer 3714
Planting Date:	May 17, 1990
Planting Rate:	30,000
Soil Type:	Sandy Loam; O.M.-1.5, pH-7.5
Herbicide:	Sutazie, 6 pounds per acre, 10 inch band
Insecticide History:	Furadan 15G, 6.7 lbs./acre on June 19, 1990
Crop History:	Corn previous 10 years
Irrigation Type:	Sprinkler

THE EFFECT OF EUROPEAN CORN BORER CONTROL APPLICATIONS ON CORN SPIDER MITES BOWMAN FARMS (MIKE FECHT) AND DON MCCASLAND FARM LAIRD, COLORADO 1990

Stan Pilcher, Golden Plains Area Extension Entomologist
Shawn Watson, CSU Technician

THE EFFECT OF FIRST GENERATION EUROPEAN CORN BORER CONTROL ON CORN SPIDER MITES, BOWMAN FARMS AND MCCASLAND FARM, LAIRD, COLORADO, 1990: The first applications were made on June 20, 1990 - Bowman, and June 30, 1990 - McCasland with modified Wintersteiger electric metering units mounted on a tool bar. The product was delivered 2 inches above the whorl with 6 inch Gandy spreaders. Plots were 2 rows, 100 feet long. Plots were arranged in 4 replications of a randomized complete block design. The Bowman Farm application was made when the corn was 14 to 16 inches tall. This application would fit a late corn rootworm control application or an early first generation European corn borer control application. The McCasland application was made on 28 to 32 inch corn simulating a late cultivation application for first generation European corn borer control.

The second application on both forms was made July 9, 1990 on late whorl stage corn prior to tassel emergence to simulate an aerial application timed to control first generation European corn borer control. Granules were applied with a gravity flow metering and spreading device.

Plots were evaluated on August 23, 1990. The number of leaves on ten consecutive plants in each plot were records as to the presences of mites or absence of mites. Also, the following predators were counted: Insidious Flower Bug - Orius insidosas (Say), Lacewing - Chryopa spp, Lady Beetles - primarily Stethorus spp, Predatory Mite - Ambyseus fallacis (Garman), and Predatory thrips. Also noted was the presence or absence of fungal diseases that cause mite crashes.

Graph I, Bowman Farm, shows Counter and the untreated check have a similar number of infested ear leaves on the June 20 application date while the two Furadan treatments have fewer leaves infested. On the July 9 application, Pounce and Capture have a similar number of ear leaves infested and the Furadan and check areas are similar. On the June 20 application date, the Counter, Furadan W, and check were statistically the same and Furadan B had the lowest number of predators. The check, Furadan W, and Capture were statistically the same.

On Table II, McCasland Farm, there was no difference on number of ear leaves infested regardless of treatment date. Also, the predator numbers were similar with the exception of the check (which showed the lightest number) on the June 30 application date. On the July 9 application date, the Capture treatment had the lowest number of predators.

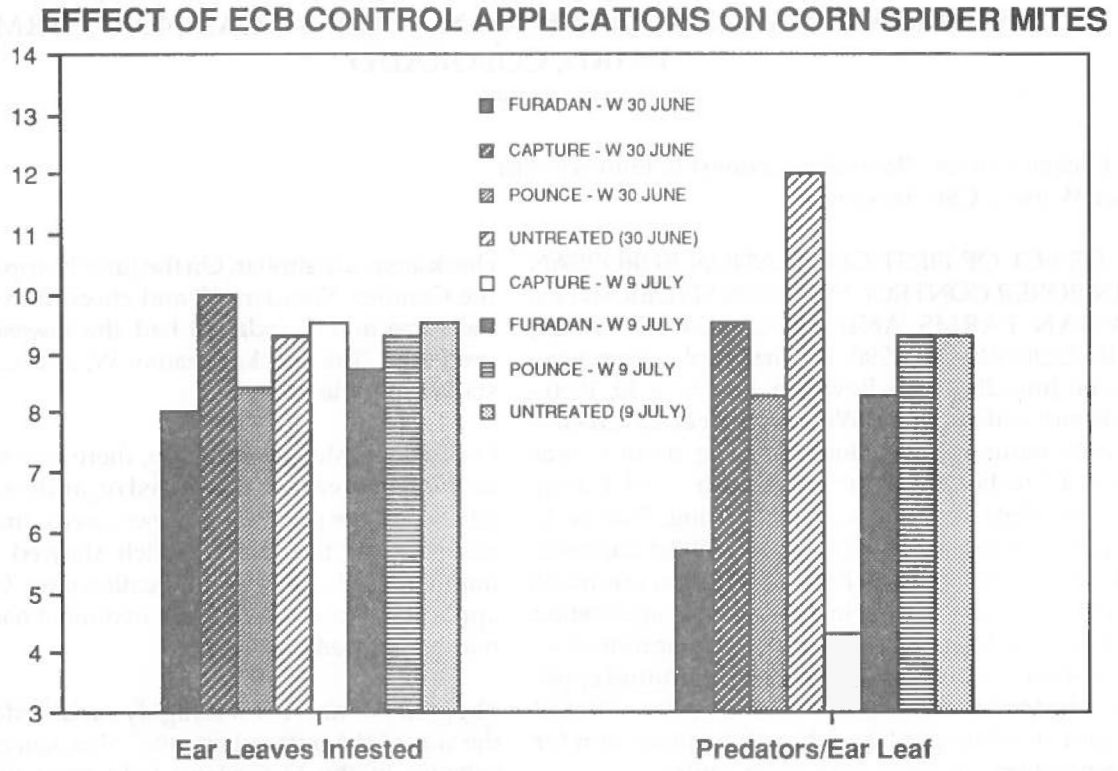
The predator number was highly variable depending on the size of the mite colony, etc. Also, some of the mite colonies in the McCasland field were infected with fungus.

Basically, these tests indicate only a slight correlation between the use of these products.

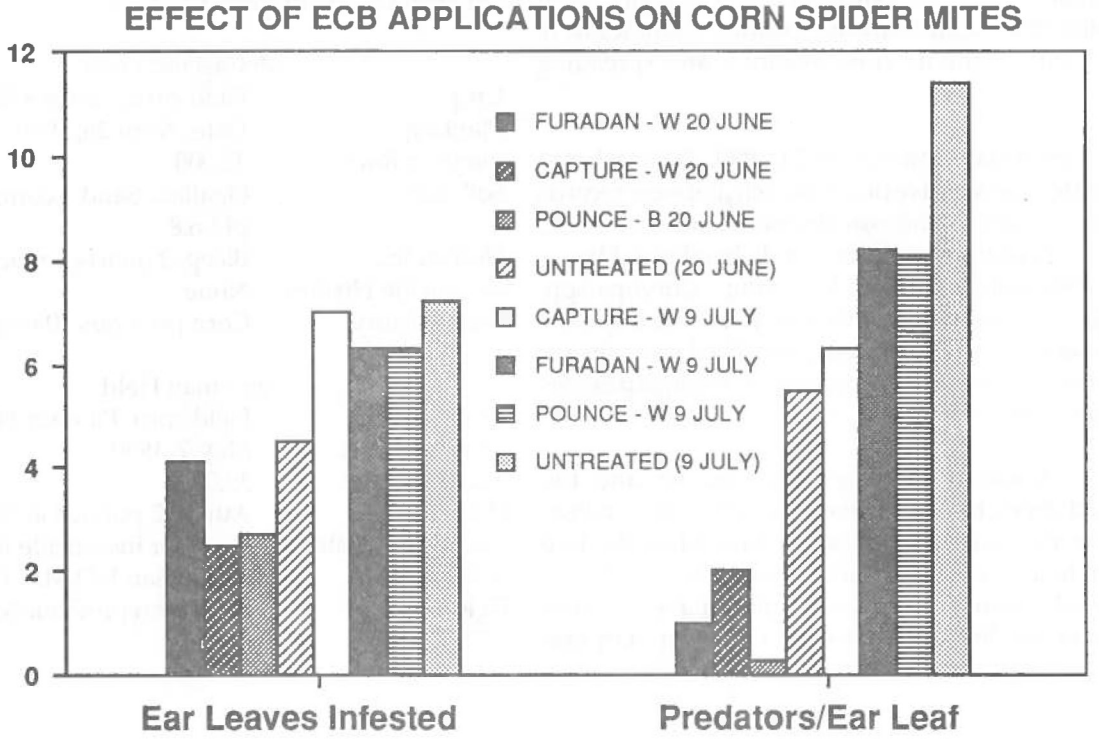
McCasland Field	
Crop:	Field corn, Payco 872
Planting	Date: April 26, 1990
Planting Rate:	32,000
Soil Type:	Ogallala Sand Loam; O.M.-0.70, pH-6.8
Herbicides:	Bicep, 2 quarts per acre
Insecticide History:	None
Crop History:	Corn previous 10 years

Bowman Field	
Crop:	Field corn, Pioneer 3475
Planting Date:	May 2, 1990
Planting Rate:	30,000
Herbicide:	Attrex, 2 pounds ai/ac
Insecticide History:	No prior insecticide in 1990
Soil Type:	Valent Sand; O.M.-1.0, pH-7.2
Field History:	Field corn previous 5 years

Graph 1.



Graph 2.



PINTO BEAN PLANTING TIME TREATMENTS WITH TEMIK BYRON WEATHERS FARM, YUMA, COLORADO 1990

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Shawn Watson, CSU Technician

TREATMENT	OZ PRODUCT/1000 ROW FT	PLACEMENT	YIELD IN LBS/ACRE	TEST WEIGHT
TEMIK 15G	3.5 OZ	IN-FURROW	1586	57.1 A
TEMIK 15G	5.0 OZ	IN-FURROW	1665	57.4 A
TEMIK 15G	7.0 OZ	T-BAND	1553	57.1 A
UNTREATED CONTROL			1534	55.3 B

PINTO BEAN PLANTING TIME TREATMENTS WITH TEMIK, BYRON WEATHERS FARM, YUMA, COLORADO, 1990: Planting time treatments were applied on June 7, 1990 to pinto beans. Plots were arranged in four replicates of a randomized complete block design. Granular products were applied with Wintersteiger electric metering units on a two-row John Deere Maxi-Merge planter. In-furrow applications were accomplished by directing a drop tube into the seed furrow. T-Band applications were made with a 4 inch John Deere spreader located between the disk openers and the press wheel. All plots were 4 rows wide and 50 feet long.

Onion thrips and flower thrips were monitored throughout the summer. All treatments controlled thrips, however, at the peak thrip population June 22, 1990 the thrips averaged only .04 thrips per plant. Thrips were not a factor on yield.

Western bean cutworms were monitored via a pheromone trap. Again, they were not present in economic numbers.

There was a numerical yield response as compared to the check, however, the yield was not statistically significant. The test weight showed a statistical difference (all treatments averaged 57.20 as compared to the check 55.3).

The difference in test weight might be due to several factors; white mold, nematodes and/or the accumulated damaged by the sum total of all insects. However, as stated, insect monitoring did not indicate that any one insect reached economic thresholds. White mold was noted at low levels at the west end of the test area and white mold will definitely effect test weight.

Crop:	Pinto beans, Othello
Planting Date:	June 7, 1990
Soil Type:	Haxtun Sandy Loam; O.M.-1.5; Ph-6.8
Fertilization:	70# N, 30# P, 7.5# K, 1.0# Zn, 7.5# S
Herbicide:	Treflan, 1.5 pints per acre; Eptam, 3.0 pints per acre
History:	Corn previous 5 years
Irrigation:	Sprinkler - Valley

THE EFFECT OF CULTIVATION TIME CORN ROOTWORM AND FIRST GENERATION EUROPEAN CORN BORER INSECTICIDE APPLICAITONS ON CORN SPIDER MITES CODY FARM, BURLINGTON, COLORADO 1990

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Shawn Watson, CSU Technician

THE EFFECT OF CULTIVATION TIME CORN ROOTWORM AND FIRST GENERATION EUROPEAN CORN BORER INSECTICIDE APPLICATIONS ON CORN SPIDER MITES, CODY FARM, BURLINGTON, COLORADO, 1990: On June 20, 1990 these insecticides were applied over the whorl or basal banded on 10 to 12 inch corn. A 2 row modified Wintersteiger electric metering unit mounted on a KMC cultivator was used to make the applications. The whorl application was made with 6 inch Gandy spreaders 2 inches above the corn. The banded application was made via a direct delivery tube to the base of the plant.

The First Generation European Corn Borer applications were made July 9, 1990 with a gravity flow metering and spreading device. The corn was in late whorl stage prior to tassel emergence.

The plots were 2 rows, 100 feet long and arranged in 4 replicates of a randomized complete block design. Each plot was separated by 2 buffer rows. The evaluations were made on July 19, August 9 and August 23, 1990. Five plants were evaluated on each evaluation date within each plot. The number of leaves with mites was recorded and each leaf was damage scored as follow: 1=1 square inch of leaf yellowing with live mites; 2-2 square inches of leaf yellowing with live mites; 3=3 square inches; 4=4 square inches; 5=5 or more square inches showing mites and leaf yellowing.

Also the number of predators were recorded for each plant. The primary predators recorded were: Insidious Flower Bug - Orius insidiosus (Say); Lacewings - Chrysopa spp; Lady Beetles - primarily Stcthorus spp; Predatory Mite - primarily Amblyseius fallacis (Garman); and Predatory Thrips. Also, the presence or absence of fungal disease that cause mite population crashes.

Figure I shows the number of leaves infested by evaluation date. Figure II shows the total mite damage score.

In summary, Figure I indicates that the Furadan over the whorl application made June 20 had significantly more infested leaves on the July 19 evaluation date than any other treatment. Counter over the whorl on the same application date significantly suppressed mite activity. The Furadan basal band June 20 application and the checks are the same. Capture over the whorl applied on July 9 showed some mite suppression as compared to the check and Furadan over the whorl applied on July 9 was the same as the check.

However, on the August 9 and August 23 evaluation dates there were no significant difference in the number of infested leaves among treatments.

Figure II total mite damage score indicates the same information as Figure I. On July 19 the Furadan over the whorl application on June 20 had a total of 16.9 as

Figure I.

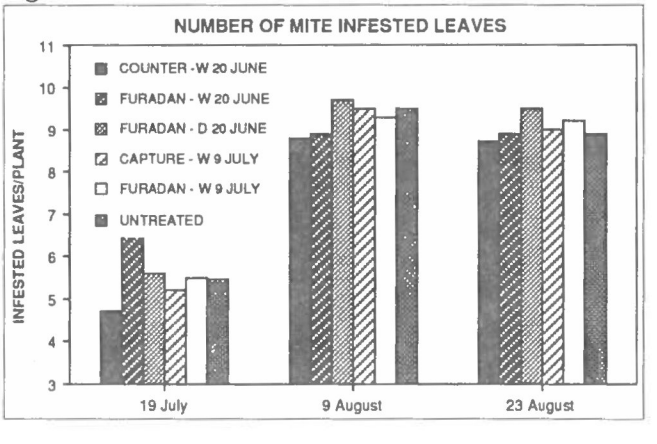
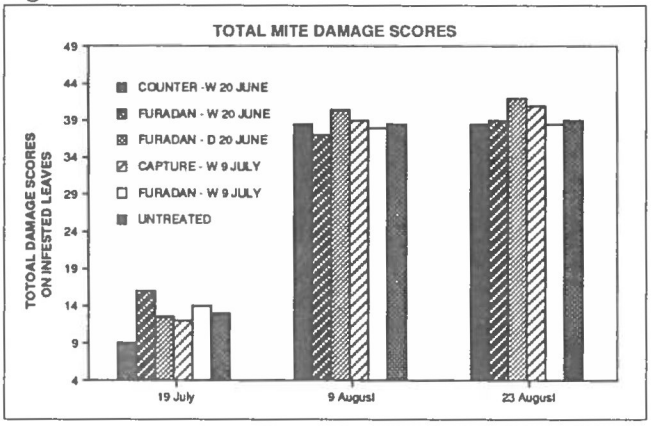


Figure II.



compared to Counter 9.0; Furadan Basal Banded 12.3 and the check 13.2. Also on the July 9 application, the Furadan over the whorl had a damage score of 14.7 as compared to Capture 12.0 and the check with 13.2.

Again, on the August 9 and August 23 evaluation dates there were no significant differences between treatments.

The predator counts were extremely variable between treatments on July 19. In fact the Furadan whorl June 20 application had the highest number of predators (104) as compared to Counter W (19), Furadan Basal Band (28) and check (15). On the July 9, 1990 application Capture over the whorl had (36), Furadan over the whorl (7), and the check (15). The total predator numbers on the August 9 and August 23 evaluation dates were similar between treatments.

Crop:	Field corn, Pioneer 3714
Planting Date:	May 17, 1990
Planting Rate:	28,000
Soil Type:	Sandy Loam; O.M.-1.5; pH-7.5
Herbicide:	Sutazine + 18.6 G 10 inch band 6 pounds total product per acre
Insecticide History:	None
Crop History:	Corn previous 10 years
Irrigation:	Sprinkler

PLANTING TIME TREATMENTS FOR THE CONTROL OF GREENBUGS ON SORGHUM PHIL WOODRICK FARM, BURLINGTON, COLORADO 1990

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Ron Meyer, Golden Plains Area Extension Agronomist
Shawn Watson, CSU Technician

TREATMENT	OZ PROD/ 1000 ROW FT	PLACEMENT	GREENBUGS/5 PLANTS ± SE		PLANTS IN 6 ROW FEET ± SE
			31 JULY 1990*	20 AUG 1990	
COUNTER 15G	8 OZ	IN FURROW	6.9 ± 0.7 C	4.2 ± 1.3	17.0 ± 4.0
AC 301,467	6 OZ	IN FURROW	14.1 ± 6.4 C	2.7 ± 1.7	23.8 ± 1.1
COUNTER 15G	8 OZ	BANDED	48.9 ± 12.6 B	2.1 ± 0.9	27.7 ± 3.2
FURADAN 15G	8 OZ	IN FURROW	51.7 ± 9.9 B	1.1 ± 0.8	23.3 ± 1.4
AC 301,467	6 OZ	BANDED	52.8 ± 13.2 B	1.4 ± 1.0	25.3 ± 2.5
FURADAN 15G	8 OZ	BANDED	64.3 ± 7.6 B	1.9 ± 0.5	23.3 ± 1.9
UNTREATED CONTROL			163.2 ± 16.1 A	2.5 ± 1.0	25.7 ± 2.7

* Original means presented. ANOVA performed on log + 1 transformed counts. Means followed by the same letter are not statistically different (SNK, p = 0.05). There was a significant difference in greenbug counts between in furrow treatments and banded treatments on July 31 (orthogonal contrast, p = 0.05) and plant stand counts between in furrow treatments and banded treatments (orthogonal contrast, p = 0.10).

PLANTING TIME TREATMENTS FOR THE CONTROL OF GREENBUGS ON SORGHUM, PHIL WOODRICK FARM, BURLINGTON, COLORADO, 1990: Planting time treatments were established May 24, 1990. Each plot consisted of two 50 foot rows. Plots were arranged in 4 replicates of a randomized complete block design. Each plot was separated by two buffer rows. Granular insecticides were applied with Wintersteiger electric metering units on a 2 row John Deere Maxi-Merge planter. In-furrow applications were accomplished by directing a drop tube into the seed furrow. Banded treatments were made with four inch John Deere spreaders located behind the press wheels and in front of the tine incorporators.

Plant stand counts were made on June 7, 1990 by counting total plants in 6 feet of row. Counter in furrow significantly reduced stand. Also, there was a significant difference between in-furrow treatments and banded treatments.

The sorghum had severe drought stress until it received an irrigation on July 6, 1990. At this time the greenbugs started to increase. Then, on August 10 a severe hail storm reduced leaf surface by 90%. The hail storm also took care of the greenbug population as noted in the figure by the August 20 count.

Greenbug counts were made on July 31 and August 20, 1990. On July 31 the sorghum was in the late boot stage. The greenbug counts were determined by counting all of the greenbugs on the plant. Three plants were counted

in one row and two plants were counted in the second row in each plot. Plants were spaced 10 feet apart.

There was a significant difference in greenbug counts between in-furrow treatments and banded treatments on July 31. Also, the Counter 15G 8 oz. in-furrow and the AC 301467 6 oz. in-furrow treatments gave significantly better control than the other treatments in this test.

Crop: Sorghum, Sorghum bicolor, Pioneer 8228
Pest: Greenbug, Schizaphis graminum (Rondani)
Planting Date: May 24, 1990
Plant Population: 105,000
Soil Type: Clay Loam; O.M.-1.5, pH-6.8
Fertilization: 100 lbs Anhydrous
Herbicide: Dual Attrex
Insecticide History: None during the entire growing season
Crop History: Milo previous 4 years
Irrigation: Flood

CONTROL OF PALE WESTERN CUTWORM IN WINTER WHEAT GENE SAFFER FARM, ARRIBA, COLORADO MAY 2, 1990

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Shawn Watson, CSU Technician

TREATMENT, LBS AI/ACRE	PALE WESTERN LARVAE/SQ FT ± SE (PERCENT CONTROL)*		
	May 4, 1990	May 10, 1990	May 17, 1990
ASANA XL, 0.03	0.3 ± 0.5 C (87)	0.3 ± 0.4 BC (86)	0.0 ± 0.0 B (100)
POUNCE 3.2E, 0.075	0.5 ± 0.6 BC (78)	0.3 ± 0.0 BC (86)	0.0 ± 0.0 B (100)
LORSBAN 4E, 0.75	0.5 ± 1.2 BC (78)	0.3 ± 0.5 BC (86)	0.0 ± 0.0 B (100)
POUNCE 3.2E, 0.10	0.8 ± 1.1 ABC (65)	0.1 ± 0.3 C (95)	0.0 ± 0.0 B (100)
LORSBAN 4E, 1.00	0.9 ± 0.5 ABC (61)	0.3 ± 0.4 BC (86)	0.3 ± 0.5 B (73)
LORSBAN 4E, 0.50	1.8 ± 1.3 AB (22)	0.8 ± 0.5 B (62)	0.1 ± 0.3 B (91)
UNTREATED CONTROL	2.3 ± 2.1 A (-)	2.1 ± 0.9 A (-)	1.1 ± 0.9 A (-)

* Actual means are presented. ANOVA performed on means transformed by the square root + 0.5 method. Means in the same column followed by the same letter are not statistically different (SNK, p = 0.05)

CONTROL OF PALE WESTERN CUTWORM IN WINTER WHEAT, GENE SAFFER FARM, ARRIBA, COLORADO, MAY 2, 1990: Plots were 6 rows wide and 50 feet long, and were arranged in a randomized complete block design. Treatments were applied on May 2, 1990 with a CO2 powered sprayer calibrated to apply 26 gallons per acre at 30 psi through four 8006 nozzles mounted on a 6 foot boom. Treatments were evaluated on May 4, May 10, and May 17. Precounts averaged 3-4 per square foot. Evaluations were made on 3 square feet in each plot. The May 17 evaluation revealed several larvae in the pupal form. As a result, this evaluation date is not valid information. The 48 hour evaluation revealed Asana 0.03 as having the greatest control (87%) followed by Pounce .075 lb. ai/ac and Lorsban 0.75 lb. ai/ac (78% control). Statistically Pounce 0.10 lb ai/ac and Lorsban 1.00 lb. ai/ac were the same (65% and 61%) followed by Lorsban 0.50 lb. ai/ac at 22 %.

Eight days after application Asana 0.03 lb. ai/ac, Pounce 0.075 lb. ai/ac, and Lorsban 0.75 lb. ai/ac showed 86% control while Pounce at 0.10 lb. ai/ac gave the higher percent control (95%). Again, Lorsban at 0.50 lb. ai/ac showed the poorest control (62%).

This test shows that Lorsban at 0.50 lb. ai/ac does not give adequate pale western cutworm control. However, army cutworm test plots indicate that Lorsban 0.50 lb. ai/ac, gives excellent army cutworm control.

Insect: Pale Western Cutworm, Agrotis orthogonia, Morrison
Crop: Winter Wheat, Tam 107
Planting Date: September 26, 1989
Planting Rate: 45 lbs./acre
Soil Type: Weld Clay Loam; O.M.-1.5; pH-7.1
Fertilization: 40# Nitrogen, 20 lbs. Phosphorus
Field History: Wheat - summer fallow past 10 years
Insecticide History: None

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES THEURER FARM, AKRON, COLORADO 1990

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Frank Peairs, Cooperative Extension Specialist
Wendy Meyer, Research Associate
Jeff Rudolph, Research Associate
Jeff Brase, Research Assistant

Part I

PRODUCT, LBS ACTIVE INGREDIENT/ACRE	RUSSIAN WHEAT APHID/10 SYMPTOMATIC TILLERS* ± SE (% CONTROL)**						
	PRECOUNT	1 WEEK		2 WEEKS		3 WEEKS	
ASANA XL, 0.025 + LORSBAN 4E, 0.025 + COC	83 ± 34	3 ± 1 B	(51)	9 ± 3 B	(83)	11 ± 6 C	(97)
ICIA 321 1E (KARATE), 0.025	115 ± 37	3 ± 1 B	(88)	7 ± 2 B	(93)	45 ± 36 BC	(95)
ASANA XL, 0.025 + CYGON 400, 0.25 + COC	119 ± 35	1 ± 0 B	(100)	9 ± 3 B	(92)	138 ± 84 BC	(87)
ICIA 321 1E (KARATE), 0.02	139 ± 64	18 ± 18 B	(85)	27 ± 12 B	(39)	75 ± 22 BC	(84)
ASANA XL, 0.025 + COC	114 ± 42	28 ± 22 AB	(-462)	10 ± 7 B	(91)	92 ± 39 BC	(82)
LORSBAN 4E, 0.50	129 ± 55	4 ± 2 B	(-46)	6 ± 3 B	(88)	33 ± 13 BC	(78)
CYGON 400, 0.375	155 ± 65	5 ± 3 B	(63)	12 ± 6 B	(71)	86 ± 57 BC	(67)
ASANA XL, 0.025	76 ± 40	50 ± 40 AB	(-2699)	5 ± 1 B	(55)	45 ± 30 BC	(63)
ICIA 321 1E (KARATE), 0.03	140 ± 35	90 ± 82 AB	(46)	10 ± 4 B	(55)	384 ± 156 B	(13)
UNTREATED	146 ± 59	219 ± 126 A	(0)	116 ± 19 A	(0)	805 ± 303 A	(0)

Part II.

PRODUCT, LBS ACTIVE INGREDIENT/ACRE	RUSSIAN WHEAT APHID/10 SYMPTOMATIC TILLERS* ± SE (% CONTROL)**						
	PRECOUNT	1 WEEK		2 WEEKS		3 WEEKS	
PENNCAP E 2E, 0.75	152 ± 23	16 ± 8 AB	(66)	81 ± 20 AB	(72)	43 ± 19 B	(80)
PENNCAP M 2E, 0.75	173 ± 36	5 ± 3 B	(63)	52 ± 22 B	(90)	54 ± 24 B	(80)
LORSBAN 4E, 0.50 + COC	93 ± 19	3 ± 1 B	(67)	9 ± 3 B	(94)	18 ± 8 B	(76)
LORSBAN 4E, 0.75	77 ± 16	2 ± 1 B	(45)	5 ± 2 B	(97)	31 ± 18 B	(70)
DI-SYSTON 8E, 0.75	106 ± 30	8 ± 5 B	(71)	60 ± 44 B	(-5)	39 ± 9 B	(61)
PENNCAP E 2E, 0.50	109 ± 24	13 ± 10 AB	(61)	86 ± 48 AB	(60)	81 ± 53 B	(57)
LORSBAN 4E, 0.50	98 ± 14	5 ± 2 AB	(71)	7 ± 3 B	(97)	44 ± 34 B	(53)
PENNCAP M 2E, 0.50	97 ± 23	23 ± 18 AB	(-7)	47 ± 17 B	(81)	41 ± 45 B	(42)
FURADAN 4F, 0.25, + M PARATHION 4E, 0.33	98 ± 28	8 ± 6 AB	(89)	95 ± 44 B	(49)	118 ± 56 B	(30)
UNTREATED	102 ± 39	40 ± 18 A	(0)	224 ± 60 A	(0)	167 ± 42 A	(0)

* Means in the same column and part followed the same letter are not statistically different (SNK, p = 0.05).
** % control calculated according to Henderson and Tilton (1955) modified Abbott's formula.

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH HAND-APPLIED INSECTICIDES, THEURER FARM, AKRON, COLORADO, 1990: Treatments were applied on 14 May 90 with a "rickshaw" type CO2-powered sprayer calibrated to apply 20 gpa at 3 mph and 20 psi through 6 8004 nozzles mounted on a 10 ft boom. Plots were 10 ft x 50 ft and were arranged in four replicates of a randomized complete block design. Crop stage was Feekes 9.

Treatments were evaluated by collecting 10 symptomatic tiller per plot at 0, 1, 2, and 3 weeks after treatment. Tillers were placed in Berlese funnels for 24 hours (Part II tillers were refrigerated for 24 hours and then placed in the Berlese funnels) and extracted aphids were counted.

All treatments in Parts I and II had significantly fewer aphids than the untreated controls at three weeks. Perecent control as calculated by the Henderson and Tilton (1955) modification of Abbott's formula was generally higher in Part I treatments because of the generally lower RWA numbers in the Part II section of the field (compare the untreated control counts at three weeks). Aphid pressure was moderate and did not increase during the course of the experiment due to cool, wet weather. There was no phytotoxicity observed with any treatment.

Pest:	Russian wheat aphid, Diuraphis noxia (Mordvilko)
Crop:	Winter wheat, Triticum aestivum, Hawk
Planting Date:	September 23, 1989
Planting Rate:	43 lbs/acre
Soil Type:	Platner Loam; O.M.-1.6; pH-6.8
Fertilization:	50# Nitrogen
Herbicide:	NA
Insecticide	History: No previous insecticide
Field History:	Fallow previous year

CONTROL OF RUSSIAN WHEAT APHID WITH PLANTING TIME INSECTICIDE AND FERTILIZER COMBINATIONS EASTERN COLORADO 1989-1990

Scott Armstrong and Wendy Meyer, Research Associates
Frank Peairs and Stan Pilcher, Cooperative Extension Specialists
Mark Porter and Jeff Rudolph, Research Technicians, CSU Department of Entomology
Jim Echols, Cooperative Extension Specialist, CSU Department of Agronomy

Table 1. Planting time treatments for control of Russian wheat aphid, Cliff Travis Farm, Lindon, CO 1989-90.

TREATMENT, LBS AI/ACRE	RWA/CORE* 1 DEC 89	RWA/CORE* 4 APR 90	RWA/SWEEP* 5 JUN 90	PLANTS/ METER*	YIELD BU/AC**	TEST WEIGHT
FURADAN 4F, 0.75 + LIQUID FERTILIZER	4.5 B	18.5 A	79.3 BC	24 BCD	43.1	57.9
DI-SYSTON 8E, 0.38 + FURADAN 4F, 0.38 + LIQUID FERTILIZER	0.8 B	1.0 B	36.3 BC	28 ABC	38.4	57.6
FURADAN 4F, 0.75 + WATER	4.0 B	32.0 A	127.3 AB	37 A	35.6	57.4
DI-SYSTON 15G + LIQUID FERTILIZER	0.0 B	0.0 B	23.3 D	28 ABC	31.5	54.4
DISYSTON 8E + LIQUID FERTILIZER	0.8 B	0.0 B	24.3 BC	16 CD	30.3	52.9
LIQUID FERTILIZER	41.3 A	46.3 A	98.3 AB	26 ABCD	29.6	52.6
THIMET 20G, 0.75	0.0 B	0.0 B	22.8 CD	15 D	28.8	52.7
UNTREATED CONTROL	31.3 A	54.0 A	158.8 A	29 AB	24.0	50.3

* Untransformed means presented. ANOVA performed on means transformed by the square root + 0.5 method. Means in the same column followed by the same letter are not statistically different (DMRT, p = 0.05).
** LSD = 2.95.

Table 2. Control of Russian wheat aphid with planting time treatments. Last Chance, CO. 1989-90.

TREATMENT, LBS AI/ACRE	RWA/CORE ON 21 NOV 89*	BUSHELS/ACRE**	TEST WEIGHT
FURADAN 4F, 0.75 + LIQUID FERTILIZER	0.3 B	26.6	57.4
DI-SYSTON 15G, 0.75 + LIQUID FERTILIZER	0.0 B	26.3	56.1
FURADAN 4F, 0.75 + WATER	0.0 B	23.7	57.0
DISYSTON 8E, 0.75 + LIQUID FERTILIZER	0.0 B	23.7	56.2
LIQUID FERTILIZER	17.5 AB	22.6	56.4
UNTREATED CONTROL	60.5 A	21.6	56.3
DI-SYSTON 8E, 0.38	0.0 B	20.7	56.8
THIMET 20G, 0.75 + LIQUID + FURADAN 4F, 0.38 + LIQUID FERTILIZER			
FERTILIZER	0.0 B	20.7	55.6

* Untransformed means presented. ANOVA performed on means transformed by the square root + 0.5 method. Means in the same column followed by the same letter are not statistically different (SNK, p = 0.05).
** LSD = 4.13.

Table 3. Planting time treatments for control of Russian wheat aphid. Akron, CO 1989-90.

	RWA/CORE*				PLANTS/	YIELD	TEST
TREATMENT, AI PER AC	12 DEC 89	2 APR 90	23 APR 90	5 JUN 90	METER*	BU/AC**	WEIGHT
DI-SYSTON 8E, 0.38 + FURADAN 4F, 0.38 + LIQUID FERTILIZER	0.0 B	0.3 D	1.0 D	1.5 B	15.0 C	58.3	58.1
DI-SYSTON 8E, 0.75 + LIQUID FERTILIZER	0.0 B	0.3 D	1.0 D	1.8 B	21.8 BC	56.4	58.0
DI-SYSTON 8E, 0.38 + FURADAN 4F, 0.38	0.3 B	2.0 D	15.5 CD	3.0 B	21.5 BC	56.4	58.0
DI-SYSTON 15G, 0.75 + LIQUID FERTILIZER	16.3 B	0.5 D	41.5 ABC	4.0 B	25.5 ABC	54.4	57.7
DI-SYSTON 8E, 0.75	0.5 B	0.0 D	1.0 D	4.3 B	20.8 BC	54.1	58.1
THIMET 20G, 0.75	2.8 B	10.0 CD	49.5 ABC	4.5 B	26.0 ABC	54.7	57.9
FURADAN 4F, 0.75 + LIQUID FERTILIZER	0.3 B	31.5 BC	72.0 AB	5.0 B	27.3 ABC	57.4	58.1
THIMET 20G, 0.75 + LIQUID FERTILIZER	5.3 B	10.0 CD	20.5 BCD	5.3 B	19.3 BC	56.3	57.8
DI-SYSTON 15G, 0.75	9.0 B	0.3 D	35.5 BCD	6.5 AB	25.3 ABC	56.6	57.9
FURADAN 4F, 0.75	0.8 B	19.8 BC	25.0 BCD	6.5 AB	29.3 AB	56.3	58.0
UNTREATED CONTROL	51.2 A	95.8 A	117.3 A	18.5 A	36.0 A	56.0	57.9
LIQUID FERTILIZER	40.3 A	37.8 B	38.5 ABC	23.5 A	32.8 AB	58.0	57.7

* Untransformed means presented. ANOVA performed on means transformed by the square root + 0.5 method. Means in the same column followed by the same letter are not statistically different (DMRT, p = 0.05).
** LSD = 5.02.

Table 4. Planting time treatments for control of Russian wheat aphid. Black Hollow (Ault), CO. 1989.

TREATMENT, LBS AI/ACRE	RWA/CORE*				
	19 OCT 89	2 NOV 89	21 NOV 89	5 DEC 89	12 DEC 89
DI-SYSTON 8E, 0.38 + FURADAN 4F, 0.38 + LIQUID FERTILIZER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
DI-SYSTON 8E, 0.75 + LIQUID FERTILIZER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
DI-SYSTON 8E, 0.38 + FURADAN 4F, 0.38 + WATER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
DI-SYSTON 15G, 0.75 + LIQUID FERTILIZER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
DI-SYSTON 8E, 0.75 + WATER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
FURADAN 4F, 0.75 + LIQUID FERTILIZER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
DI-SYSTON 15G, 0.75	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
FURADAN 4F, 0.75 + WATER	0.0 B	0.0 B	0.0 B	0.0 B	0.0 B
UNTREATED CONTROL	35.0 A	51.8 A	52.5 A	45.5 A	63.3 A
LIQUID FERTILIZER	28.0 A	65.3 A	37.8 A	67.3 A	55.8 A

* Untransformed means presented. ANOVA performed on means transformed by the square root + 0.5 method. Means in the same column followed by the same letter are not statistically different (SNK, p = 0.05).

CONTROL OF RUSSIAN WHEAT APHID WITH PLANTING TIME INSECTICIDE AND FERTILIZER COMBINATIONS, USDA ARS EXPERIMENT STATION, AKRON, CO, 1989-90: Treatments were applied with a precision research planter equipped with modified Wintersteiger meters (Wintersteiger of North America, Salt Lake City) for granule applications and a microtube injector (Agri Inject, Yuma, CO) for liquid fertilizer (5 gal/acre 10-34-0) and insecticide applications. Plots were 6 ft by 50 ft and were arranged in four replicates of a randomized complete block design. Experiments were planted on September 19, 1989 (Akron), September 25, 1989 (Black Hollow), September 18, 1989 (Lindon), and Oct. 2, 1989 (Last Chance). Treatments were evaluated by taking plants from the field, potting them, and infesting them with Russian wheat aphid in the greenhouse. This is a measure of insecticide available to be taken up during adequate growing conditions rather than what might actually be present in plants and active against aphids under field conditions. The table gives the average number of aphids found in each treatment one week after each sample date and, where appropriate, yields, test weights, sweep net counts, and plant stand counts.

Most treatments performed very well. The activity of Furadan 4F was not improved by the addition of liquid fertilizer as it was in 1988-89. Yields were significantly higher in the Furadan 4F at Lindon which is likely due to the control of lesion nematodes. There was no phytotoxicity observed at Black Hollow or Last Chance, but plant stands were significantly reduced by some treatments at Akron and Lindon.

Pests:	Russian wheat aphid, Diuraphis noxia (Mordvilko)
Crop:	Winter wheat, Triticum aestivum, 'TAM 107'
Plant Population:	500,000 plants/acre
Herbicide:	NA
Insecticide History:	No previous insecticide
Field History:	Fallow previous year

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH AERIALLY APPLIED INSECTICIDES THEURER FARMS, AKRON, COLORADO 1990

Stan Pilcher, Golden Plains Area Extension Entomologist
Shawn Watson, CSU Technician
Mark Porter, CSU Technician
Scott Armstrong, Research Associate, Department of Entomology

TREATMENT, LBS AI/ACRE	GPA	RWA PER 100 SYMPTOMATIC TILLERS 1 WEEK	2 WEEKS	3 WEEKS	AVERAGE*	(% CONTROL)
LORSBAN 4E, 0.5 + 1 PINT CROP OIL	1	104	210	744	352.7 B	(87)
LORSBAN 4E, 0.5	1	82	264	350	232.0 B	(91)
LORSBAN 4E, 0.5	2	49	223	152	141.3 B	(95)
LORSBAN 4E, 1.0	2	8	92	85	61.7 C	(98)
UNTREATED CONTROL	-	1227	1818	5015	2686.7 A	(-)

* Untransformed means presented. ANOVA performed on log + 1 transformed means, using sample time as blocks. Means followed by the same letter are not statistically different (SNJK, p = 0.05).

CONTROL OF RUSSIAN WHEAT APHID IN WINTER WHEAT WITH AERIALLY APPLIED INSECTICIDES, THEURER FARMS, AKRON, COLORADO, 1990 - Treatments were applied with a Pieper P.A.25 (Hutchinson Wing Modifications) airplane. The one gpa treatments were made with 23, D-5, 45 core nozzles at 28 psi. The 2 gpa treatments were made with 23, D8, 45 core nozzles at 30 psi. All plots were applied on a 45 foot swath Plots were 450 feet wide and 4,342 feet long. Crop stage was Feekes 9.

Treatments were evaluated by collecting ten symptomatic tillers at ten locations across each treatment area at 1, 2, and 3 weeks after treatment. Tillers were placed in Burlese funnels for 24 hours and extracted aphids were counted.

The purpose of the trial was to determine if the addition of crop oil to Lorsban would enhance or extend control. The results of this test indicates statistically that there was no difference. Numerically a comparison of Lorsban, 0.5 lb. ai/ac at 1 gpa and 2 gpa showed a 4% increase in the average percent control. The only statistical increase in control occurred when comparing all Lorsban 0.50 lb. ai/ac treatments to Lorsban at 1.0 lb. ai/ac, 2 gpa.

Pest:	Russian wheat aphid, Diuraphis noxia (Mordvilko)
Crop:	Winter wheat, Triticum aestivum, Hawk
Planting Date:	September 23, 1989
Planting Rate:	43 lbs./acre
Soil Type:	Platner Loam
Fertilization:	5 lbs. nitrogen
Herbicide:	NA
Insecticide History:	No previous insecticide
Field History:	Fallow previous year

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WITH SEED TREATMENTS AND PLANTING TIME GRANULES RIGDEN FARM, FORT COLLINS, COLORADO 1990

Wendy L. Meyer, Research Associate
Jeffrey B. Rudolph, Research Associate
Frank B. Peairs, Cooperative Extension Specialist, Department of Entomology

Treatment	5/24		6/21		7/19	
	#RWA*	%Control	#RWA	%Control	#RWA	%Control
NTN 33893 100 g/100 kg	10.2b	88.5	134.5ab	52.7	281.1	91.2
NTN33893 125 g/100 kg	12.8b	85.5	17.1b	94.0	375.9	88.2
NTN 33893 150 g/100 kg	7.8b	92.0	13.9b	95.1	375.9	92.3
Disyston15 G 1.8 oz/1000 row-ft	6.3b	92.9	28.9ab	89.8	502.2	84.2
G11002 10 G 2.8 oz/1000 row-ft	23.1ab	74.0	103.3ab	63.7	2847.9	10.4
G18017 10 G 2.8 oz/1000 row-ft	24.3ab	72.6	57.1ab	79.9	390.4	70.7
G03009 15 G 1.8 oz/1000 row-ft	91.3a	-2.8	221.8ab	22.0	3278.5	-6.3
Untreated	88.8a	0.0	284.4a	0.0	3178.2	0.0

* Means represent mean number of RWA/row-ft. Means followed by the same letter not significantly different by Tukey's test. There was no significant differences in the mean number of RWA/row-ft for the last date. Percent control represents apparent control calculated by Abbott's (1925) method. (Percent control equals check value - treatment value/check value)

CONTROL OF RUSSIAN WHEAT APHID IN SPRING BARLEY WTIH SEED TREATMENTS AND PLANTING TIME GRANULES, RIGDEN FARM, FORT COLLINS, CO, 1990: Seven planting time insecticides were applied on April 13, 1990 in spring barley at the CSU Agronomgy Research Center. Three of these treatments were three rates of experimental pretreated flowable seed treatments (NTN 33893, Mobay corporation). Three other treatments were experimental slow-release granular formulations (G11002, G18017, G03009, Incitec corporation). Disyston 15G at the recommended application rate and an untreated check plot were included for comparison. Plots were 6 X 25 ft. with four replicates in a randomized complete block design. The crop was planted using the CSU agronomy department test plot dual disk drill with 12 inch spacing. Granular treatments were applied with Nobel granular application units. One row foot section in each plot was artificially infested with an average of 6, 17, and 22 aphids per inch for the three sample dates, respectively. The first infestation date was approximately two weeks after crop emergence (5/9/90). The aphids were applied using a device called the "bazooka", which could be calibrated to deliver a known volume of aphids and "Cream of Wheat" carrier with each delivery. Aphids were left on the plants for two weeks and then the infested portion of row was clipped at ground level. The plants were placed in the berlese funnels for 24 hours to extract the RWA. The total number of aphids were counted for each plot. The first evaluation was on 5/24, six weeks after planting.

The plots planted with seed treated with all rates of NTN 33893 and Disyston 15G had significantly fewer aphids than the untreated check six weeks after planting. The two higher rates of NTN 33893 (125 and 150 g/100 kg seed) had significantly fewer aphids than the untreated check up through 10 weeks after planting. Percent control was comparable to Disyston 15G. None of the slow-release granules were effective at controlling RWA at any date. For the last evaluation date (7/19) none of the insecticides had significantly fewer aphids than the untreated check plot. At this date, the presence of large numbers of migratory aphids (as shown by Larimer county suction trap catches) seemed to cause large variability between the replicates.

Pest:	Russian wheat aphid, Diuraphis noxia (Mordvilko)
Crop:	"Triumph" malting barley, Hordeum vulgare L.
Planting Date:	April 13, 1990
Plant Population:	1 X 106 seeds/acre
Soil Type:	Nunn clay-loam
Herbicide:	None
Fertilizer:	None
Insectide History:	No insecticide applied in 1989
Field History:	Fallow previous year

NONTARGET EFFECTS OF AERIALLY-APPLIED RUSSIAN WHEAT APHID INSECTICIDES IN COLORADO TERRY SHERMAN FARM, LINDON, COLORADO

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F. Peairs, S. Pilcher, W. Meyer, J. Rudolph, R. Johnsen
CSU Department of Entomology

More than 2,000,000 acres of Colorado small grains have been sprayed with insecticides for control of Russian wheat aphid since this pest first appeared in the state in 1986. This has been cause for much speculation as to possible impacts on wildlife from such an unprecedented control activity. Avian risks have been of particular concern. Dominant species in winter wheat are, in order, lark buntings, horned larks, mourning doves, and pheasants. Because winter wheat and wheat stubble provides 90% of the nesting habitat for pheasants in eastern Colorado, this species was selected for closer study.

A ca 300 acre winter wheat field near Lindon, CO was selected. The crop was in the 25-50% bloom stage and was approximately 80% infested with Russian wheat aphid. A randomized complete block experiment consisting of three treatments (Di-Syston 8E, 0.75 lbs ai/ac; Lorsban 4E, 0.50 lbs ai/ac; and untreated) replicated three times was employed. Plots were 400 ft wide and ran the length of the field. Applications were made on June 1, 1989 with a Pawnee PA 25 aircraft calibrated to apply treatments in two gallons of spray volume per acre. RWA and beneficial insect populations were assessed using a standard insect sweep net. Insecticide residues deposited on cloth held at canopy and ground level were also determined. Yields and test weights were measured for each plot.

Three quarter-acre pens were placed in each plot. Ten six-day old chicks were placed in each pen prior to application. Chicks were kept in pens during the day, but were removed and fed each night. Inclement weather prevented their return three of the seven days of the study. Observations on chick mortality and weight gain were made.

Sweep net captures of RWA are given in Table 1. Both insecticide treatments gave good RWA control for two weeks, while the Lorsban treatment had significantly fewer aphids than the check at three weeks. Sweep net captures of beneficial insects, primarily coccinellids, nabids and chrysopids, are given in Table 2. Numbers were very low and unaffected by treatment. These insect groups comprise an important food source for pheasant chicks. Such low numbers can explain the low weight gains shown in Figure 2 below. Lack of food likely forces pheasant chicks to leave winter wheat habitat quickly, thus reducing their potential exposure to insecticide applications.

Table 1. Nontarget effects of Russian wheat aphid treatments: RWA per 20 sweeps.

	RWA PER 20 SWEEPS			
TREATMENT	0 DAT	7 DAT	14 DAT	21 DAT
DI-SYSTON 8E, 0.75 LBS AI/ACRE	2835.7	75.0 A	283.0 A	1472.0 AB
LORSBAN 4E, 0.50 LBS AI/ACRE	3106.7	89.7 A	342.0 A	683.0 A
UNTREATED	3460.3	1086.0 B	4912.0 B	3872.0 B

Table 2. Nontarget effects of RWA treatments: Predators per 20 sweeps.

	PREDATORS PER 20 SWEEPS			
TREATMENT	0 DAT	7 DAT	14 DAT	21 DAT
DI-SYSTON 8E, 0.75 LBS AI/ACRE	2.3	0.0	1.7	1.0
LORSBAN 4E, 0.50 LBS AI/ACRE	0.7	0.0	0.0	4.3
UNTREATED	0.0	1.3	2.0	4.3

Composite samples of insecticides residues detected at crop canopy and ground levels are given in Table 3. Lorsban residues fit the expected pattern, while Di-Syston residues were lower than expected and did not show any canopy interception. Low levels of Lorsban were detected in untreated areas.

Yields and test weights were determined (Table 4). No statistical differences, although they did follow the same pattern as RWA control measured by sweep net captures.

Table 3. Nontarget effects of RWA treatments: Insecticide residues.

TREATMENT	RESIDUES (µg per in2) CANOPY LEVEL	GROUND LEVEL
DI-SYSTON 8E, 0.75 LBS AI/ACRE	4.020	4.700
LORSBAN 4E, 0.50 LBS AI/ACRE	16.470	8.530
UNTREATED	0.048	0.019

Table 4. Nontarget effects of RWA treatments: Yield and test weight.

TREATMENT	BUSHELS PER ACRE	TEST WEIGHT
DI-SYSTON 8E, 0.75 LBS AI/ACRE	27.7	54.0
LORSBAN 4E, 0.50 LBS AI/ACRE	32.2	56.3
UNTREATED	25.5	53.2

Pheasant chick mortality at 48 hours was significantly higher in the Di-Syston treatment (Fig 1), while subsequent survival was similar in all treatments (Fig 2).

Additionally, weight gains were relatively low for chicks in all treatments, with most progress being made while the birds were being held outside of the experimental area. Lack of insect food sources in the wheat field was shown in Table 2.

In summary, insecticide treatments provided good RWA control, although significant yield benefits were not observed. Observed Lorsban residues followed expected patterns, but Di-Syston residues were measured at much lower than expected levels. Treatments did not affect numbers of nontarget beneficial insects, pheasant chick survival after 48 hours, or pheasant weight gain.

Figure 1.

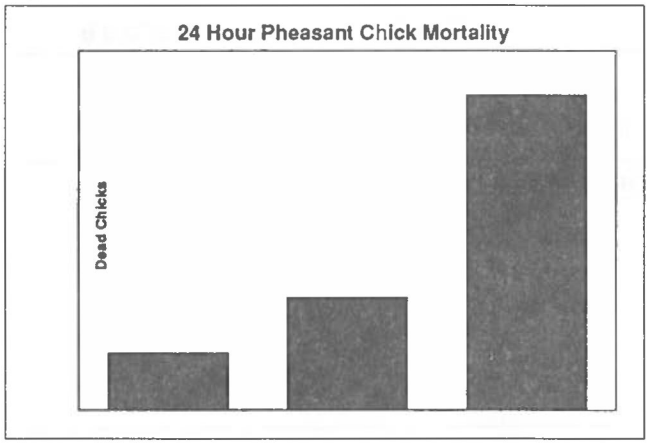
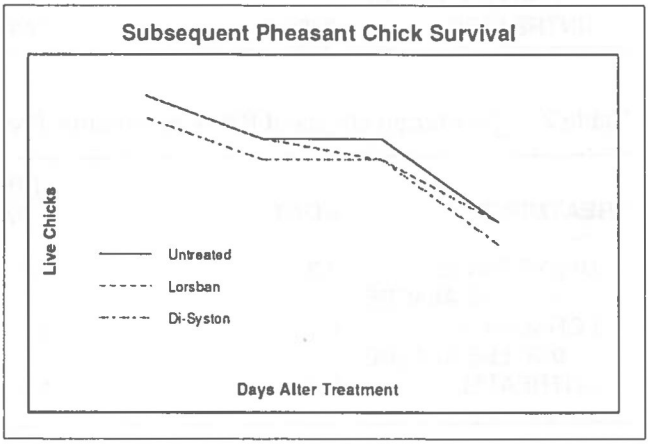


Figure 2.



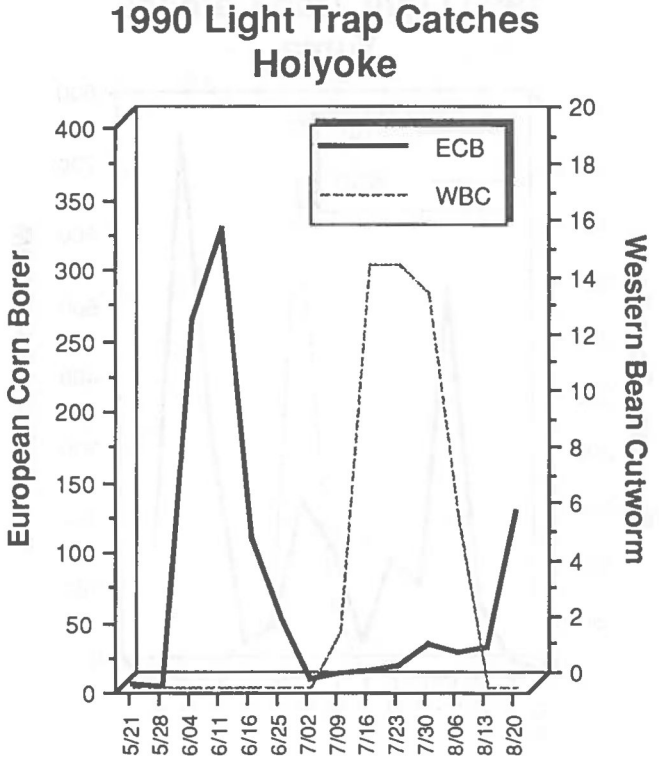
INSECT PEST SURVEY
1990

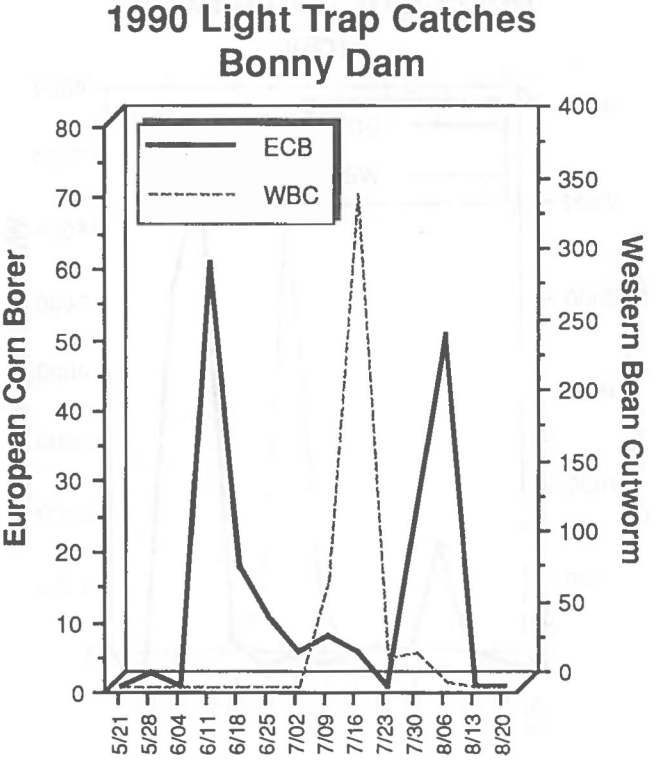
Stan Pilcher, Golden Plains Area Extension Entomologist
Mike Koch, CSU Technician

The Colorado pest survey was conducted during the summer of 1990 in cooperation with Morgan, Logan, Sedgwick, Washington, Yuma, Phillips and Kit Carson counties. Ten light traps, 40 pheromone traps, and nine weather stations were operated by the following people: Bill Cody and family of Bonny Dam (Hale); Randy Harberg of Kirk; Kevin and Gary Koenig of Yuma; Ed Weingardt, Hank Schaefer, Bruce Bosley and Darrell Merten of Sterling; McCleary Farms of Sedgwick; Gleason Dryden of Wray; Jack Rhoades of Holyoke; and Marlin Eisenach of Fort Morgan.

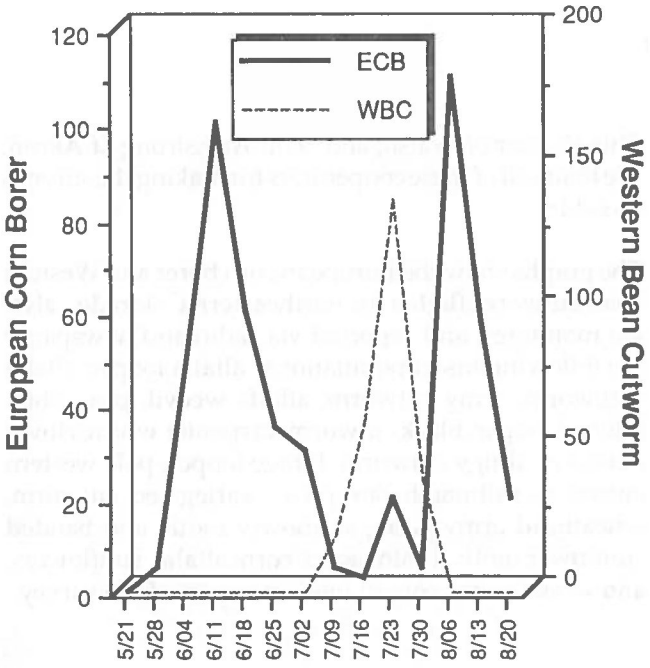
The Russian wheat aphid suction traps were operated by the following people: Leroy and Randy Loutzenhiser of Flagler; Cliff Travis of Anton; Bob Hammon of Fruita; Thia Walker of Walsh; and Scott Armstrong of Akron. We thank all of these cooperators for making the surveys possible.

The graphs show the European corn borer and Western bean cutworm flights for northeastern Colorado. also, we monitored and reported via radio and newspaper the following insect populations: alfalfa looper, alfalfa webworm, army cutworm, alfalfa weevil, pea aphid, bilobed looper, black cutworm, carpenter worm, clover cutworm, dingy cutworm, forage looper, pale western cutworm, saltmarsh caterpillar, variegated cutworm, wheathead armyworm, sunflower moth, and banded sunflower moth. Pinto beans, corn, alfalfa, sunflowers, and wheat were scouted weekly as part of the survey.

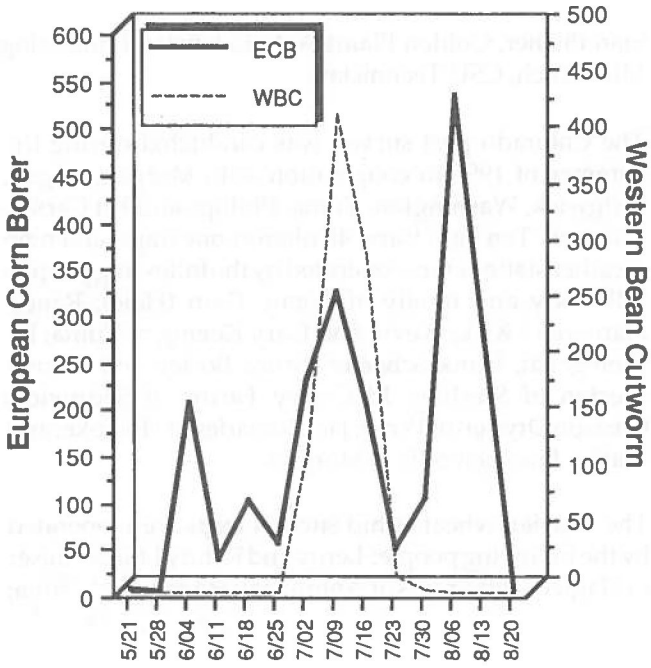




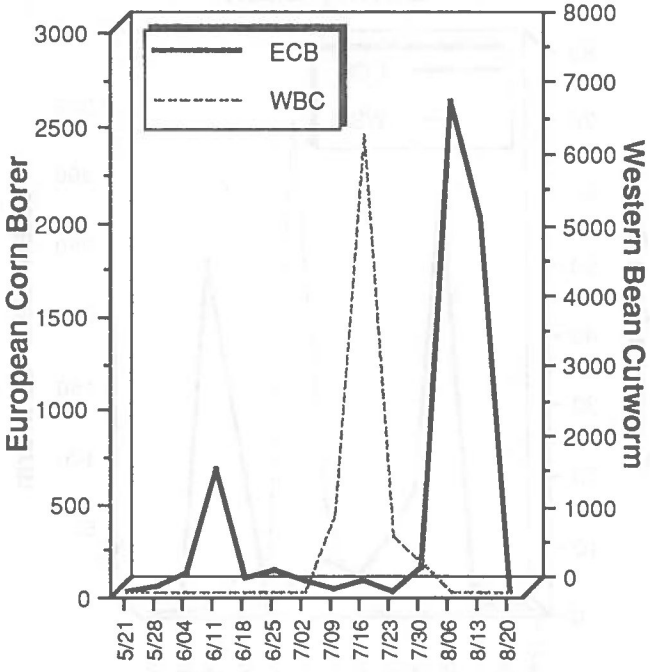
1990 Light Trap Catches Burlington



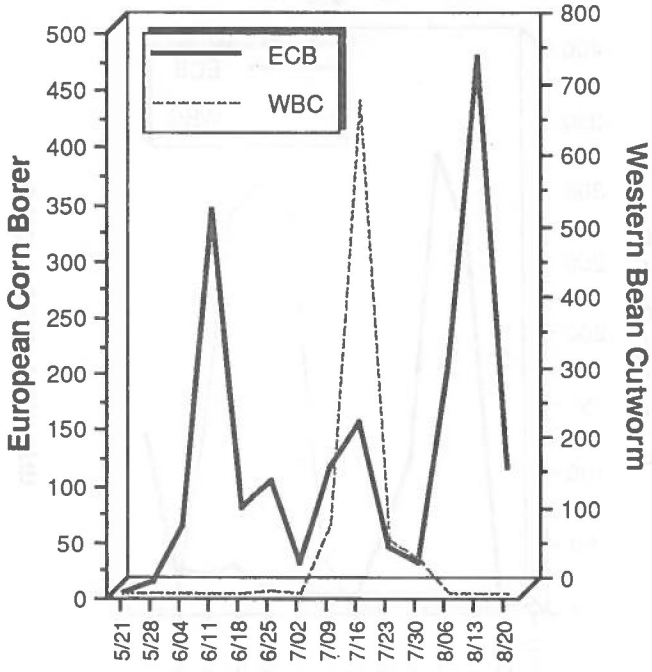
1990 Light Trap Catches Kirk



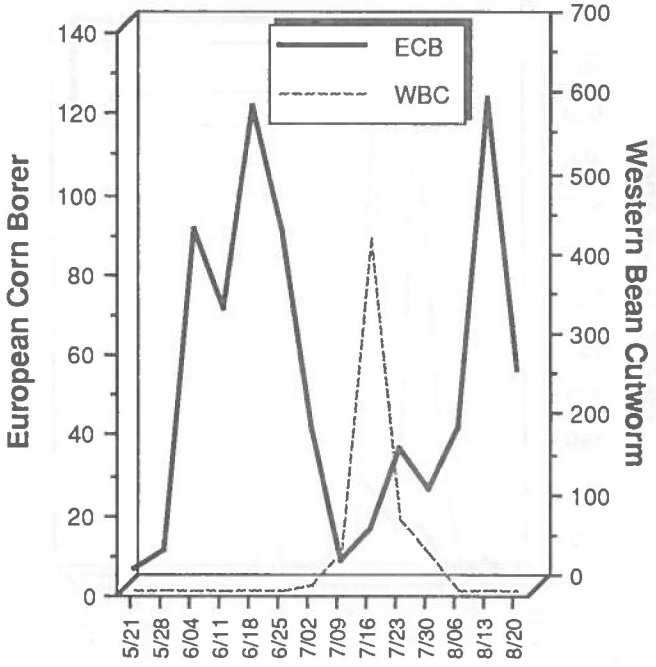
1990 Light Trap Catches Wray



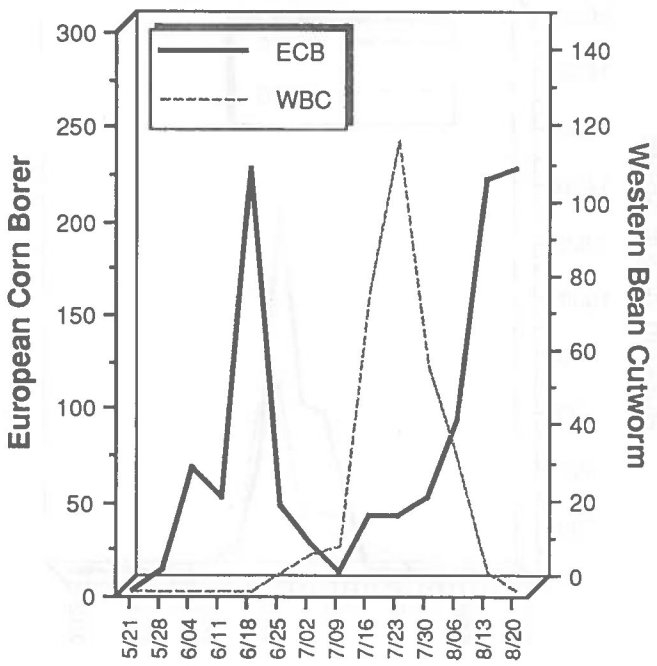
1990 Light Trap Catches Yuma



1990 Light Trap Catches Sterling



1990 Light Trap Catches Sedgwick



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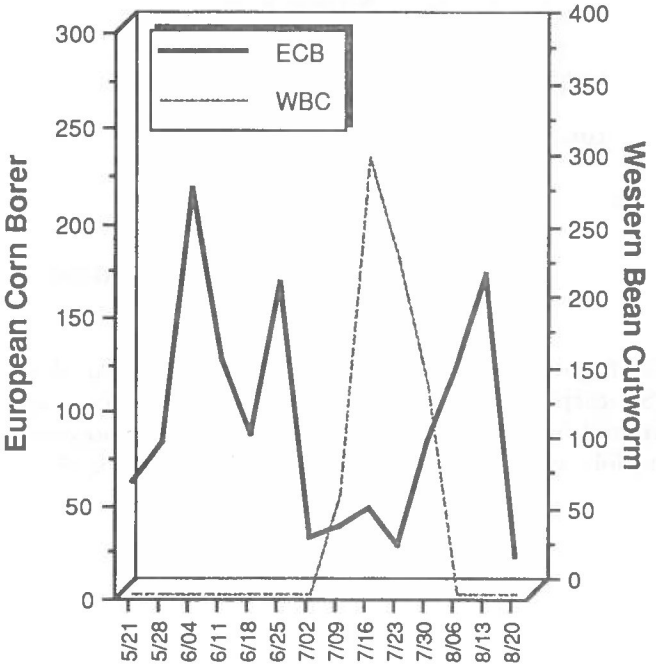

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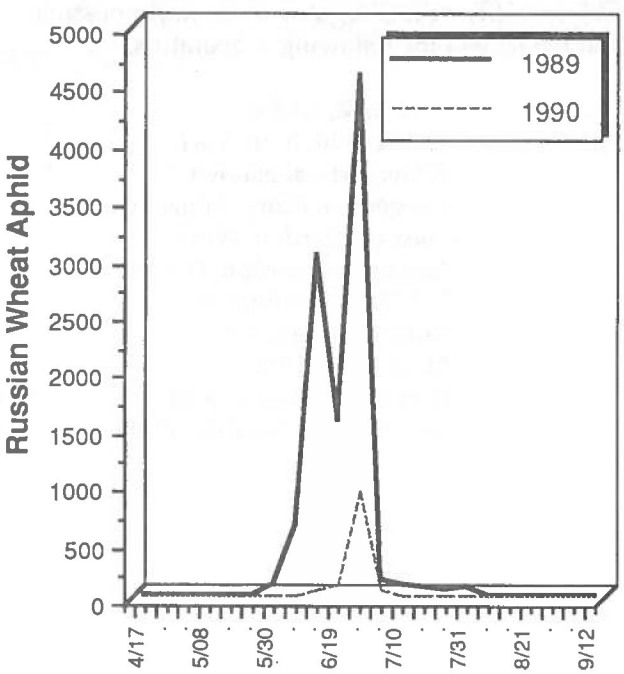

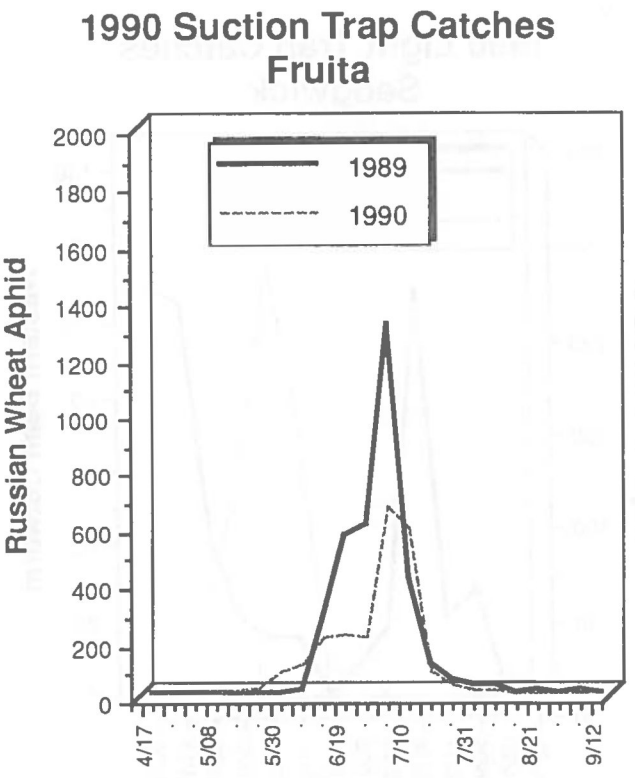

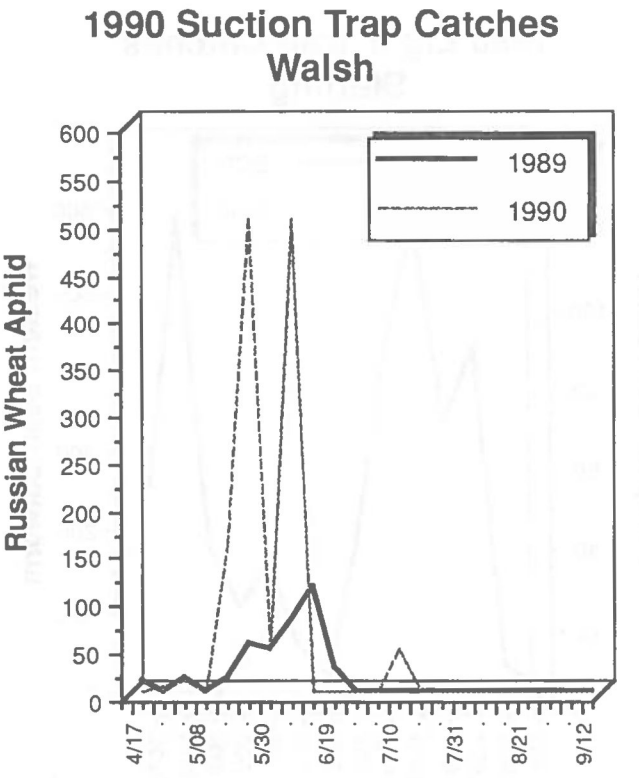

COOPERATORS

The CSU Insect Test Plot Program would not be possible without the help of the following cooperators:

Corn: Earl Jesse, Akron
D. Seewald, Johnstown
R.Hergert, Johnstown
Gregerston Dairy, Johnstown
Gleason Dyrden, Wray
Lawrence Rudolph, Ft. Collins
Bill Cody, Burlington
Mike Bowman, Wray
Mike Fecht, Wray
Don McCassland, Laird
Joe and Gary Newton, Wray

Beans: Byron Weathers, Eckley

Sorghum: Phil Woodrick, Burlington

Wheat: Gene Saffer, Arriba
Joe Theurer, Akron
Cliff Travis, Anton
Dwayne Brown, Ault
USDA Experiment Station, Akron
Terry Sherman, Lindon

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CLIMATIC SUMMARY 1990

R. Wayne Shawcroft
Cooperative Extension
Regional Irrigation-Agronomist
Central Great Plains Research Statio
Akron, Colorado

The crop season weather in 1990 was generally favorable for crop production in the Northeastern Colorado area. There were, however, some weather events that did have considerable impact on the crops in the area. Weather data in this article is taken from the 83-year record at the Central Great Plains Research Station at Akron and from the automated weather station near Yuma. The climatic data at the Research Station and the Yuma station indicates, in a general way, the crop season climate for the Northeastern Colorado area. The climatic data for 1990 will be reviewed by separating the year into the wheat-crop climate and the summer-crop climate.

WINTER WHEAT CROP CLIMATE

For the second year in a row, the fall period was very warm and dry. The Sept.-Oct.-Nov. 1989 period at the Akron Station ranked in the driest 20% of the 83 years on record with a total rainfall of only 1.24 inches for these three months. Actual ranking for the 1989 fall period was the 14th driest. The average for this period is 2.64 inches, while the wettest Sept.-Nov. period was in 1946 with 8.47 inches of rain.

Stand establishment for the winter wheat during this dry planting period was not very good. A wet period from Sept. 8-13 did supply some moisture for germination. Even though temperatures were warm, particularly during November, wheat growth did not produce much cover, and concern over wind erosion damage during the winter months was heightened. Only light snow fell in the area during December, although the wheat in most of the area did have some snow cover from about Dec. 10 through Dec. 28. A short, but extreme coldwave brought new record low temperatures throughout the area on Dec. 22. A new 83-year record low temperature for the Research Station of -32 degrees F was set. Several locations in Northeastern Colorado set new "all-time" record low temperatures well into the -30 degree range on this date.

This cold spell was short lived, however, and the first part of January brought some new record maximum temperatures. Along with the warm temperatures and lack of snow cover came winds. Several severe dust storms occurred around Jan. 8, and record warm temperatures were set around Jan. 11. A crop saving storm occurred on Jan. 19-20, that provided a 14 to 20 inch snow cover for a large part of the area.

The January snowstorm began a change from a near disastrous outlook to increasing favorable conditions for an excellent winter wheat crop. Snow cover from the January storm lasted until late February. While February temperatures were somewhat below normal for the month, conditions for the wheat crop remained favorable. March and April continued to be promising for the wheat crop with moderate seasonal temperatures and above normal precipitation.

The month of May was both significantly wetter and cooler than normal with even some snow accumulation during a wet period around May 9-10. While there were no extremely cold or unusual freezes during May, daily maximum temperatures continued to be low. At the Akron Station, there were only six days in May with daily maximums above 80 degrees. The early part of June remained moderately cool, but also quite dry.

The prospects for the winter wheat crop appeared to be excellent even though heading had been delayed somewhat by the prevailing cool temperatures. Much of the wheat had lush growth from the cool, wet conditions that had predominated since spring growth initiation.

About the only thing that could reduce winter wheat yields for the 1989-90 crop would be a change to dry conditions in June, and an increase in heat and hot winds. With the wheat in such a lush condition and late heading and grain filling, the worst thing that could happen would be the onset of a heatwave.

This indeed is what happened! After about four days of mild temperatures, from mid 70's to low 80's from June 19 to 22, the temperature maximum climbed to 93 on June 23. This was the start of a major heatwave over much of the Central and Western U. S., that saw new record high temperatures set in a widespread area. The next eleven days brought a series of days with above 90 degree temperatures. Within this period there were seven days of 100 degree or greater temperatures including five consecutive days of above 100 degree temperatures from June 29 through July 3. Adding emphasis of the heat during this period was the fact that overnight temperatures remained above 70 on two of these eleven

days, and the coolest temperature was only 59 degrees.

On June 26, 27, and July 2, with daily maximum temperatures of 97, 105, and 106 degrees respectively, the 24-hour wind run for these days was 172, 173, and 207 miles. These are relatively high wind run totals for the summer months. The record heat and hot winds, at a time when the wheat had not been subjected to much heat stress, and was in a lush, succulent growth condition, took a heavy toll on grain test weights and wheat yields.

Just as fast as the heatwave appeared, a cool down with thunderstorms occurred on July 9-10. In fact, even with the first four days in July of above 100 degree heat, the average mean temperature for the month of July was 3.14 degrees below the average. The remainder of the month was cool and wet, and wheat harvest was delayed by the cool, damp weather.

Wheat yields were reduced considerably by a combination of weather events that were relatively short lived, namely: 1)the cool spring months, particularly the month of May, that delayed heading and maturity, and left the wheat crop highly susceptible to heat and hot winds during a critical growth stage; and 2)the heat and hot winds at the end of June and the first few days of July, that shriveled wheat kernels and reduced yields. The old adage that the wheat crop yield cannot be measured until "it's in the bin," certainly held true for the 1989-90 crop.

SUMMER CROP CLIMATE

The summer crop season began with excellent prospects. Early spring precipitation (March and April) was near or above normal. The wet conditions during the early spring did delay field work in preparation for the early May planting season. The first week of May brought some additional concern for corn planting as a late snow and cold period occurred on May 9-10. Although this was the last period of freezing temperatures for the spring, the remainder of May was very cool.

The cool, wet conditions in May delayed planting and slowed germination and development of corn. This cool weather continued until about the last week of June. The Growing Degree-Day (GDD) index for May (see Table 1.) was considerably below the 83-year average for data from Akron and below the 4-year average for the Yuma data.

The summer season appeared to change drastically beginning about June 23, when a massive dome of heat covered most of the Western and Central United States. While this heatwave had a devastating effect of small grain crops, it actually helped summer crops, such as corn. Growth and development of the corn crop was enhanced considerably during this 16-day period, even though many areas set new record high temperatures. The corn crop probably benefited most from the above normal night temperatures that prevailed during this period. The cumulative GDD curves shown in Figure 1 and 2, finally showed an upward swing to near or above the long-term average for the area.

Even though the heatwave brought some heat stress conditions and some high water use days, most of the corn began to look more like normal for this time of the year. Prospects for an excellent corn crop were actually improved after this warm-up period. If normal summer temperatures would have prevailed for the remainder of the summer, the summer crop season would have been unexceptional.

Just as fast as the warm temperatures appeared, there was a return to prevailing cool temperatures for almost the remainder of the summer. While the average June temperature turned out to be about 3.5 degrees above normal, the July and August temperatures were 3.1 and 2.0 degrees below normal. In fact, new record low temperatures were set on July 21, when the minimum temperature dropped to only 42 degrees. The GDD index curves dropped back below the long-term average by July 20, and remained below average for the remainder of the season.

After a dryer than normal June, both July and August had above normal precipitation. This was favorable in some respects since crop water use was considerably below average for the later part of the July and early August. This reduced irrigation pumping stress for the most part, however the late August and early September period brought high crop water use. Overall the seasonal crop water use (ET) value for corn was 4.7 inches less than the average of the last four years. Seasonal crop water use calculated for corn at Yuma has averaged 26.1 inches for the 1987-90 period. Actual ET values are: 1987, 27.2 inches; 1988, 29.6 inches; 1989, 26.1 inches; and 1990, 21.3 inches.

The last week of August and the first two weeks of September brought a return of above average heat. This period was probably the most stressful for summer crops, since for most of the summer crops had been conditioned to relatively cool conditions. Corn development and maturity was enhanced during the late summer heat, but maturity was still somewhat later than normal, and not much corn was harvested before Oct. 1. September remained warm and relatively dry and without any freezing temperatures. The first hard freeze did not occur in the area until Oct. 7 and 8.

Unfortunately, this cold period was accompanied with wet and snowy conditions that delayed corn dry-down and harvest.

Corn yields were generally near average for the area even with the cool-hot-cool trend in summer weather. The GDD index again stresses the importance of choosing hybrid varieties according to the expected "heat unit" rating. The cool, damp conditions in July and early August presented some disease control problems for beans, and this was aggravated with the heat in late August and early September.

This is the second summer in a row where cool July and August temperatures, and thus low "heat unit" totals (GDD) have been a dominate feature of the summer crop season. The other major difference between the 1989 and 1990 season was the very cool conditions in May 1990 and the onset of a heatwave in late August and early September.

Table 1. Growing season rainfall and temperature summary for northeastern Colorado area.

			TEMPERATURE DATA											
					GROWTH UNITS****				NUMBER OF DAYS					
	RAINFALL, in		DAILY MEAN F		AKRON		YUMA		AKRON 1990*			AKRON 83 YR. AV		
MONTH	1990*	AVG.*	1990*	AVG.*	1990*	83 yr. Avg.*	1990 **	87-90 avg.**	0+	100+	<55 ***	90+	100+	<55 ***
MAY	4.09	3.04	53.1	56.2	163	235	114	249	0	0	30	1	0	30
JUN	0.93	2.51	70.0	66.6	600	500	538	554	10	3	26	8	1	22
JUL	4.71	2.67	70.4	73.5	631	727	516	656	10	4	9	16	2	8
AUG	4.41	2.03	69.6	71.5	607	667	516	597	9	1	15	14	1	13
SEP	0.70	1.25	65.6	62.3	364	277	294	224	10	0	25	5	0	27
SEASON TOTAL	14.84	11.50	65.7	66.0	2365	2406	1978	2280	39	8	105	44	4	100

* 83 year average rainfall and temperature data (1908 1990), monthly rainfall, average monthly mean temperature, and number of days 90+, 100+, less than 55 degrees F, from Central Great Plains Research Station, Akron, Colorado.

** From automated weather station, Gene Beauprex farm, east of Yuma, Colorado.

*** Number of days that the night temperature 55 degrees F or less.

**** Growth Units (Growing Degree Days or "Heat Units) defined as the number of degrees that the daily mean temperature is above a 50 degree F temperature. For example: Daily max. temp. = 85, Daily min. temp. = 53, then Daily mean temp. = (85+53)/2 = 138/2 = 69. Daily Growth Unit = 69 50 = 19 degree day units. If daily mean temperature is less than or equal to 50, then Degree Day value = 0. Growth units are accumulated daily from planting to harvest. Akron data through Sept. 18. Yuma data through Sept. 16.

Figure 1: Comparison Degree-Day: 1987, 1988, 1989, 1990 and Average
Yuma, Colorado via Auto Weather Station

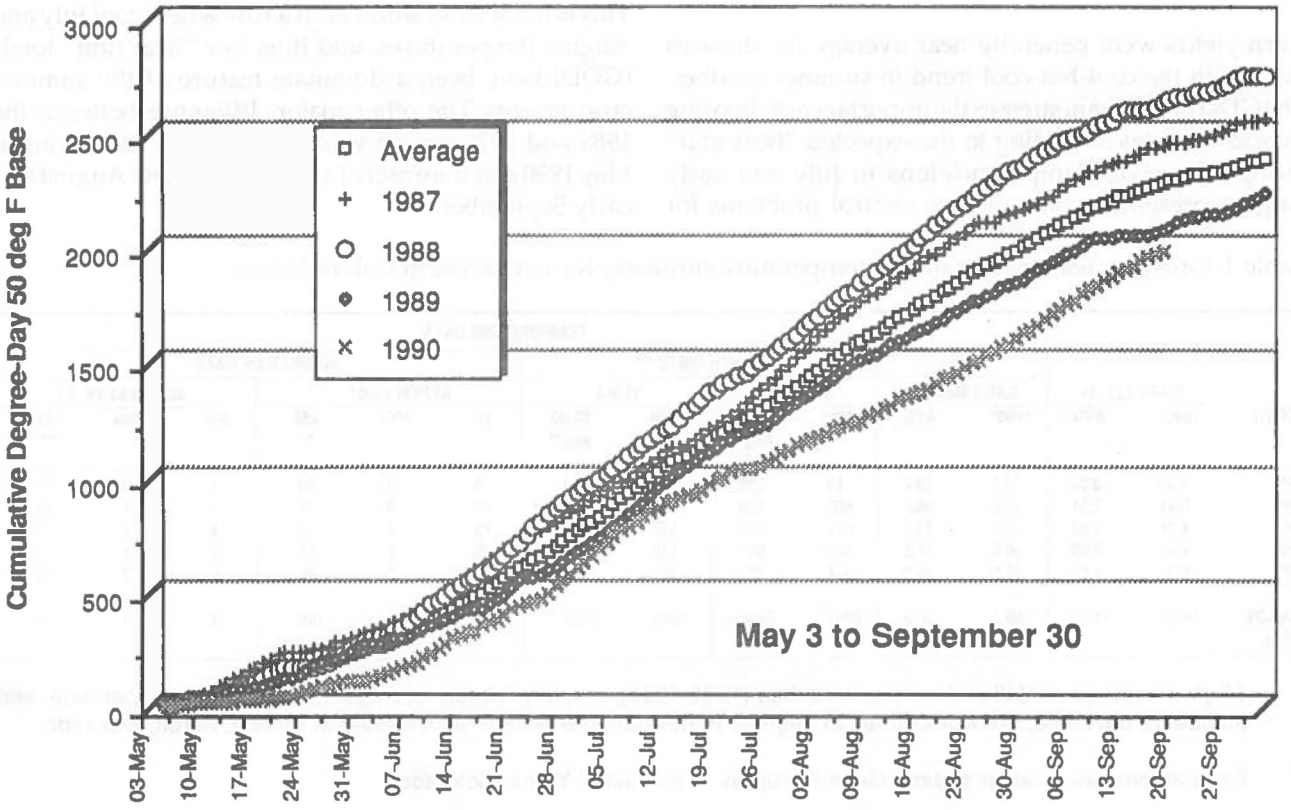
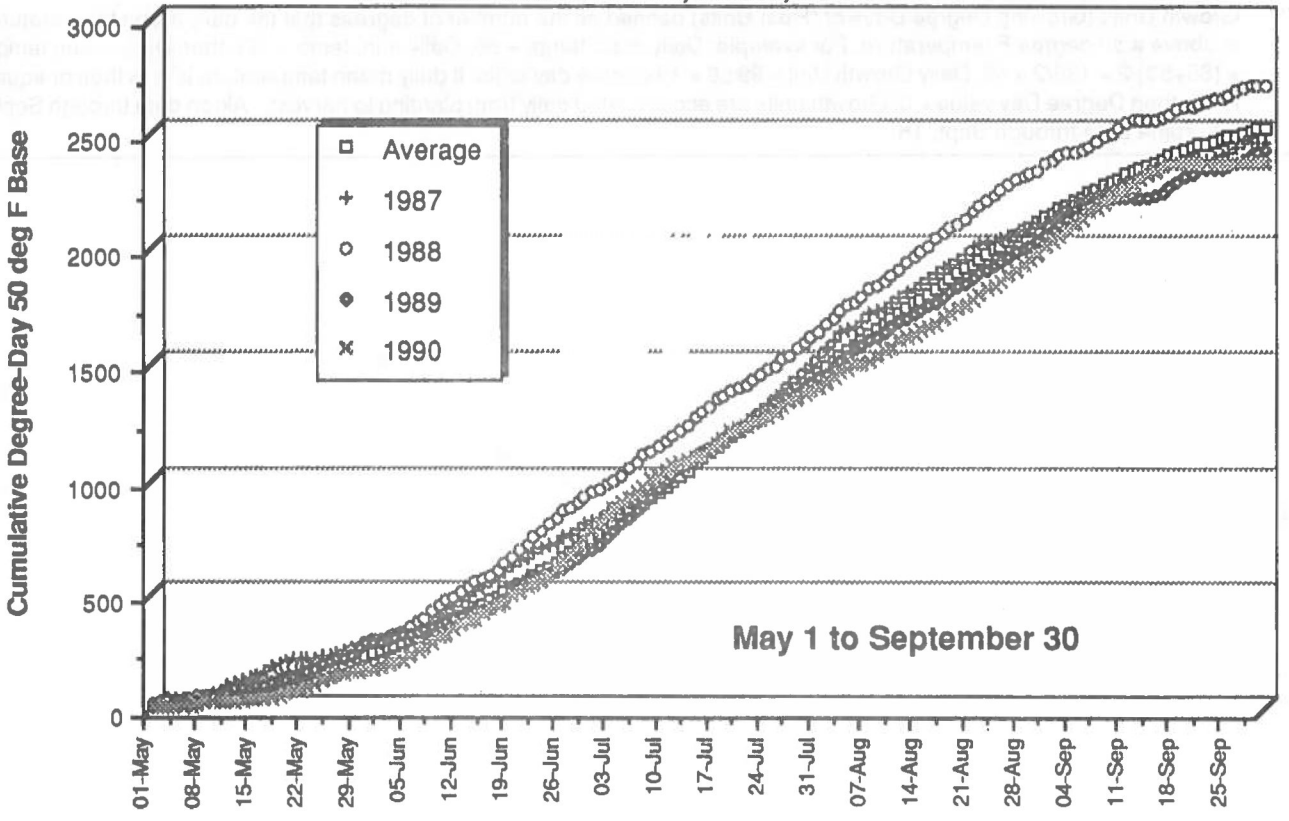


Figure 2: Comparison Degree-Day: 1987, 1988, 1989, 1990 and Average
USDA Research Station, Akron, Colorado



PEAK MOTH FLIGHTS AS COMPARED WITH GROWING DEGREE DAYS
1990

Sterling: Started light trap on May 26.
First European Corn Borer (ECB) peak was recorded on June 19 with a total of 625 growing degree days accumulated.
Second ECB peak recorded on August 17 with 1209 growing degree days accumulated.

Holyoke: Started light trap on May 24.
First ECB peak flight was recorded with 525 GDD on the day of June 11.
Second peak was around August 22 with a recorded 1871.5 GDD.

Burlington: Started light trap on May 29.
First ECB peak recorded on June 16 with 646 GDD accumulated.
Second peak on August 9 with 1407.5 GDD.

Bonny Dam: Started light trap on May 29.
June 15 was the ECB peak with 650 GDD recorded.
August 10 was the second peak flight in record for the season with a total GDD accumulation of 1630.

Yuma: Started light trap on May 27.
First peak on June 11 for ECB and an accumulation of 676 GDD.
Second peak was recorded on August 18 with 1516 GDD.

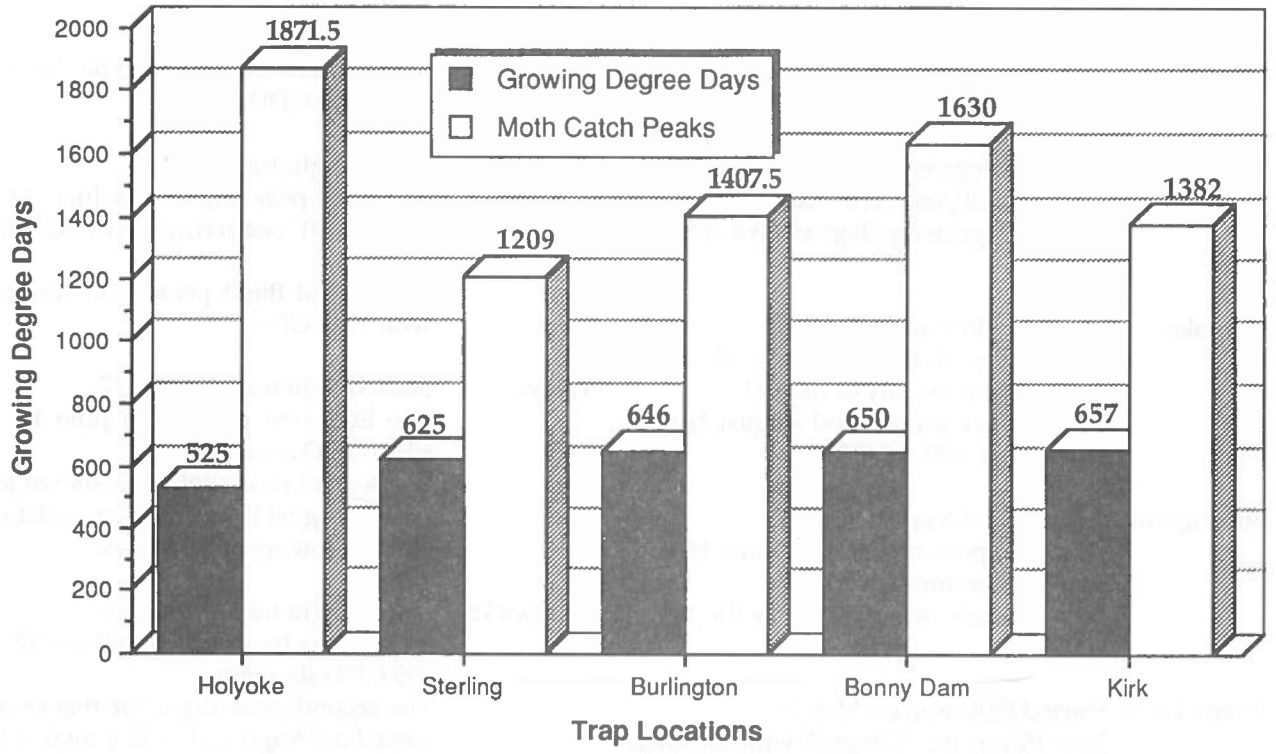
Kirk: Started light trap on May 27.
ECB first peak flight was June 14 and showed it occurring with 657 GDD counted.
The second flight peaked on August 17 with 1382 GDD.

Wray: Started light trap on May 27.
The ECB first peaked on June 17 with 623.5 GDD recorded.
The second peak flight was shown to occur on August 12 with an accumulation of 1854.5 growing degree days.

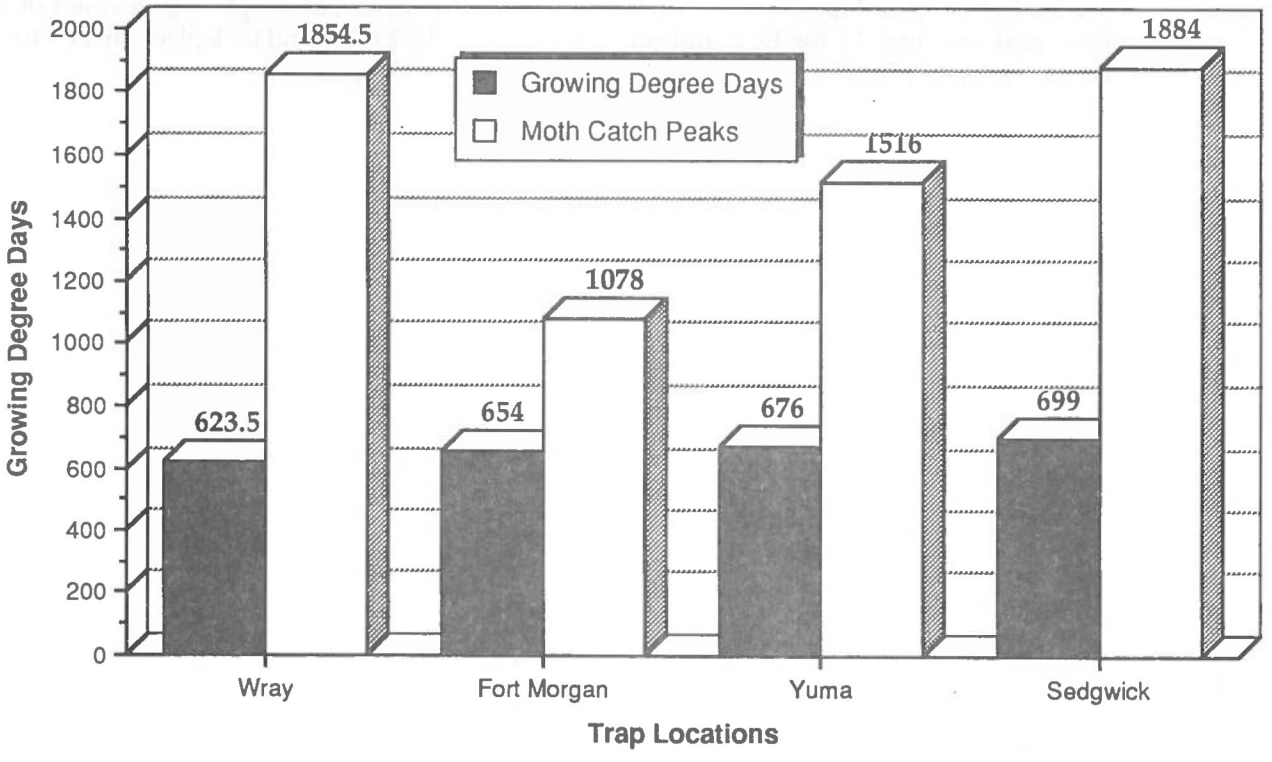
Sedgwick: Started light trap on May 28.
ECB moths first peaked on June 22 with 699 GDD showing.
The second peak flight for this area occurred on August 21 with a total of 1884 GDD.

Fort Morgan: Started light trap on May 24.
First peak for ECB on June 10 with 654 GDD determined.
Second peak flight was a result of only 1078 GDD and took place on the 14th day of August.

DATA COMPARING GDD AND MOTH CATCH PEAKS



DATA COMPARING GDD AND MOTH CATCH PEAKS



1989-90 WINTER WHEAT PLOTS

Sponsored by: Colorado State University Cooperative Extension and Agricultural Experiment Station
Coordinated by J.W. Echols and J.S. Quick

VARIETY	DESCRIPTION
Abilene	A 1987 semidwarf release from Agripro tested for the second year in eastern Colorado (labeled W81-362-5) High yield performance in the region, good straw strength and excellent leaf rust resistance.
Arapahoe	A Nebraska medium height variety (NE82656) with very good winter hardiness released in 1988.
Baca	A selection from Scout released by Colorado in 1973. Similar to Scout but has greater uniformity and yield advantage in drought stress conditions. It is stem rust resistant and susceptible to leaf rust. Milling and baking quality is excellent.
Bronco	An Agripro variety (W83-256) released in 1989 and adapted to western Kansas and eastern Colorado.
Century	A white-chaffed semidwarf released by Oklahoma in 1986. It has been about one inch taller and one day later than Vona. It is resistant to leaf rust and greenbug biotypes B and C, but susceptible to greenbug biotype E and Hessian fly. It has some field tolerance to Septoria leaf blotch and resistance to leaf rust. Tested for the fourth year in eastern Colorado variety trials.
C0840050	A Colorado medium height experimental line entered in the eastern Colorado variety test for the third year. Derived from the cross Mir. 808/Vona.
C0850034	A new experimental line evaluated in eastern Colorado plots for the third time. Derived from the cross NS14/NS603//Newton/3/PB835.
C0850061	A new experimental line evaluated in eastern Colorado plots for the second time. Derived from the cross NS14/NS25//2*Vona.
C0850260	A new experimental line evaluated in eastern Colorado plots for the third time. Derived from the cross F16/F71//Newton/3/Vona.
C0850267	A new experimental line evaluated in eastern Colorado plots for the third time. Derived from the cross Mex Dwarf/77F50362//Vona.
C0860154	A new experimental line evaluated in eastern Colorado plots for the second time.
C0860008	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860015	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860055	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860086	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860094	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860140	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860142	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860215	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860235	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860253	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860268	A new experimental line evaluated in eastern Colorado plots for the first time.
C0860282	A new experimental line evaluated in eastern Colorado plots for the first time.

VARIETY	DESCRIPTION
C0860284	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870425	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870434	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870438	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870449	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870481	A new experimental line evaluated in eastern Colorado plots for the first time.
C0870506	A new experimental line evaluated in eastern Colorado plots for the first time.
Hawk	A 1981 release from Agripro derived from crosses between Mexican spring wheats and hard winter wheats. Hawk is similar to Vona in most respects but has larger kernels, grater tolerance to leaf rust, and lower late season drought tolerance.
Lamar	A new Colorado medium height variety released in 1988. Derived from Vona crossed with an experimental line to improve test weight. Excellent drought resistance.
Mesa	A 1987 release from Agripro tested for the third year in eastern Colorado. A short semidwarf labeled W81-171-14. High yield performance in the region and tentatively identified as adapted to the area from Burlington south.
Pioneer 2163	A Pioneer variety tested for the first year in Colorado.
Newton	A 1977 release from Kansas having medium maturity and short, strong straw. It has fair winterhardiness and moderate resistance to leaf and stem rust.
Quantum 542	A standard height hybrid marketed by Hybritech, Inc. and in the second year of Colorado tests.
Quantum 549	A new hybrid wheat from Hybritech, Inc.
Quantum 562	A semidwarf wheat developed by Hybritech, Inc., and tested in eastern Colorado for the fourth year (labeled XH 140).
Quantum 578	A new hybrid wheat from Hybritech, Inc.
Quantum 589	A new hybrid wheat from Hybritech, Inc.
Sandy	A 1980 Colorado release from crosses between a Mexican semidwarf, Trapper and Centurk. Sandy has medium height and maturity and excellent stand establishment ability. It has tolerance to root rot, excellent winterhardiness, and excellent milling and baking quality.
Scout 66	A selection from Scout released by Nebraska in 1967. It is medium maturing, tall with weak straw and good winterhardiness. It has moderate resistance to leaf an stem rust. It is very resistant to shattering, which may result in poor threshability.
Sierra	A new semidwarf from Agripro (AGP W84-229). Questionable quality in 1988.
Siouxland	A 1984 release from Nebraska. It is similar in height to Centurk 78, but is slightly earlier and superior in lodging resistance, kernel weight and grain yield. It has excellent resistance to leaf and stem rust and its milling and baking properties are similar to those of Scout 66.
TAM 107	A brown-chaffed semidwarf released by the Texas Agric. Experimental Station in 1984. It is a backcross-derived line from TAM 105. It is similar in appearance to TAM 105, but has resistance to stem rust, susceptibility to leaf rust, resistance to biotype E greenbug, susceptibility to Hessian fly and is slightly earlier. It has tolerance to the mite vector of Wheat Streak Mosaic and is a replacement for TAM 105.

VARIETY	DESCRIPTION
TAM 200	A new semidwarf wheat from Texas tested for the fourth year in eastern Colorado variety trials. Has excellent performance under irrigation.
Thunderbird	A 1985 release by Agripro. A medium height variety with a long coleoptile, very good winterhardiness, strong straw, high test weight and excellent disease resistance.
Victory	Released by Agripro in 1985. An intermediate height semidwarf variety with strong straw, early maturity and excellent leaf rust resistance. Fifth year in eastern Colorado variety trials. Very susceptible to Wheat Streak Mosaic Virus.
Vona	A 1976 release from Colorado derived from a cross between Lancer and experimental wheats from Kansas, Colorado and Mexico. It is an early maturing semidwarf wheat with strong straw and fair winterhardiness. It has moderate resistance to stem and leaf rust and resistance to Hessian fly.
Wichita	A 1944 release from Kansas. It is a tall, early maturity variety which shatters, has weak straw, is susceptible to leaf and stem rust, has excellent test weight, and poor to fair milling and baking quality (long term check variety).

1990 SUMMARY OF WINTER WHEAT VARIETIES TESTED AT IRRIGATED SITES IN EASTERN COLORADO

	YIELD								
	BURLINGTON	ROCKY FORD	VERNON	WALSH	YLD AVG	YIR % AVG	TW AVG	PL.HT AVG	LODGE* AVG
C0860094	60.1	109.7	76.9	72.5	79.8	110	54.2	37	2.3
TAM 200	74.2	99.4	75.8	68.3	79.4	110	58.7	33	1.9
C0860086	55.9	107.2	79.5	73.5	79.0	109	55.4	34	4.1
AGRIPRO SIERRA	80.5	90.2	70.4	74.5	78.9	109	57.5	34	0.7
C0850061	67.7	103.4	71.4	70.5	78.3	108	55.8	35	2.8
C0850260	71.1	100.0	68.9	68.0	77.0	106	57.3	35	1.7
PI2163	74.7	90.8	75.2	59.9	75.2	104	55.4	33	0.7
QUANTUM 589	75.0	94.1	68.9	61.0	74.8	103	56.6	32	1.5
QUANTUM 578	68.7	90.9	75.9	61.1	74.2	102	57.1	33	1.8
C0870438	68.0	101.7	67.1	59.6	74.1	102	55.2	32	1.9
AGRIPRO HAWK	58.2	94.9	73.8	65.3	73.1	101	56.0	36	2.0
VONA	61.8	98.6	62.4	67.9	72.7	100	56.9	35	1.8
QUANTUM 562	51.5	98.0	70.4	70.3	72.6	100	55.6	35	3.3
C0860142	57.9	106.4	67.8	55.5	71.9	99	54.8	34	0.3
C0850034	54.1	83.4	72.9	73.5	71.0	98	57.0	36	6.7
TAM 107	70.1	92.9	61.1	58.4	70.6	97	56.5	34	0.1
C0870506	54.2	95.7	70.8	59.4	70.0	97	54.8	35	3.2
AGRIPRO ABILENE	61.4	92.1	60.7	57.4	67.9	94	57.0	32	1.8
AGRIPRO VICTORY	78.8	76.8	62.0	53.4	67.8	93	56.9	35	2.8
AGRIPRO MESA	83.4	71.8	51.6	62.2	67.3	93	57.9	32	2.6
CENTURY	56.9	87.6	64.4	58.4	66.8	92	55.0	37	1.2
C0870434	66.6	84.2	58.3	57.4	66.6	92	57.0	35	2.8
C0860140	39.1	101.8	66.0	57.3	66.1	91	54.7	33	1.4
C0860282	48.2	85.4	66.2	61.6	65.4	90	56.2	40	5.7
AVERAGE	64.1	94.0	68.3	63.6	72.5	100	56.2	35	2.3

* LODGING FROM BURLINGTON AND ROCKY FORD

1990 SUMMARY OF WINTER WHEAT VARIETIES TESTED AT HIGHER MOISTURE SITES IN EASTERN SECTION OF NORTHEAST COLORADO

VARIETY	YIELD					YLD	YIR	TW	PL.HT.	LODGE*
	AKRON	AMHERST	BURLINGTON	CLARKVILLE	OVID	AVG %	AVG	AVG	AVG	AVG
TAM 200	52.3	49.5	59.6	43.3	34.6	47.9	117	56.0	31	0.0
C0850061	53.4	51.6	48.4	44.8	39.2	47.5	116	53.8	31	0.0
TAM 107	52.1	49.4	45.3	46.8	37.9	46.3	113	55.0	30	0.0
ARAPAHOE	46.8	47.6	50.7	44.5	36.2	45.2	111	52.6	33	0.0
VONA	52.6	44.7	44.5	45.8	35.6	44.6	109	55.1	32	0.0
C0870449	50.3	47.8	49.4	41.9	32.7	44.4	109	53.2	30	0.0
C0850034	46.6	45.7	50.6	43.4	30.9	43.4	106	52.5	32	0.0
AGRIPRO HAWK	45.8	48.7	49.2	40.8	32.6	43.4	106	54.2	32	0.3
C0870481	53.6	39.2	50.5	37.6	32.4	42.7	105	50.5	30	0.0
QUANTUM 562	46.2	45.4	44.5	43.4	33.0	42.5	104	51.9	32	0.0
QUANTUM 549	47.7	43.3	44.4	44.0	32.9	42.5	104	51.9	34	0.0
PI2163	49.2	43.0	42.8	42.8	33.4	42.2	104	49.6	30	0.0
C0870438	52.1	44.5	42.8	39.5	31.7	42.1	103	51.0	29	0.0
C0870434	53.6	46.0	40.0	36.8	33.3	41.9	103	55.2	33	0.0
QUANTUM 542	43.5	46.8	42.0	44.6	32.2	41.8	103	54.5	37	0.0
LAMAR	45.2	46.2	46.1	40.3	31.0	41.8	102	55.1	37	0.0
AGRIPRO THUNDERBIRD	46.4	40.1	46.7	42.9	30.6	41.3	101	55.9	34	0.0
C0850267	45.3	42.5	48.1	37.0	31.4	40.9	100	53.0	35	0.0
C0860154	44.1	44.8	42.5	40.7	29.7	40.4	99	55.4	36	0.0
AGRIPRO BRONCO	46.5	40.8	48.1	38.5	27.7	40.3	99	51.7	32	0.0
C0870506	47.6	44.0	41.7	39.7	27.9	40.2	98	49.5	31	0.0
C0840050	42.0	42.1	47.3	36.6	31.7	39.9	98	54.8	38	0.3
C0850260	47.9	43.8	37.3	38.0	32.6	39.9	98	55.0	31	0.0
C0860094	48.5	41.1	43.9	39.0	24.0	39.3	96	48.4	30	0.0
SCOUT 66	42.5	43.8	45.9	37.9	26.3	39.3	96	55.2	39	1.3
C0860086	50.3	40.3	33.3	42.9	28.4	39.0	96	48.3	29	0.0
SANDY	43.4	43.5	40.4	41.5	25.8	38.9	95	54.0	36	0.3
SIOUXLAND	39.0	40.7	43.5	38.2	28.9	38.1	93	53.6	37	0.3
C0860142	45.2	42.2	31.3	40.1	31.0	38.0	93	51.5	30	0.0
WICHITA	30.3	40.2	36.8	36.6	33.7	35.5	87	56.6	41	1.5
C0870425	39.9	38.0	37.1	34.6	27.2	35.4	87	53.8	34	0.0
C0860282	39.5	34.3	37.7	37.2	26.0	34.9	86	52.9	38	0.5
CENTURY	38.5	35.3	34.6	37.4	26.1	34.4	84	51.3	32	0.3
C0860140	43.8	37.3	24.1	35.0	24.3	32.9	81	50.8	29	0.0
AGRIPRO ABILENE	44.4	47.4	39.0							0.0
AGRIPRO MESA	47.2	47.5	42.6							0.0
AVERAGE	46.2	43.6	43.1	40.4	31.0	40.8	100	53.1	33	0.1

* LODGING OCCURRED ONLY AT AMHERST

COMPARISON OF SOME WINTER WHEAT VARIETIES FOR ACREAGE. AQRONOMIC TRAITS AND QUALITY[1]

Variety	Percent Colorado Seeded Acreage 1990[2]	Relative						Resistance or Tolerance to				Relative quality		
		Ht (cm)	Mat.	TW	Straw Strength	Winter Hardi-ness	Coleop Length (mm)	Leaf Rust	Stem Rust	Hessian Fly	Wheat Streak Mosaic	Milling	Mixing[3]	Loaf Vol.
Abiline	1.3	80	3	4	3	5	100	1	2	-	-	2	3	2
Baca	7.6	120	4	4	6	3	120	5	5	-	7	2	3	3
Bronco	-	75	2	4	4	5	75	5	5	-	-	2	1	3
Brule	-	100	5	4	4	2	70	3	4	2	5	2	2	2
Hawk	10.4	75	3	4	4	5	75	7	5	8	6	2	1	3
Lamar	-	105	-	4	4	2	110	7	2	-	-	2	3	2
Larned	1.3	120	4	4	5	3	120	5	3	1	7	2	3	2
Mesa	0.5	70	3	4	1	5	75	1	1	-	-	2	2	2
Newton	2.0	80	3	4	4	6	75	7	6	8	6	2	2	
Sandy	4.6	110	5	3	5	2	120	3	-	8	-	2	0	4
Scout (s)	9.2	120	4	4	6	3	120	5	5	7	7	2	3	3
TAM 105	1.6	80	3	5	3	3	80	8	9	8	6	2	2	1
TAM 107	37.9	80	3	5	3	3	80	8	1	8	2	2	2	1
TAM 200	-	70	3	3	1	8	75	1	1	-	-	3	3	4
Thunderbird	2.3	100	3	4	4	5	110	-	-	-	-	-	-	-
Turkey	-	150	8	6	9	1	120	8	8	9	7	2	3	2
Vona	6.2	75	2	5	3	6	70	7	3	5	8	2	2	2
Wichita	0.5	130	1	4	8	6	120	-	8	8	-	2	5	4

[1] Rated on a scale of 0 to 9, except for maturity (here 0 is earliest and 9 latest), 0 is best and 9 poorest. A dash indicates insufficient evidence for classification.

[2] Includes most varieties grown on at least 0.5% of 1990 acreage, based on Colorado Crop & Livestock Reporting Service Survey.

[3] A zero rating means exceptionally long mixing time. Varieties with a 0 rating are particularly good for blending with mellow or weak wheats. Mixing time will vary with the environmental condition under which the varieties are grown.

SUMMARY OF WINTER WHEAT VARIETIES TESTED FROM 1979-1990 AT HIGHER MOISTURE SITES IN EASTERN SECTION OF NORTHEAST COLORADO

VARIETY/ YEAR	AKRON YIELD	AKRON YIR**	AMHERST YIELD	AMHERST YIR**	ANTON YIELD	ANTON YIR**	BURLINGTON YIELD	BURLINGTON YIR**	CLARKVILLE YIELD	CLARKVILLE YIR**	OVID** YIELD	OVID** YIR**	AVG. %
AGATE													
1984	47.6	87	51.1	101	74.5	97	51.2	98	49.3	101	41.2	108	99
1983	35.1	100	53.7	92	51.1	85	37.0	77	49.6	93	48.6	94	90
1982	49.7	104	36.4	104	54.7	98	60.5	96	25.4	105	58.6	95	100
1981			28.1	88	56.4	93					22.5	78	86
1980			39.5	93			26.0	87					90
1979			41.0	98			41.0	112			65.0	115	108
AVERAGE	44.1	97	41.6	96	59.2	93	43.1	94	41.4	100	47.2	98	96
AGRIPRO ABILENE													
1990	44.4	96	47.4	109			39.0	90					98
1988	31.6	91	43.0	104	36.6	96	48.4	111	31.9	109	40.7	115	104
1987			53.5	92	49.4	89			36.8	86	29.5	86	88
AVERAGE	38.0	94	48.0	102	43.0	93	43.7	101	34.4	98	35.1	101	97
AGRIPRO BRONCO													
1990	46.5	101	40.8	94			48.1	112	38.5	95	27.7	89	98
AVERAGE	46.5	101	40.8	94			48.1	112	38.5	95	27.7	89	98
AGRIPRO HAWK													
1990	45.8	99	48.7	112			49.2	114	40.8	101	32.6	105	106
1989	32.1	92	21.8	88	51.2	108	62.0	101	41.3	107	52.7	114	102
1988	33.3	96	39.9	97	34.1	90	42.4	97	33.4	114	33.4	95	98
1987			56.8	98	64.0	115			40.1	94	30.9	90	99
1986	43.0	122	49.4	114	49.3	106							114
1985	67.5	102	65.0	110	91.4	114	51.3	89	59.0	107	39.1	90	102
1984	51.6	95	52.5	103	78.7	102	55.0	105	48.2	99	38.1	99	101
1983	42.3	121	63.8	110	67.1	112	51.8	108	57.1	107	51.9	101	110
1982	51.4	108	37.6	107	61.4	110	73.2	116	27.6	114	64.4	105	110
1981			33.8	106	65.5	108	41.0	137			39.2	136	122
AVERAGE	45.9	104	46.9	104	62.5	107	53.2	108	43.4	105	42.5	104	106
AGRIPRO MESA													
1990	47.2	102	47.5	109			42.6	99					103
1988	34.9	101	47.4	115	37.1	97	49.2	112	28.9	99	39.5	112	106
AVERAGE	41.1	102	47.5	112	37.1	97.0	45.9	106	28.9	99.0	39.5	112	105
AGRIPRO MUSTANG													
1988	44.0	127	42.8	104	39.3	103	46.6	106	29.0	99	39.3	111	108
AVERAGE	44.0	127	42.8	104	39.3	103	46.6	106	29.0	99	39.3	111	108
AGRIPRO THUNDERBIRD													
1990	46.4	100	40.1	92			46.7	108	42.9	106	30.6	99	101
1989	32.1	92	27.9	113	42.0	89	58.4	95	39.0	101	40.6	88	96
1988	33.4	96	42.0	102	35.4	93	42.4	97	28.6	98	35.3	100	98
1987			55.2	95	51.5	92			41.9	98	31.8	93	95
1986	41.3	117	42.4	98	48.4	104							106
1985	64.6	98	53.7	91	75.2	94	55.5	96	46.4	84	40.5	93	93
AVERAGE	43.6	101	43.6	98	50.5	94	50.8	99	39.8	97	35.8	95	98
AGRIPRO VICTORY													
1988	36.2	104	44.4	108	44.0	115	53.0	121	30.9	105	48.3	137	115
AVERAGE	36.2	104	44.4	108	44.0	115	53.0	121	30.9	105	48.3	137	115

VARIETY/ YEAR	AKRON YIELD	AKRON YIR*	AMHERST YIELD	AMHERST YIR*	ANTON YIELD	ANTON YIR*	BURLINGTON YIELD	BURLINGTON YIR*	CLARKVILLE YIELD	CLARKVILLE YIR*	OVID** YIELD	OVID** YIR*	AVG. %
ARAPAHOE													
1990	46.8	101	47.6	109			50.7	118	44.5	110	36.2	117	111
1989	28.9	83	26.0	105	44.3	94	61.6	101	41.6	108	45.9	99	98
1988	33.9	98	45.0	109	34.5	91	48.7	111	29.4	101	40.3	114	104
AVERAGE	36.5	94	39.5	108	39.4	92	53.7	110	38.5	106	40.8	110	104
BRULE													
1985	68.3	103	55.9	95	80.7	101	53.0	92	57.6	105	43.8	100	99
1984	55.9	102	48.4	95	74.2	96	51.6	98	47.4	97	41.5	108	99
1983	36.3	104	66.6	115	65.0	109	51.8	108	61.6	115	58.4	113	111
1982	51.0	107	38.0	109	56.4	101	61.7	98	21.2	88	69.3	113	103
AVERAGE	52.9	104	52.2	104	69.1	102	54.5	99	47.0	101	53.3	109	103
CARSON													
1989	31.7	91	16.3	66	41.9	89	49.8	81	37.6	98	46.6	100	87
1988	34.6	100	36.3	88	36.8	97	37.0	84	29.4	100	33.5	95	94
1987			53.6	92	54.1	97			40.6	95	31.2	91	94
1986	34.7	99	44.6	103	47.6	103							102
1985	69.9	106	60.8	103	85.2	107	60.1	104	53.0	96	42.9	98	102
AVERAGE	42.7	99	42.3	90	53.1	99	49.0	90	40.2	97	38.6	96	96
CENTURA													
1987			53.5	92	48.9	88			43.6	102	32.5	95	94
1986	35.8	102	44.6	103	46.6	100							102
1985	61.0	92	55.2	94	73.4	92	54.5	95	51.8	94	41.7	96	94
1984	50.7	93	55.6	109	75.8	98	48.3	92	47.9	98	42.0	110	100
AVERAGE	49.2	96	52.2	100	61.2	95	51.4	94	47.8	98	38.7	100	97
CENTURK 78													
1985	59.7	90	52.2	88	78.5	98	52.7	96	41.8	96			94
1984	56.8	104	50.7	99	68.4	89	52.5	100	42.2	86	43.9	115	99
1983	36.5	104	50.6	87	53.1	89	40.8	85	45.0	84	46.0	89	90
1982	47.0	98	39.7	113	60.5	109	59.8	95	25.7	106	58.8	95	103
1981			30.4	96	58.2	96	29.0	97			29.0	97	97
1980			42.4	99			27.1	91					95
1979			45.0	108			37.0	101			63.0	112	107
AVERAGE	50.0	99	44.4	99	63.7	96	42.7	95	38.7	93	48.1	102	98
CENTURY													
1990	38.5	83	35.3	81			34.6	80	37.4	93	26.1	84	84
1989	36.7	105	30.1	121	46.1	98	63.0	103	39.0	101	47.6	103	105
1988	31.9	92	40.4	98	33.8	89	42.4	97	31.0	106	38.2	108	98
1987			69.2	119	57.0	102			51.8	121	39.8	116	115
AVERAGE	35.7	93	43.8	105	45.6	96	46.7	93	39.8	105	37.9	103	101
CHISHOLM													
1986	39.6	113	42.1	97	47.5	102							104
1985	71.4	108	64.4	109	75.8	95	60.4	105	57.6	105	44.6	102	104
1984	57.1	105	46.3	91	74.2	96	55.1	105	45.4	93	34.8	91	97
1983											50.7	111	111
AVERAGE	56.0	109	50.9	99	65.8	98	57.8	105	51.5	99	43.4	101	104
COLT													
1986	33.6	95	42.5	98	44.9	97							97
1985	68.5	104	61.0	103	85.5	107	60.0	104	58.5	106	42.3	97	104
1984	53.7	98	49.3	97	73.5	95	55.1	105	46.4	95	37.4	98	98
AVERAGE	51.9	99	50.9	99	68.0	100	57.6	105	52.5	101	39.9	98	99

VARIETY/ YEAR	AKRON YIELD	AKRON YIR**	AMHERST YIELD	AMHERST YIR**	ANTON YIELD	ANTON YIR**	BURLINGTON YIELD	BURLINGTON YIR**	CLARKVILLE YIELD	CLARKVILLE YIR**	OVID** YIELD	OVID** YIR**	AVG. %
DUKE													
1985	59.6	90	52.5	89	76.4	96	59.5	103	54.2	99	43.7	100	96
1984	50.7	93	49.5	97	74.6	97	55.2	105	49.1	100	44.4	116	101
1983	31.0	89	44.9	77	54.4	91	39.2	82	50.0	94	48.8	95	88
1982	43.1	90	35.5	101	55.6	99	59.7	95	22.7	94	59.4	96	96
1981			28.6	90	61.2	101			25.0	83	25.8	89	91
1980			40.7	96			30.8	103					100
AVERAGE	46.1	91	42.0	92	64.4	97	48.9	98	40.2	94	44.4	99	95
LAMAR													
1990	45.2	98	46.2	106			46.1	107	40.3	100	31.0	100	102
1989	37.7	108	27.7	112	48.2	102	63.9	104	40.2	104	47.5	102	106
1988	37.8	109	42.3	103	42.2	111	38.1	87	28.5	97	33.6	95	100
1987			56.5	97	49.8	89			48.5	113	37.8	110	102
1986	40.4	115	44.3	102	48.4	104							107
AVERAGE	40.3	108	43.4	104	47.2	102	49.4	99	39.4	104	37.5	102	103
NEWTON													
1989	36.6	105	23.5	95	49.1	104	65.5	107	37.9	98	47.4	102	102
1988	38.1	110	43.7	106	38.9	102	45.7	104	27.4	94	36.5	103	103
1987			59.3	102	51.6	93			37.9	89	31.0	90	94
1986	39.9	113	43.2	100	49.2	106							106
1985	65.7	99	58.0	98	75.5	94	59.6	103	52.7	96	44.6	102	99
1984	50.0	92	51.9	102	76.1	99	55.3	105	55.2	113	34.2	89	100
1983	16.4	47	54.3	93	57.3	96	47.2	99	43.9	82	38.7	75	82
1982	50.9	106	38.2	109	53.5	96	61.5	97	24.3	100	67.3	109	103
1981			34.7	109	61.9	102	21.0	70			32.0	111	98
1980			47.3	111			29.1	98					105
1979			43.0	103			38.0	104			54.0	96	101
AVERAGE	42.5	96	45.2	103	57.0	99	47.0	99	39.9	96	42.9	97	99
QUANTUM 542													
1990	43.5	94	46.8	107			42.0	97	44.6	110	32.2	104	102
1989	48.0	138	33.3	134	57.1	121	68.9	113	41.9	109	54.3	117	122
1988	36.9	106	43.1	105	43.7	115	46.2	105	30.6	104	38.8	110	108
AVERAGE	42.8	113	41.1	115	50.4	118	52.4	105	39.0	108	41.8	110	111
QUANTUM 549													
1990	47.7	103	43.3	99			44.4	103	44.0	109	32.9	106	104
AVERAGE	47.7	103	43.3	99			44.4	103	44.0	109	32.9	106	104
QUANTUM 555													
1987			51.8	89	59.6	107			39.3	92	35.0	102	98
1986	32.8	93	41.2	95	50.3	108							99
1985	67.7	103	62.8	106	90.3	113	58.7	102	54.5	99	53.1	112	106
1984	59.6	109	47.8	94	75.3	98	56.0	107	53.1	109	44.5	116	106
AVERAGE	53.4	102	50.9	96	68.9	107	57.4	105	49.0	100	44.2	110	102
QUANTUM 562													
1990	46.2	100	45.4	104			44.5	103	43.4	107	33.0	106	104
1989	45.8	131	30.6	123	51.2	108	74.6	122	43.4	113	50.3	108	118
1988	36.4	105	45.1	109	37.9	99	46.6	106	30.1	103	38.5	109	105
1987			62.0	107	58.0	104			42.3	99	35.9	105	104
AVERAGE	42.8	112	45.8	111	49.0	104	55.2	110	39.8	105	39.4	107	108
QUANTUM 568													
1985	68.2	103	56.0	95	81.6	102	59.4	103	56.6	103	47.4	109	103
1984	66.2	121	46.1	91	78.3	100	58.7	112	52.2	107	38.8	101	105
AVERAGE	67.2	112	51.1	93	80.0	101	59.1	108	54.4	105	43.1	105	104

VARIETY/ YEAR	AKRON YIELD	AKRON YIR*	AMHERST YIELD	AMHERST YIR*	ANTON YIELD	ANTON YIR*	BURLINGTON YIELD	BURLINGTON YIR*	CLARKVILLE YIELD	CLARKVILLE YIR*	OVID** YIELD	OVID** YIR*	AVG. %
RAM													
1986	34.8	99	44.3	102	43.2	93							98
1985	68.4	104	65.4	111	89.1	111	58.6	102	62.6	114	40.8	94	106
1984	59.8	110	45.4	89	83.9	109	52.3	99	48.5	99	41.1	107	102
1983	41.3	118	57.5	99	59.7	100	49.7	104	46.9	88	48.9	95	101
AVERAGE	51.1	108	53.2	100	69.0	103	53.5	102	52.7	100	43.6	99	102
RODEO													
1986	29.5	84	41.8	96	46.5	100							93
1985	67.2	102	63.3	107	85.2	107	62.2	108	53.2	97	43.2	99	103
AVERAGE	48.4	93	52.6	102	65.9	104	62.2	108	53.2	97	43.2	99	98
SANDY													
1990	43.4	94	43.5	100			40.4	94	41.5	103	25.8	83	95
1989	36.1	103	25.4	102	52.2	111	64.9	106	41.9	109	52.1	112	107
1988	34.5	99	37.3	91	32.4	85	39.4	90	29.8	102	30.8	87	92
1987			55.1	95	48.1	86			46.9	110	37.5	109	100
1986	34.7	99	46.9	108	47.6	103							103
1985	60.4	92	54.0	92	80.6	101	55.5	96	51.5	94	41.6	95	95
1984	61.9	113	48.4	95	75.9	98	51.0	97	53.2	109	40.0	104	103
1983	29.2	83	50.7	87	51.3	86	38.8	81	51.9	97	45.1	87	87
1982	47.2	99	38.2	109	60.5	109	68.4	108	30.8	127	58.5	95	108
1981			29.1	92	60.9	101	35.0	117			24.5	85	99
1980			43.0	101			28.6	96					99
AVERAGE	43.4	98	42.9	97	56.6	98	46.9	98	43.4	106	39.5	95	99
SCOUT 66													
1990	42.5	92	43.8	100			45.9	106	37.9	94	26.3	85	95
1989	33.7	97	21.8	88	49.2	104	57.9	95	35.4	92	41.4	89	94
1988	33.3	96	42.2	102	37.4	98	46.4	106	29.5	101	39.3	111	102
1987			50.2	87	47.5	85			38.8	91	33.8	99	91
1986	37.1	105	42.8	99	42.2	91							98
1985	60.9	92	52.1	88	72.1	90	51.8	90	56.9	103	41.1	95	93
1984	51.5	94	49.6	98	75.0	97	53.3	102	48.6	99	39.6	103	99
1983	25.9	74	57.6	99	58.0	97	41.6	87	47.4	89	51.2	99	91
1981			25.2	79	52.8	87	23.0	77			19.5	67	78
1980			42.8	100			28.7	96					98
1979			43.0	103			37.0	101			52.0	92	99
AVERAGE	40.7	93	42.8	95	54.3	94	42.8	96	42.1	96	38.2	93	94
SIOUXLAND													
1990	39.0	84	40.7	93			43.5	101	38.2	95	28.9	93	93
1989	36.0	103	27.4	110	50.8	108	63.0	103	35.6	92	49.5	107	104
1988	38.0	110	41.3	100	39.6	104	42.8	98	29.9	102	40.2	114	105
1987			51.6	89	48.5	87			38.5	90	35.5	103	92
1986	32.7	93	42.2	97	49.6	107							99
1985	59.9	91	59.3	101	78.7	98	50.9	88	49.4	90	49.0	112	97
1984	47.1	86	54.2	107	83.7	108	49.6	94	52.3	107	40.0	104	101
AVERAGE	42.1	95	45.2	100	58.5	102	50.0	97	40.7	96	40.5	105	99
TAM 105													
1985	68.6	104	59.4	101	83.0	104	57.2	99	59.7	109	43.6	100	103
1984	57.6	105	51.8	102	78.7	102	57.6	110	54.3	111	40.4	105	106
1983	29.6	85	60.4	104	67.2	112	59.3	124	52.7	99	48.6	94	103
1982	55.7	117	38.8	111	58.8	106	72.4	115	30.9	128	68.1	111	115
1981			38.9	122	60.4	99	31.0	103			37.8	131	114
1980			44.2	104			36.3	122					113
AVERAGE	52.9	103	48.9	107	69.6	105	52.3	112	49.4	112	47.7	108	109

VARIETY/ YEAR	AKRON YIELD	AKRON YIR***	AMHERST YIELD	AMHERST YIR***	ANTON YIELD	ANTON YIR***	BURLINGTON YIELD	BURLINGTON YIR***	CLARKVILLE YIELD	CLARKVILLE YIR***	OVID** YIELD	OVID** YIR***	AVG. %
TAM 107													
1990	52.1	113	49.4	113			45.3	105	46.8	116	37.9	122	114
1989	36.1	103	27.5	111	53.7	114	66.7	109	38.8	101	45.8	99	106
1988	41.3	119	48.6	118	43.9	115	49.3	113	31.5	108	34.6	98	112
1987			67.3	116	62.3	112			49.4	115	44.0	128	118
1986	36.0	102	48.6	112	51.7	111							108
1985	65.7	99	66.8	113	79.9	99	62.1	108	61.4	112	43.8	100	105
1984	56.9	104	56.9	112	81.5	106	56.8	108	58.7	120	39.2	102	109
AVERAGE	48.0	107	52.2	114	62.2	109	56.0	109	47.8	112	40.9	108	110
TAM 108													
1985	71.1	108	64.4	109	91.0	114	57.6	100	64.8	118	43.3	99	108
1984	62.0	114	61.3	121	81.5	106	55.7	106	57.6	118	37.3	97	110
AVERAGE	66.6	111	62.9	115	86.3	110	56.7	103	61.2	118	40.3	98	109
TAM 200													
1990	52.3	113	49.5	114			59.6	138	43.3	107	34.6	112	117
1989	38.1	109	24.1	97	49.5	105	69.9	114	43.6	113	48.5	105	107
1988	37.1	107	45.0	109	39.3	103	46.0	105	28.3	97	35.4	100	104
1987			61.3	106	60.6	109			45.5	106	34.5	101	106
AVERAGE	42.5	110	45.0	107	49.8	106	58.5	119	40.2	106	38.3	104	108
VONA													
1990	52.6	114	44.7	103			44.5	103	45.8	113	35.6	115	110
1989	33.9	97	25.0	101	47.1	100	62.3	102	40.3	105	47.8	103	101
1988	33.5	97	42.3	103	34.4	90	42.0	96	32.0	109	30.6	87	97
1987			59.0	102	62.1	111			49.7	116	35.3	103	108
1986	43.1	122	46.2	106	53.5	115							114
1985	71.0	108	58.3	99	79.6	99	60.0	104	58.0	105	42.3	97	102
1984	58.3	107	48.2	95	66.4	86	50.9	97	48.3	99	29.8	78	94
1983	40.0	114	62.9	108	67.8	113	54.3	113	58.7	110	55.3	107	111
1982	53.6	112	33.5	96	59.6	107	69.7	110	28.2	117	68.9	112	109
1981			35.5	112	67.7	112	32.0	107			35.3	122	113
1980			45.5	107			37.3	125					116
1979			42.0	100			37.0	101			57.0	101	101
AVERAGE	48.3	109	45.3	103	59.8	104	49.0	106	45.1	109	43.8	103	106
WICHITA													
1990	30.3	66	40.2	92			36.8	85	36.6	91	33.7	109	89
1989	29.5	85	19.7	79	38.0	81	48.6	79	36.4	95	34.0	73	82
1988	27.7	80	38.9	94	35.1	92	40.2	92	28.4	97	37.3	106	94
1987			42.2	73	42.0	75			36.9	86	20.4	59	73
1986	24.3	69	36.2	83	38.5	83							78
1985	45.8	69	40.0	68	58.5	73	42.7	74	43.2	79	35.4	81	74
1984	44.3	81	44.7	88	72.4	94	45.9	87	44.3	91	35.1	92	89
1983	27.1	77	38.9	67	50.1	84	39.4	82	39.1	73	46.5	90	79
1982	40.7	85	30.9	88	50.4	90	50.1	79	19.8	82	50.9	83	85
1981			25.4	80	44.5	74	20.0	67			22.8	79	75
1980			40.0	94			25.3	85					90
1979			40.0	96			33.0	90			53.0	94	93
AVERAGE	33.7	76	36.4	84	47.7	83	38.2	82	35.6	87	36.9	87	83

* Yield is bushels per acre:% indicates relation to the average of all varieties tested in each test plot site.

** Ovid data for 1989.Years prior to 1989 reflect data from Julesburg test plot sites.

*** Yield Index Ratio provides an equitable method of comparing the yielding ability of varieties at all locations for all years tested. It is obtained by dividing the yield of a variety by the average yield of all varieties in the test for that year. A YIR of 100 percent is average and should be used for comparison. For more detailed information, contact your Extension Agent or Jim Echols, Extension Agronomist, Colorado State University, Ft. Collins, CO 80523 (303) 491-6201.

SUMMARY OF WINTER WHEAT VARIETIES TESTED FROM 1979-1990 AT IRRIGATED SITES IN EASTERN COLORADO*

VARIETY/ YEAR	BURLINGTON YIELD	BURLINGTON YIR***	FT. COLLINS YIELD	FT. COLLINS YIR***	PAOLI YIELD	PAOLI YIR***	ROCKY FORD YIELD	ROCKY FORD YIR***	WALSH YIELD	WALSH YIR***	VERNON** YIELD	VERNON** YIR***	AVG. %
AGRIPRO ABILENE													
1990	61.4	96					92.1	98	57.4	90	60.7	89	93
1989	122.7	113	87.1	92	72.9	105	51.5	93			58.2	104	102
1988	81.2	103			44.7	100	91.3	101	27.2	94	47.5	101	100
1987	85.0	107	119.4	93	65.5	102			70.1	110	63.8	107	104
AVERAGE	87.6	105	103.3	93	61.0	102	78.3	97	51.6	98	57.6	100	100
AGRIPRO HAWK													
1990	58.2	91					94.9	101	65.3	103	73.8	108	101
1989	109.4	101	101.9	108	69.9	101	54.8	99			57.5	103	102
1988	69.1	87			32.5	73	86.3	96	28.3	98	44.4	94	90
1987	62.2	78	135.1	106	58.6	92			67.5	106	51.1	86	94
1986	57.0	93	90.4	100	64.3	106	91.1	108			68.3	105	102
1985	87.7	99	116.6	107			118.9	106	70.0	99			103
1984	77.8	115	111.0	116	60.7	107	114.0	104	115.1	101			109
1983			118.0	106			112.0	99	56.1	104			103
1982	86.3	107					101.4	105					106
1981			104.0	111			74.0	123	81.0	119			118
AVERAGE	76.0	96	111.0	108	57.2	96	94.2	105	69.0	104	59.0	99	103
AGRIPRO MESA													
1990	83.4	130					71.8	76	62.2	98	51.6	76	95
1989	112.1	103	66.9	71	63.3	92	45.7	82			48.5	87	87
1988	90.0	114			48.4	109	81.3	90	35.8	123	50.3	107	109
1987	107.7	135	114.1	89	74.8	117			55.9	88	69.6	117	109
AVERAGE	98.3	121	90.5	80	62.2	106	66.3	83	51.3	103	55.0	97	100
AGRIPRO MUSTANG													
1986	58.8	96	83.5	92	62.9	103	84.2	100			62.9	97	98
1985	89.5	102	95.8	88			115.4	103	77.8	110			101
1984	74.2	109	76.8	80	55.1	97	111.6	102	121.7	107			99
1983			109.9	99			117.5	104	52.4	97			100
AVERAGE	74.2	102	91.5	90	59.0	100	107.2	102	84.0	105	62.9	97	99
AGRIPRO SIERRA													
1990	80.5	126					90.2	96	74.5	117	70.4	103	111
AVERAGE	80.5	126					90.2	96	74.5	117	70.4	103	111
AGRIPRO VICTORY													
1990	78.8	123					76.8	82	53.4	84	62.0	91	95
1989	100.9	93	87.0	92	65.1	94	47.8	86			53.4	95	92
1988	87.1	110			56.4	126	85.7	95	28.0	97	52.9	112	108
1987	73.7	93	117.1	91	61.0	95			55.8	88	63.3	106	95
1986	62.0	102	84.0	93	61.6	101	79.3	94			57.5	89	96
1985	92.4	105	100.5	92			117.0	104	71.2	100			100
AVERAGE	82.5	104	97.2	92	61.0	104	81.3	92	52.1	92	57.8	99	98
ARAPAHOE													
1988	73.8	93			42.7	96	86.2	96	34.5	119	48.2	102	101
AVERAGE	73.8	93			42.7	96	86.2	96	34.5	119	48.2	102	101
CARSON													
1988	66.7	84			34.2	77	83.7	93	25.0	86	43.0	91	86
1987	73.1	92	127.6	100	59.4	93			59.9	94	49.4	83	92
1986	54.8	90	91.8	102	57.9	95	83.5	99			58.1	90	95
AVERAGE	64.9	89	109.7	101	50.5	88	83.6	96	42.5	90	50.2	88	91

VARIETY/ YEAR	BURLINGTON YIELD	BURLINGTON YIR***	FT. COLLINS YIELD	FT. COLLINS YIR***	PAOLI YIELD	PAOLI YIR***	ROCKY FORD YIELD	ROCKY FORD YIR***	WALSH YIELD	WALSH YIR***	VERNON** YIELD	VERNON** YIR***	AVG. %
CENTURY													
1990	56.9	89					87.6	93	58.4	92	64.4	94	92
1989	104.9	97	85.2	90	69.5	101	57.5	104			60.3	108	100
1988	78.7	99			36.9	83	89.5	99	33.6	116	46.3	98	99
1987	90.3	113	132.7	104	73.1	114			69.5	109	65.8	111	110
AVERAGE	82.7	99	109.0	97	59.8	99	78.2	99	53.8	106	59.2	103	100
CHISHOLM													
1986	58.5	96	91.3	101	50.4	83	89.2	105			65.5	101	97
1985	81.6	93	95.3	87			110.6	99	66.2	93			93
1984	61.7	91	82.8	86	56.4	99	101.5	93	112.9	99			94
1983			115.3	104			109.5	98	51.3	95			99
AVERAGE	67.3	93	96.2	95	53.4	91	102.7	99	76.8	96	65.5	101	96
COLT													
1986	57.6	94	91.1	101	59.5	98	88.6	105			64.6	100	100
1985	77.9	89	111.7	102			112.4	100	69.1	97			97
1984	70.7	104	88.5	92	65.6	116	106.0	97	109.8	97			101
1983			112.4	101			118.4	105	56.8	105			104
AVERAGE	68.7	96	100.9	99	62.6	107	106.4	102	78.6	100	64.6	100	100
NEWTON													
1989	108.1	100	99.0	105	61.8	89	59.7	108			56.4	101	100
1988	80.2	101			45.1	101	87.6	97	27.4	94	46.3	98	98
1987	68.3	86	121.1	95	55.7	87			70.6	111	57.1	96	95
1986	57.0	93	92.2	102	60.5	99	88.0	104			65.7	101	100
1985	84.9	97	119.8	110			110.3	98	68.1	96			100
1984	72.1	106	98.7	103	55.0	97	105.9	97	113.7	100			101
1983			112.3	101			114.3	101	52.6	97			100
1982	76.9	96					100.0	104					100
1981			96.0	102			56.0	93	70.0	103			99
1980			74.7	106			77.9	115	77.0	108			110
1979			94.5	133			91.5	111					122
AVERAGE	8.2	97	100.9	106	55.6	95	89.1	103	68.5	101	56.4	99	102
QUANTUM 555													
1986	63.5	104	88.3	98	52.4	86	85.1	101			57.9	89	96
1985	86.7	99	118.0	108			110.8	99	67.5	95			100
1984	71.6	106	115.1	120	53.6	95	114.7	105	108.8	96			104
AVERAGE	73.9	103	107.1	109	53.0	91	103.5	102	88.2	96	57.9	89	100
QUANTUM 562													
1990	51.5	80					98.0	104	70.3	111	70.4	103	100
AVERAGE	51.5	80					98.0	104	70.3	111	70.4	103	100
QUANTUM 578													
1990	68.7	107					90.9	97	61.1	96	75.9	111	103
1989	110.9	102	87.7	93	72.5	105	50.6	91			58.6	105	99
1988	75.3	95			38.9	87	85.7	95	31.2	108	46.6	99	97
AVERAGE	85.0	101	87.7	93	55.7	96	75.7	94	46.2	102	60.4	105	100
QUANTUM 588													
1988	79.2	100			50.0	112	90.2	100	27.8	96	50.7	108	103
1987	88.5	111	131.7	103	57.9	90			71.2	112	55.7	94	102
1986	62.4	102	86.1	95	48.0	79	95.5	113			62.9	97	97
1985	93.4	106	112.2	103			120.6	107	68.3	96			103
1984	47.9	71	100.1	104	57.1	101	111.1	102	116.3	102			96
AVERAGE	4.3	98	107.5	101	53.3	96	104.4	106	70.9	102	56.4	100	100

VARIETY/ YEAR	BURLINGTON YIELD	BURLINGTON YIR****	FT. COLLINS YIELD	FT. COLLINS YIR****	PAOLI YIELD	PAOLI YIR****	ROCKY FORD YIELD	ROCKY FORD YIR****	WALSH YIELD	WALSH YIR****	VERNON** YIELD	VERNON** YIR****	AVG. %
QUANTUM 589													
1990	75.0	117					94.1	100	61.0	96	68.9	101	104
AVERAGE	75.0	117					94.1	100	61.0	96	68.9	101	104
RODEO													
1986	59.6	98	92.1	102	66.1	109	81.1	96			57.4	89	99
1985	79.9	91	107.3	98			106.6	95	70.1	99			96
1984	67.4	99	98.5	103	58.9	104	109.0	99	110.6	97			100
AVERAGE	69.0	96	99.3	101	62.5	107	98.9	97	90.4	98	57.4	89	98
TAM 105													
1985	85.3	97	100.1	92			111.4	99	71.6	101			97
1984	75.4	111	95.5	99	56.0	99	110.6	101	119.1	105			103
1983			115.8	105			116.2	103	51.1	94			101
1982	94.7	118					106.0	110					114
1981			99.0	105			64.0	107	75.0	110			107
1980			61.5	87			89.2	131	74.6	105			108
AVERAGE	85.1	109	94.4	98	56.0	99	99.6	109	78.3	103			105
TAM 107													
1990	70.1	109					92.9	99	58.4	92	61.1	89	97
1989	104.1	96	97.3	103	73.2	106	68.1	123			51.9	93	104
1988	81.2	103			43.8	98	100.7	112	35.0	121	50.2	107	108
1987	77.3	97	124.6	97	66.9	105			70.5	111	64.7	109	104
1986	62.2	102	86.9	96	67.3	111	85.4	101			74.6	115	105
1985	76.8	87	105.1	96			108.1	96	66.7	94			93
AVERAGE	78.6	99	103.5	98	62.8	105	91.0	106	57.7	105	60.5	103	102
TAM 108													
1985	88.8	101	122.1	112			105.3	94	73.1	103			103
AVERAGE	88.8	101	122.1	112			105.3	94	73.1	103			103
TAM 200													
1990	74.2	116					99.4	106	68.3	107	75.8	111	110
1989	114.9	106	104.2	110	76.3	110	70.4	127			60.8	109	112
1988	88.1	111			43.3	97	101.9	113	37.6	130	46.6	99	110
1987	97.6	123	133.7	104	73.5	115			69.3	109	67.9	114	113
AVERAGE	93.7	114	119.0	107	64.4	107	90.6	115	58.4	115	62.8	108	111
VONA													
1990	61.8	96					98.6	105	67.9	107	62.4	91	100
1989	101.7	94	102.0	108	74.8	108	55.8	101			52.8	94	101
1988	78.9	100			44.3	99	86.7	96	26.5	91	46.6	99	97
1987	74.9	94	135.1	106	59.0	92			71.1	112	55.1	93	99
1986	61.9	101	79.8	88	60.4	99	87.0	103			67.1	104	99
1985	80.3	91	105.7	97			110.6	99	69.9	98			96
1984	73.2	108	94.2	98	50.6	89	100.6	92	117.1	103			98
1983			111.5	101			113.6	101	62.7	116			106
1982	86.2	107					110.5	115					111
1981			105.0	112			64.0	107	80.0	118			112
1980			76.5	108			89.2	131	75.5	106			115
1979			95.0	134			97.2	118					126
AVERAGE	77.4	99	100.5	106	57.8	97	92.2	106	71.3	106	56.8	96	105

* Yield is bushels per acre. % indicates relation to the average of all varieties tested in each site.

** Vernon data for 1988. Preceeding years' data from Wray site.

*** Paoli data for 1989, Preceeding year data from Holyoke site.

**** Yield Index Ratio provides an equitable method of comparing the yielding ability of varieties at all locations for all years tested. It is obtained by dividing the yield of a variety by the average yield of all varieties in the test for that year. A YIR of 100 percent is average and should be used for comparison. For more detailed information, contact your Extension Agent or Jim Echols, Extension Agronomist, Colorado State University, Ft. Collins, CO 80523 (303) 491-6201.

1990 COLORADO COMMERCIAL CORN GRAIN VARIETY TRIAL, YUMA

SEEDING DATE: MAY 2 HARVEST DATE: OCT 30

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac.	Plant Ht.-In.	Test Weight	Pct. Lodge	Pct. E Drop
ORO EXP 803	220.0	21.1	24.4	93.	55.0	0.0	0.0
PIONEER 3578	198.1	15.8	26.1	94.	56.5	0.3	0.0
DEKALB-PLANT DK535	197.2	16.3	25.0	88.	55.1	0.0	0.0
GREAT LAKES GL 582	197.1	20.0	25.8	89.	53.6	0.0	0.0
PIONEER 3417	195.5	18.2	26.7	83.	55.9	0.0	0.0
AGRIGENE AG4500	194.0	16.8	26.1	84.	56.6	0.3	0.0
JACQUES 6770	193.4	17.2	25.2	85.	55.2	0.0	0.0
GOLDEN ACRES T-E7016	193.2	18.6	27.4	89.	55.8	0.3	0.3
PIONEER 3475	191.5	16.9	26.0	81.	56.9	0.3	0.3
CARGILL SX269	191.5	17.9	26.6	92.	54.5	0.6	0.0
SUPER CROST 4386	190.6	19.6	26.7	83.	55.6	0.8	0.6
FUNK'S G-BRAND 4385	190.4	18.4	26.8	92.	55.1	0.0	0.3
HORIZON 9111	189.4	20.8	26.5	76.	54.3	0.5	0.3
ASGROW RX626	189.0	16.8	26.1	87.	56.2	0.0	0.6
FONTANELLE 4230	188.7	18.7	28.3	89.	55.8	0.2	0.0
MC CURDY 4925	188.4	17.7	27.1	82.	55.8	0.3	0.3
ORO 083	188.4	16.5	25.9	82.	56.2	0.0	0.0
HOEGEMEYER 2632	188.4	19.8	26.8	76.	55.7	2.9	0.3
FUNK'S G-BRAND 4393	187.9	17.5	25.9	88.	56.1	0.6	0.0
GREAT LAKES GL 595	187.8	20.9	26.9	86.	54.1	0.0	0.0
FUNK'S G-BRAND 4450	186.9	21.2	26.9	89.	52.5	0.3	0.0
SUPER CROST 3130	186.9	17.0	27.3	84.	55.5	0.0	0.0
GRAND VALLEY SX130	186.8	19.0	24.9	81.	55.1	0.3	0.3
ASGROW RX469	185.5	15.4	26.1	82.	57.8	0.6	0.0
NORTHRUP KING N 6330	184.6	20.7	27.4	88.	53.5	0.0	0.0
GRAND VALLEY SX131	184.3	19.2	26.5	91.	56.6	0.3	0.0
TRIUMPH 1270	183.8	21.4	26.2	88.	52.8	0.4	0.0
HOEGEMEYER EXPO-DO5	183.4	15.8	26.2	80.	57.2	0.3	0.6
JACQUES 7770	183.2	20.5	24.7	79.	55.2	0.9	0.3
FUNK'S G-BRAND 4472	182.5	22.5	26.2	87.	53.6	0.5	0.0
DEKALB-PLANT DK572	182.3	19.5	26.2	86.	55.8	0.3	0.4
PIONEER 3714	181.9	15.0	25.8	86.	57.9	0.3	0.3
FUNK'S G-BRAND 4485	181.7	20.5	26.2	82.	53.2	0.0	0.0
GREAT LAKES GL 566	181.0	15.9	27.0	87.	57.1	0.5	0.5
DEKALB-PLANT DK547	180.9	17.9	25.3	88.	55.5	0.6	0.5
HORIZON 4111	180.8	20.1	26.2	89.	54.1	0.0	0.0
CARGILL 3427	180.6	13.7	27.7	84.	55.3	0.0	0.0
ASGROW RX706	178.8	22.4	27.8	93.	52.0	0.0	0.0
HORIZON 9107	178.7	17.7	25.7	76.	58.2	0.3	0.3
MC CURDY 6660	178.6	20.5	26.4	82.	54.2	0.3	0.3

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac.	Plant Ht.-In.	Test Weight	Pct. Lodge	Pct. E Drop
GRAND VALLEY SX1222	178.1	15.1	25.5	80.	58.0	0.0	0.0
ORO 100	177.9	20.3	26.2	90.	54.8	0.3	0.3
CARGILL 4327	177.7	15.5	25.1	92.	56.8	0.3	0.3
HOEGEMEYER 2617	177.2	16.9	24.6	82.	56.0	0.3	0.3
JACQUES 5700	176.6	16.7	25.4	78.	56.8	0.3	0.3
MC CURDY 6222	176.4	22.1	26.3	91.	53.6	1.9	0.3
FONTANELLE 4435	174.6	22.0	26.2	84.	52.1	0.3	0.0
CARGILL 5157	174.3	15.7	24.6	85.	58.6	0.6	0.3
ORO 002	174.2	15.5	22.8	74.	57.3	0.3	0.0
NORTHRUP KING N 4545	174.2	17.5	25.5	85.	54.5	0.6	0.3
CASTERLINE 1181	173.9	17.2	25.5	83.	56.8	0.3	0.3
GOLDEN ACRES T-E6951	173.8	26.0	23.6	92.	51.7	0.0	0.0
CARGILL 5327	173.3	16.7	26.1	88.	56.3	0.0	0.3
HORIZON 7113	173.3	20.5	24.9	90.	52.5	0.3	0.3
HOEGEMEYER 2628	172.6	21.6	26.7	91.	52.7	0.3	0.0
HORIZON 6101	170.8	16.1	25.2	76.	57.3	0.6	0.0
TRIUMPH TRX 0141	169.9	17.2	25.1	77.	56.1	0.7	0.4
AGRIPRO AP495	169.6	19.8	26.0	88.	52.3	0.0	0.0
NORTHRUP KING N 4350	169.3	15.3	25.7	81.	56.6	0.0	0.0
ORO 120	168.7	26.1	25.5	95.	51.5	0.5	0.5
FONTANELLE 4140	167.4	17.6	26.4	74.	57.9	0.3	0.3
WILSON 1700	165.0	27.2	25.0	94.	51.6	0.5	0.5
SUPER CROST A3051	156.6	22.9	27.0	88.	53.0	0.4	0.4
WILSON DEMAND 110	150.3	21.0	25.3	75.	55.9	2.8	1.2
TRIUMPH 1265	147.6	22.9	24.0	86.	51.4	1.0	0.0
CARGILL 3427	13.7	180.6	27.7	84.	55.3	0.0	0.0
PIONEER 3714	15.0	181.9	25.8	86.	57.9	0.3	0.3
GRAND VALLEY SX1222	15.1	178.1	25.5	80.	58.0	0.0	0.0
NORTHRUP KING N 4350	15.3	169.3	25.7	81.	56.6	0.0	0.0
ASGROW RX469	15.4	185.5	26.1	82.	57.8	0.6	0.0
CARGILL 4327	15.5	177.7	25.1	92.	56.8	0.3	0.3
ORO 002	15.5	174.2	22.8	74.	57.3	0.3	0.0
CARGILL 5157	15.7	174.3	24.6	85.	58.6	0.6	0.3
PIONEER 3578	15.8	198.1	26.1	94.	56.5	0.3	0.0
HOEGEMEYER EXPO-DO5	15.8	183.4	26.2	80.	57.2	0.3	0.6
GREAT LAKES GL 566	15.9	181.0	27.0	87.	57.1	0.5	0.5
HORIZON 6101	16.1	170.8	25.2	76.	57.3	0.6	0.0
DEKALB-PLANT DK535	16.3	197.2	25.0	88.	55.1	0.0	0.0
ORO 083	16.5	188.4	25.9	82.	56.2	0.0	0.0
JACQUES 5700	16.7	176.6	25.4	78.	56.8	0.3	0.3
CARGILL 5327	16.7	173.3	26.1	88.	56.3	0.0	0.3
AGRIGENE AG4500	16.8	194.0	26.1	84.	56.6	0.3	0.0
ASGROW RX626	16.8	189.0	26.1	87.	56.2	0.0	0.6
PIONEER 3475	16.9	191.5	26.0	81.	56.9	0.3	0.3
HOEGEMEYER 2617	16.9	177.2	24.6	82.	56.0	0.3	0.3

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac.	Plant Ht.-In.	Test Weight	Pct. Lodge	Pct. E Drop
SUPER CROST 3130	17.0	186.9	27.3	84.	55.5	0.0	0.0
CASTERLINE 1181	17.2	173.9	25.5	83.	56.8	0.3	0.3
JACQUES 6770	17.2	193.4	25.2	85.	55.2	0.0	0.0
TRIUMPH TRX 0141	17.2	169.9	25.1	77.	56.1	0.7	0.4
FUNK'S G-BRAND 4393	17.5	187.9	25.9	88.	56.1	0.6	0.0
NORTHRUP KING N 4545	17.5	174.2	25.5	85.	54.5	0.6	0.3
FONTANELLE 4140	17.6	167.4	26.4	74.	57.9	0.3	0.3
MC CURDY 4925	17.7	188.4	27.1	82.	55.8	0.3	0.3
HORIZON 9107	17.7	178.7	25.7	76.	58.2	0.3	0.3
CARGILL SX269	17.9	191.5	26.6	92.	54.5	0.6	0.0
DEKALB-PLANT DK547	17.9	180.9	25.3	88.	55.5	0.6	0.5
PIONEER 3417	18.2	195.5	26.7	83.	55.9	0.0	0.0
FUNK'S G-BRAND 4385	18.4	190.4	26.8	92.	55.1	0.0	0.3
GOLDEN ACRES T-E7016	18.6	193.2	27.4	89.	55.8	0.3	0.3
GRAND VALLEY SX130	19.0	186.8	24.9	81.	55.1	0.3	0.3
GRAND VALLEY SX131	19.2	184.3	26.5	91.	56.6	0.3	0.0
DEKALB-PLANT DK572	19.5	182.3	26.2	86.	55.8	0.3	0.4
SUPER CROST 4386	19.6	190.6	26.7	83.	55.6	0.8	0.6
HOEGEMEYER 2632	19.8	188.4	26.8	76.	55.7	2.9	0.3
AGRIPRO AP495	19.8	169.6	26.0	88.	52.3	0.0	0.0
GREAT LAKES GL 582	20.0	197.1	25.8	89.	53.6	0.0	0.0
HORIZON 4111	20.1	180.8	26.2	89.	54.1	0.0	0.0
ORO 100	20.3	177.9	26.2	90.	54.8	0.3	0.3
HORIZON 7113	20.5	173.3	24.9	90.	52.5	0.3	0.3
FUNK'S G-BRAND 4485	20.5	181.7	26.2	82.	53.2	0.0	0.0
MC CURDY 6660	20.5	178.6	26.4	82.	54.2	0.3	0.3
JACQUES 7770	20.5	183.2	24.7	79.	55.2	0.9	0.3
NORTHRUP KING N 6330	20.7	184.6	27.4	88.	53.5	0.0	0.0
HORIZON 9111	20.8	189.4	26.5	76.	54.3	0.5	0.3
GREAT LAKES GL 595	20.9	187.8	26.9	86.	54.1	0.0	0.0
WILSON DEMAND 110	21.0	150.3	25.3	75.	55.9	2.8	1.2
ORO EXP 803	21.1	220.0	24.4	93.	55.0	0.0	0.0
FUNK'S G-BRAND 4450	21.2	186.9	26.9	89.	52.5	0.3	0.0
TRIUMPH 1270	21.4	183.8	26.2	88.	52.8	0.4	0.0
HOEGEMEYER 2628	21.6	172.6	26.7	91.	52.7	0.3	0.0
FONTANELLE 4435	22.0	174.6	26.2	84.	52.1	0.3	0.0
MC CURDY 6222	22.1	176.4	26.3	91.	53.6	1.9	0.3
ASGROW RX706	22.4	178.8	27.8	93.	52.0	0.0	0.0
FUNK'S G-BRAND 4472	22.5	182.5	26.2	87.	53.6	0.5	0.0
TRIUMPH 1265	22.9	147.6	24.0	86.	51.4	1.0	0.0
SUPER CROST A3051	22.9	156.6	27.0	88.	53.0	0.4	0.4
GOLDEN ACRES T-E6951	26.0	173.8	23.6	92.	51.7	0.0	0.0
ORO 120	26.1	168.7	25.5	95.	51.5	0.5	0.5
WILSON 1700	27.2	165.0	25.0	94.	51.6	0.5	0.5
GRAND COLUMN MEAN	18.9	181.2	26.0	85.	55.2	0.4	0.2

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YEILD BU/AC	181.19	8.781	2.0605	22.05

* Some wind damage occurred soon after emergence.The windstorm was followed by very cold, wet weather.

SUMMARY OF CORN GRAIN VARIETY PERFORMANCE TEST
YUMA, CO - 1988-90

BRAND	VARIETY	YIELD			% AVERAGE TEST				
		1990	1989	1988	1990	1989	1988	2-YR	3-YR
AGRIPRO	AP364	—	163	195	—	97	99	98	—
AGRIPRO	680	—	177	202	—	105	102	104	—
ASGROW/O'S GOLD	RX626	189	169	186	104	101	94	—	100
ASGROW/O'S GOLD	RX746	—	169	202	—	101	102	102	—
CARGILL	4327	178	176	—	98	105	—	102	—
CARGILL	5157	174	177	190	96	105	96	—	99
CARGILL	6227	—	171	203	—	102	103	103	—
DEKALB/PLANT	DK547	181	166	—	100	99	—	100	—
DEKALB/PLANT	DK572	182	159	—	101	95	—	98	—
FONTANELLE	4230	189	169	—	104	101	—	103	—
FONTANELLE	4280	—	160	203	—	95	103	99	—
FONTANELLE	4435	175	170	205	97	101	104	—	101
FUNK'S	G-brand4385	190	171	—	105	102	—	104	—
FUNK'S	G-brand4393	188	174	—	104	104	—	104	—
FUNK'S	G-brand4485	182	170	—	101	101	—	101	—
FUNK'S	G-brand4513	—	171	212	—	102	107	105	—
GOLDEN ACRES	TE6951	174	175	208	96	104	105	—	102
GOLDEN ACRES	TE6988	—	174	189	—	104	96	100	—
GOLDEN ACRES	TE7016	193	158	204	107	94	103	—	101
GRAND VALLEY	SX130	187	178	206	103	106	104	—	104
GRAND VALLEY	SX131	184	165	213	102	98	108	—	103
GRAND VALLEY	SX1222	178	167	202	98	99	102	—	100
GREAT LAKES	GL582	197	—	206	109	—	104	107	—
HORIZON	4111	181	179	208	100	107	105	—	104
HORIZON	7113	173	173	197	96	103	100	—	100
HORIZON	7115	—	176	206	—	105	104	105	—
JACQUES	5700	177	166	—	98	99	—	99	—
JACQUES	6770	193	178	—	107	106	—	107	—
JACQUES	7770	183	—	186	101	—	94	98	—
MC CURDY	4925	188	167	198	104	99	100	—	101
MC CURDY	5750	—	175	213	—	104	108	106	—
MC CURDY	6222	176	176	—	97	105	—	101	—
MC CURDY	6660	179	183	204	99	109	103	—	104
NORTHRUP KING	N4350	—	169	165	—	101	83	92	—
NORTHRUP KING	N4545	174	165	198	96	98	100	—	98
NORTHRUP KING	S5340	—	169	204	—	101	103	102	—
ORO HYBRIDS	100	178	166	197	98	99	100	—	99
ORO HYBRIDS	120	169	179	—	93	107	—	100	—
ORO HYBRIDS	EXP803	220	181	—	122	108	—	115	—
ORO HYBRIDS	ORO 002	174	154	—	96	92	—	94	
PIONEER	3475	192	181	206	106	108	104	—	106
PIONEER	3578	198	169	—	109	101	—	105	—
PIONEER	3714	—	182	164	—	108	83	96	—
S-BRAND	SS-62A	—	165	210	—	98	106	102	—
SUPER CROST	4386	191	172	208	106	102	105	—	104
SUPER CROST	3130	187	169	—	103	101	—	102	—
TRIUMPH	1040	—	162	200	—	96	101	99	—
TRIUMPH	1270	184	181	195	102	108	99	—	103
TRIUMPH	9640	—	157	202	—	94	102	98	—
WILSON	1700	165	170	202	91	101	102	—	98
AVERAGE LISTED VARIETIES		184	171	200					
AVERAGE VARIETIES IN EXPERIMENT		181	168	198					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS.COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO COMMERCIAL CORN GRAIN VARIETY PERFORMANCE TEST, BURLINGTON

SEEDING DATE: MAY 11 HARVEST DATE: OCT 16

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
PIONEER 3417	199.6	22.7	27.	76.	54.	0.	0.
FUNK'S G-BRAND 4450	196.7	23.9	27.	80.	52.	1.	0.
MC CURDY 6222	192.4	23.3	27.	80.	53.	1.	0.
MC CURDY 6660	191.6	24.1	27.	73.	53.	1.	0.
NORTHRUP KING N 6560	189.9	25.1	28.	73.	53.	1.	0.
GERMAIN'S GC 86040	189.1	26.7	28.	83.	53.	1.	0.
GERMAIN'S GC 5247	189.0	25.0	29.	82.	53.	1.	0.
GRAND VALLEY SX131	184.6	19.0	29.	76.	55.	1.	0.
GERMAIN'S GC 6255	181.6	25.8	26.	79.	53.	1.	0.
GERMAIN'S GC 96007	180.7	28.0	26.	77.	53.	1.	0.
ASGROW RX706	180.5	23.7	29.	80.	52.	0.	0.
TRIUMPH 1270	180.0	22.8	26.	76.	53.	0.	0.
PIONEER 3578	179.7	17.7	26.	73.	55.	0.	0.
NORTHRUP KING N 6330	179.3	24.6	28.	75.	52.	1.	0.
TRIUMPH 1040	178.7	19.5	28.	77.	55.	1.	0.
HORIZON 7115	178.4	25.8	26.	73.	52.	0.	0.
SUPER CROST 5415	177.2	27.9	29.	79.	51.	1.	0.
FUNK'S G-BRAND 4472	177.0	21.4	27.	77.	54.	0.	0.
SUPER CROST A3051	176.1	24.4	26.	78.	53.	1.	0.
HORIZON 9111	174.6	24.2	28.	69.	53.	2.	0.
AGRIPRO AP525	173.5	20.8	28.	76.	54.	0.	0.
NORTHRUP KING N 4545	173.2	19.0	27.	69.	53.	0.	0.
CARGILL 4327	173.0	18.1	28.	76.	55.	0.	0.
DEKALB-PLANT DK636	172.6	24.6	28.	79.	53.	0.	0.
CARGILL 7877	171.3	21.8	27.	83.	53.	2.	0.
CARGILL SX269	171.1	18.4	26.	81.	54.	1.	1.
SUPER CROST 3130	171.0	19.2	28.	69.	54.	0.	0.
CASTERLINE 1191	170.6	18.5	27.	74.	54.	1.	0.
GOLDEN ACRES T-E6951	170.3	25.8	27.	82.	52.	0.	0.
FUNK'S G-BRAND 4385	170.1	18.3	27.	76.	54.	0.	0.
GRAND VALLEY SX130	168.8	19.5	26.	71.	54.	2.	0.
FUNK'S G-BRAND 4393	168.8	18.8	25.	79.	55.	0.	0.
GOLDEN ACRES T-E7016	165.9	17.9	28.	73.	55.	1.	0.
DEKALB-PLANT DK572	164.4	18.0	26.	78.	55.	2.	0.
AGRIGENE AG5500	164.0	18.3	26.	76.	55.	2.	0.
MC CURDY 5222	163.2	19.1	28.	66.	56.	1.	0.
HORIZON 4111	161.3	18.2	27.	76.	55.	0.	0.
CARGILL 3627	160.9	15.6	26.	67.	56.	1.	0.
ASGROW RX626	160.6	20.2	26.	68.	54.	1.	1.
GREAT LAKES GL 509	160.1	15.8	28.	66.	54.	0.	0.

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
ASGROW RX469	160.1	14.7	26.	65.	57.	1.	0.
PIONEER 3475	159.5	15.7	25.	68.	56.	0.	0.
NORTHRUP KING N 4350	158.5	15.7	27.	66.	55.	0.	0.
GREAT LAKES GL 566	156.9	17.3	27.	73.	55.	0.	0.
HORIZON 9107	156.7	18.5	26.	64.	57.	0.	0.
TRIUMPH TRX 0141	153.5	16.2	26.	67.	56.	0.	0.
CARGILL 3427	144.9	13.1	30.	66.	54.	0.	0.
GOLDEN ACRES T-E7010	144.4	16.0	31.	64.	54.	1.	0.
GREAT LAKES GL 446	133.6	13.0	29.	66.	55.	0.	0
GREAT LAKES GL 446	13.0	133.6	29.	66.	55.	0.	0.
CARGILL 3427	13.1	144.9	30.	66.	54.	0.	0.
ASGROW RX469	14.7	160.1	26.	65.	57.	1.	0.
CARGILL 3627	15.6	160.9	26.	67.	56.	1.	0.
PIONEER 3475	15.7	159.5	25.	68.	56.	0.	0.
NORTHRUP KING N 4350	15.7	158.5	27.	66.	55.	0.	0.
GREAT LAKES GL 509	15.8	160.1	28.	66.	54.	0.	0.
GOLDEN ACRES T-E7010	16.0	144.4	31.	64.	54.	1.	0.
TRIUMPH TRX 0141	16.2	153.5	26.	67.	56.	0.	0.
GREAT LAKES GL 566	17.3	156.9	27.	73.	55.	0.	0.
PIONEER 3578	17.7	179.7	26.	73.	55.	0.	0.
GOLDEN ACRES T-E7016	17.9	165.9	28.	73.	55.	1.	0.
DEKALB-PLANT DK572	18.0	164.4	26.	78.	55.	2.	0.
CARGILL 4327	18.1	173.0	28.	76.	55.	0.	0.
HORIZON 4111	18.2	161.3	27.	76.	55.	0.	0.
AGRIGENE AG5500	18.3	164.0	26.	76.	55.	2.	0.
FUNK'S G-BRAND 4385	18.3	170.1	27.	76.	54.	0.	0.
CARGILL SX269	18.4	171.1	26.	81.	54.	1.	1.
CASTERLINE 1191	18.5	170.6	27.	74.	54.	1.	0.
HORIZON 9107	18.5	156.7	26.	64.	57.	0.	0.
FUNK'S G-BRAND 4393	18.8	168.8	25.	79.	55.	0.	0.
NORTHRUP KING N 4545	19.0	173.2	27.	69.	53.	0.	0.
GRAND VALLEY SX131	19.0	184.6	29.	76.	55.	1.	0.
MC CURDY 5222	19.1	163.2	28.	66.	56.	1.	0.
SUPER CROST 3130	19.2	171.0	28.	69.	54.	0.	0.
GRAND VALLEY SX130	19.5	168.8	26.	71.	54.	2.	0.
TRIUMPH 1040	19.5	178.7	28.	77.	55.	1.	0.
ASGROW RX626	20.2	160.6	26.	68.	54.	1.	1.
AGRIPRO AP525	20.8	173.5	28.	76.	54.	0.	0.
FUNK'S G-BRAND 4472	21.4	177.0	27.	77.	54.	0.	0.
CARGILL 7877	21.8	171.3	27.	83.	53.	2.	0.
PIONEER 3417	22.7	199.6	27.	76.	54.	0.	0.
TRIUMPH 1270	22.8	180.0	26.	76.	53.	0.	0.
MC CURDY 6222	23.3	192.4	27.	80.	53.	1.	0.
FUNK'S G-BRAND 4450	23.9	196.7	27.	80.	52.	1.	0.
MC CURDY 6660	24.1	191.6	27.	73.	53.	1.	0.

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
HORIZON 9111	24.2	174.6	28.	69.	53.	2.	0.
SUPER CROST A3051	24.4	176.1	26.	78.	53.	1.	0.
DEKALB-PLANT DK636	24.6	172.6	28.	79.	53.	0.	0.
NORTHRUP KING N 6330	24.6	179.3	28.	75.	52.	1.	0.
GERMAIN'S GC 5247	25.0	189.0	29.	82.	53.	1.	0.
NORTHRUP KING N 6560	25.1	189.9	28.	73.	53.	1.	0.
HORIZON 7115	25.8	178.4	26.	73.	52.	0.	0.
GERMAIN'S GC 6255	25.8	181.6	26.	79.	53.	1.	0.
GOLDEN ACRES T-E6951	25.8	170.3	27.	82.	52.	0.	0.
GERMAIN'S GC 86040	26.7	189.1	28.	83.	53.	1.	0.
SUPER CROST 5415	27.9	177.2	29.	79.	51.	1.	0.
GERMAIN'S GC 96007	28.0	180.7	26.	77.	53.	1.	0.
GRAND COLUMN MEAN	20.4	171.4	27.	74.	54.	1.	0.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD BU/AC	171.42	9.618	2.7069	22.85

SUMMARY OF CORN GRAIN VARIETY PERFORMANCE TEST
BURLINGTON, CO - 1988-90

BRAND	VARIETY	YIELD			% AVERAGE TEST				
		1990	1989	1988	1990	1989	1988	2-YR	3-YR
AGRIPRO	AP525	174	140	167	102	109	104	—	105
AGRIPRO	680	—	123	157	—	95	98	97	—
ASGROW/O'S GOLD	RX626	161	135	173	94	105	108	—	102
CARGILL	4327	173	158	—	101	123	—	112	—
CARGILL	6227	—	126	164	—	98	103	101	—
GOLDEN ACRES	TE6951	170	108	159	99	84	99	—	94
GOLDEN ACRES	TE6988	—	110	151	—	85	94	90	—
GOLDEN ACRES	TE-X7016	166	120	167	97	93	104	—	98
GRAND VALLEY	SX130	169	136	178	99	105	111	—	105
GRAND VALLEY	SX131	185	119	162	108	92	101	—	100
GREAT LAKES	GL509	160	127	—	94	98	—	96	—
FUNK'S	G-brand4385	170	137	—	99	106	—	103	—
FUNK'S	G-brand4393	169	138	—	99	107	—	103	—
FUNK'S	G-brand4513	—	127	148	—	98	93	96	—
FUNK'S	G-brand4543	—	126	147	—	98	92	95	—
HORIZON	4111	161	—	156	94	—	98	96	—
MC CURDY	5222	163	139	—	95	108	—	102	—
MC CURDY	6660	192	114	177	112	88	111	—	104
NORTHRUP KING	N4350	159	141	—	93	109	—	101	—
NORTHRUP KING	N4545	173	148	178	101	115	111	—	109
NORTHRUP KING	N6560	190	120	187	111	93	117	—	107
NORTHRUP KING	S5340	—	146	150	—	113	94	104	—
PAYCO	SX872	—	109	162	—	85	101	93	—
PIONEER	3475	160	139	169	94	108	106	—	103
S-BRAND	SS-54A	—	95	164	—	74	103	89	—
S-BRAND	SS-62A	—	129	163	—	100	102	101	—
S-BRAND	SS-62B	—	128	160	—	99	100	100	—
SUPER CROST	3130	171	146	—	100	113	—	107	—
TRIUMPH	1040	179	154	170	105	119	106	—	110
TRIUMPH	1270	180	133	176	105	103	110	—	106
WILSON	1700	—	99	158	—	77	99	88	—
AVERAGE LISTED VARIETIES		171	129	164					
AVERAGE ALL VARIETIES IN EXPERIMENT		171	129	160					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS. COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO COMMERCIAL DRYLAND CORN GRAIN VARIETY TRIAL, FLEMING

SEEDING DATE: MAY 15 HARVEST DATE: OCT 18

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
DAHLGREN D5088	107.6	15.6	11.5	66.	55.0	0.0	0.6
PIONEER 3733	104.8	13.1	12.2	71.	57.9	0.0	0.5
ORO 083	104.0	15.1	12.5	69.	55.3	0.5	0.6
NORTHRUP KING N 4350	102.6	12.2	11.8	66.	54.2	0.0	1.1
PIONEER 3751	100.5	12.9	11.9	72.	56.1	0.0	1.7
NC+ HYBRIDS X3750	99.0	25.0	11.4	72.	52.4	0.0	0.5
ASGROW RX469	98.9	14.7	12.2	66.	56.1	0.5	0.0
PIONEER 3585	97.0	15.2	12.2	70.	55.8	0.0	0.0
DEKALB-PLANT DK524	96.9	16.3	11.8	74.	56.3	1.7	1.7
PIONEER 3732	95.7	14.0	12.0	71.	54.0	0.0	0.5
FUNK'S G-BRAND 4309	95.7	12.7	11.9	71.	52.0	0.6	1.1
CARGILL EXP37012	95.5	16.9	11.8	72.	55.3	0.0	0.6
CARGILL 4327	95.4	13.7	12.2	75.	54.1	0.6	1.1
HORIZON 6101	95.0	15.5	11.5	65.	56.2	0.0	0.6
GOLDEN ACRES T-E7010	94.9	14.7	12.2	74.	53.0	0.6	1.7
GARRISON SG6101	94.9	15.8	11.8	68.	58.1	0.0	0.0
DEKALB-PLANT DK550	94.8	23.3	12.1	70.	53.7	0.0	0.0
DAHLGREN DE0545	93.8	15.9	12.3	62.	56.9	0.0	0.6
ASGROW RX409	93.7	13.6	11.3	65.	53.5	0.0	2.3
DEKALB-PLANT DK485	93.0	13.9	11.8	69.	53.5	0.0	0.5
MC CURDY 87-21	92.8	14.4	12.5	70.	58.5	0.0	0.6
NC+ HYBRIDS X4275	92.6	17.2	12.5	71.	52.4	0.5	1.2
HOEGEMEYER EXPO-DO5	90.8	16.1	11.9	67.	55.6	0.0	1.1
GOLDEN ACRES T-E7003	90.2	12.7	11.6	66.	57.1	0.0	1.2
DEKALB-PLANT DK535	89.5	14.4	11.9	70.	53.0	1.1	0.6
HORIZON 9107	88.4	15.7	12.0	69.	57.7	0.0	0.0
JACQUES EXP0107	88.0	17.3	11.5	71.	55.1	0.0	0.5
TRIUMPH 1270	86.5	22.5	11.7	70.	51.6	1.1	0.6
CASTERLINE 1171	85.0	19.2	12.9	67.	53.8	4.2	0.0
JACQUES EXP0108	84.4	17.2	10.9	72.	54.0	0.0	0.0
SUPER CROST A3051	83.7	22.2	12.0	76.	52.0	1.7	1.7
GOLDEN ACRES T-E7016	83.6	22.0	12.0	74.	53.3	2.2	0.6
SUPER CROST EXP0109	82.6	20.4	12.0	69.	52.3	0.5	1.1
AGRIPRO EX6490	82.5	28.3	12.4	77.	49.5	0.0	0.0
SINDELAR 516	81.3	25.2	12.5	71.	52.0	0.0	1.7
CASTERLINE 1191	81.2	18.8	12.9	72.	52.9	1.9	1.3
HOEGEMEYER EXP0-D37	80.6	14.1	11.3	61.	54.4	0.0	1.2
DEKALB-PLANT DK572	80.3	23.4	12.5	74.	53.2	0.5	0.5
CARGILL EXP116027	79.1	12.9	11.5	76.	55.7	0.0	0.6
GARRISON SG6909	78.2	23.0	10.8	70.	51.3	0.6	1.2

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
AGRIPRO EX495	77.3	24.3	11.8	71.	51.6	3.3	0.7
SINDELAR X0110	76.6	14.0	11.5	76.	54.1	0.6	2.9
AGRIPRO EX6497	76.3	21.9	10.9	73.	54.1	0.6	0.6
GERMAIN'S GC 96008	74.0	22.5	11.8	74.	50.9	1.1	0.6
CARGILL 3477	72.1	12.1	12.4	64.	56.2	0.0	2.2
GERMAIN'S GC06107	57.4	25.0	11.8	76.	51.8	0.6	0.6
CARGILL 3477	12.1	72.1	12.4	64.	56.2	0.0	2.2
NORTHRUP KING N 4350	12.2	102.6	11.8	66.	54.2	0.0	1.1
FUNK'S G-BRAND 4309	12.7	95.7	11.9	71.	52.0	0.6	1.1
GOLDEN ACRES T-E7003	12.7	90.2	11.6	66.	57.1	0.0	1.2
CARGILL EXP116027	12.9	79.1	11.5	76.	55.7	0.0	0.6
PIONEER 3751	12.9	100.5	11.9	72.	56.1	0.0	1.7
PIONEER 3733	13.1	104.8	12.2	71.	57.9	0.0	0.5
ASGROW RX409	13.6	93.7	11.3	65.	53.5	0.0	2.3
CARGILL 4327	13.7	95.4	12.2	75.	54.1	0.6	1.1
DEKALB-PLANT DK485	13.9	93.0	11.8	69.	53.5	0.0	0.5
PIONEER 3732	14.0	95.7	12.0	71.	54.0	0.0	0.5
SINDELAR X0110	14.0	76.6	11.5	76.	54.1	0.6	2.9
HOEGEMEYER EXP0-D37	14.1	80.6	11.3	61.	54.4	0.0	1.2
MC CURDY 87-21	14.4	92.8	12.5	70.	58.5	0.0	0.6
DEKALB-PLANT DK535	14.4	89.5	11.9	70.	53.0	1.1	0.6
ASGROW RX469	14.7	98.9	12.2	66.	56.1	0.5	0.0
GOLDEN ACRES T-E7010	14.7	94.9	12.2	74.	53.0	0.6	1.7
ORO 083	15.1	104.0	12.5	69.	55.3	0.5	0.6
PIONEER 3585	15.2	97.0	12.2	70.	55.8	0.0	0.0
HORIZON 6101	15.5	95.0	11.5	65.	56.2	0.0	0.6
DAHLGREN D5088	15.6	107.6	11.5	66.	55.0	0.0	0.6
HORIZON 9107	15.7	88.4	12.0	69.	57.7	0.0	0.0
GARRISON SG6101	15.8	94.9	11.8	68.	58.1	0.0	0.0
DAHLGREN DE0545	15.9	93.8	12.3	62.	56.9	0.0	0.6
HOEGEMEYER EXPO-DO5	16.1	90.8	11.9	67.	55.6	0.0	1.1
DEKALB-PLANT DK524	16.3	96.9	11.8	74.	56.3	1.7	1.7
CARGILL EXP37012	16.9	95.5	11.8	72.	55.3	0.0	0.6
JACQUES EXP0108	17.2	84.4	10.9	72.	54.0	0.0	0.0
NC+ HYBRIDS X4275	17.2	92.6	12.5	71.	52.4	0.5	1.2
JACQUES EXP0107	17.3	88.0	11.5	71.	55.1	0.0	0.5
CASTERLINE 1191	18.8	81.2	12.9	72.	52.9	1.9	1.3
CASTERLINE 1171	19.2	85.0	12.9	67.	53.8	4.2	0.0
SUPER CROST EXP0109	20.4	82.6	12.0	69.	52.3	0.5	1.1
AGRIPRO EX6497	21.9	76.3	10.9	73.	54.1	0.6	0.6
GOLDEN ACRES T-E7016	22.0	83.6	12.0	74.	53.3	2.2	0.6
SUPER CROST A3051	22.2	83.7	12.0	76.	52.0	1.7	1.7
GERMAIN'S GC 96008	22.5	74.0	11.8	74.	50.9	1.1	0.6
TRIUMPH 1270	22.5	86.5	11.7	70.	51.6	1.1	0.6
GARRISON SG6909	23.0	78.2	10.8	70.	51.3	0.6	1.2

Variety Name	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
DEKALB-PLANT DK550	23.3	94.8	12.1	70.	53.7	0.0	0.0
DEKALB-PLANT DK572	23.4	80.3	12.5	74.	53.2	0.5	0.5
AGRIPRO EX495	24.3	77.3	11.8	71.	51.6	3.3	0.7
GERMAIN'S GC06107	25.0	57.4	11.8	76.	51.8	0.6	0.6
NC+ HYBRIDS X3750	25.0	99.0	11.4	72.	52.4	0.0	0.5
SINDELAR 516	25.2	81.3	12.5	71.	52.0	0.0	1.7
AGRIPRO EX6490	28.3	82.5	12.4	77.	49.5	0.0	0.0
GRAND COLUMN MEAN	17.5	88.9	11.9	70.	54.2	0.5	0.8

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD BU/AC	88.89	10.756	4.3641	13.25

* Rainfall was greater than average

1990 COLORADO DRYLAND CORN POPULATION STUDY, FLEMING*

SEEDING DATE: MAY 15 HARVEST DATE: OCT 18

Population	Yield Bu./Ac.	Grain Moisture	Plant /Ac	Plant Ht.-In.	Test Weight	Pct. Lodged	Pct. E Drop
16,000 SEEDS/A	97.9	13.0	15.4	65.	53.7	0.0	0.5
14,000 SEEDS/A	90.9	12.9	13.0	62.	53.8	0.0	0.0
12,000 SEEDS/A	84.5	12.9	12.2	67.	53.4	0.0	0.0
8,000 SEEDS/A	79.5	14.0	9.9	62.	54.0	0.0	1.3
10,000 SEEDS/A	76.1	14.3	10.2	67.	54.0	0.0	0.0
GRAND COLUMN MEAN	85.8	13.4	12.1	65.	53.8	0.0	0.4

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD BU/AC	85.78	10.957	3.4834	14.48

* Rainfall was greater than average. The variety was Pioneer 3732.

1990 SMITH-WUDTKE CORN VARIETY TEST PLOT
Glen Wudtke Farm, Idalia, Colorado

The Smith-Wudtke Corn Variety Test Plot was established in 1982 by Jim Smith and Glenn Wudtke. Clyde Richardson, Colorado State University © Golden Plains Area Extension Agent, joined the team in 1987 to aide in harvest computation, tabulation and distribution of data from the test.

Location: 4 1/2 miles west of Idalia Planted: May 8, 1990 with a John Deere, 8 row Max-Emerge Planter over 1 acre strips.

Seeding Rate: 28,400 seeds per acre
Soil Type: Kuma Silt Loan

Early Frost: Light frost September 23. Killing frost Oct. 9.

Irrigation: Center Pivot.

Fertilizer: N - 200 pounds, P205 - 35 pounds, S - 10 pounds

Herbicide: 2 pt. Marksman, 1# Bladex

The Season: Soil temperature was low at planting time. The month of May was cool. June & July were hot. August cool, first part Sept. hot. GDD from May 8 was around 2500.

Tester Variety: Pioneer 3475. The well set between strips 8 & 9.

Harvested: November 14, 1990. The plot was harvested with a John Deere 7720 and a John Deere 8820 combine with eight row headers. All varieties and testers were weighed by a mobile scale set stationary at the unloading site.

Harvest Data: Yields are adjusted to 15.5% moisture and are then adjusted for field variability using the tester variations and averages to adjust the yields of the entered varieties ie:

$$\frac{\text{Overall tester average}}{\text{Tester A and B average}} \times \text{Entered Variety} = \text{Adjusted Field Variability Yield}$$

Net Value Index: Is a percentile comparison of the net value of the individual varieties compared to the average net value of the test plot. $2.03 was the price of corn at the Idalia Co©op Nov. 14, 1990. Drying charges started at 17.1% moisture.

1990 SMITH-WUDTKE CORN VARIETY TEST PLOT
IDALIA, COLORADO

COMPANY	VARIETY	PERCENT MOISTURE	TEST WEIGHT	YIELD	GROSS VALUE @ $2.03	DRYING CHARGE	NET VALUE	NET RETURN INDEX	PLANTS /ACRE	% LODG-ING
PIONEER	3475	15.6	60.0	188.96	$383.58	$0.00	$383.58		27500	2
TRIUMPH	1270	16.9	57.0	204.58	$415.29	$0.00	$415.29	102.1	27400	4
McCURDY	6660	17.3	59.0	199.44	$404.86	$7.12	$397.73	97.7	26900	2
AVA	2525	14.3	60.0	209.77	$425.83	$0.00	$425.83	104.7	27900	2
PIONEER	3503	15.2	61.0	209.72	$425.73	$0.00	$425.73	104.6	27500	3
NORTHRUP KING	N6330	15.9	58.0	210.33	$426.96	$0.00	$426.96	104.9	27400	9
KELTGEN	2711	16.0	58.0	212.18	$430.72	$0.00	$430.72	105.9	27000	8
PIONEER	3475	14.6	60.0	196.88	$399.67	$0.00	$399.67		27600	3
PIONEER	3475	14.6	59.0	197.32	$400.56	$0.00	$400.56		27400	2
TRIUMPH	1265	16.5	58.0	209.24	$424.76	$0.00	$424.76	104.4	27500	4
GARST	8574	16.0	57.0	205.17	$416.50	$0.00	$416.50	102.4	26900	7
GOLDEN HARVEST	2525	17.2	57.5	207.75	$421.73	$7.21	$414.52	101.9	28400	8
ASGROW	RX706	16.4	57.0	214.29	$435.00	$0.00	$435.00	106.9	27200	4
SUPERCROST	3130	14.4	58.0	200.46	$406.93	$0.00	$406.93	100.0	26900	8
PIONEER	3475	15.2	59.0	199.52	$405.03	$0.00	$405.03		27200	2
AVA	2575	16.6	58.0	202.73	$411.55	$0.00	$411.55	101.1	28000	5
CARGILL	SX269	15.5	59.0	200.00	$405.99	$0.00	$405.99	99.8	27900	6
GARST	8492	16.4	57.0	210.39	$427.10	$0.00	$427.10	105.0	26900	4
PIONEER	3417	15.7	59.0	214.16	$434.75	$0.00	$434.75	106.8	27200	4
PAYCO	872	14.7	60.0	196.33	$398.55	$0.00	$398.55	97.9	27000	1
PIONEER	3475	14.7	59.0	202.00	$410.06	$0.00	$410.06		27500	2
ASGROW	RX626	14.4	58.0	191.16	$388.05	$0.00	$388.05	95.4	28000	9
CARGILL	4327	14.3	59.0	196.82	$399.55	$0.00	$399.55	98.2	27500	5
NORTHRUP KING	N4545	14.7	57.0	186.22	$378.03	$0.00	$378.03	92.9	27200	8
GOLDEN HARVEST	2344	12.6	57.5	193.58	$392.97	$0.00	$392.97	96.6	26700	4
SUPERCROST	A3051	15.8	58.0	203.78	$413.67	$0.00	$413.67	101.7	27000	5
PIONEER	3475	14.8	59.0	200.07	$406.14	$0.00	$406.14		27500	2
HORIZON	9107	14.8	59.0	183.20	$371.89	$0.00	$371.89	91.4	27500	8
McCURDY	5222	13.6	60.0	204.51	$415.15	$0.00	$415.15	102.0	26900	6
HORIZON	4111	14.0	60.0	186.97	$379.55	$0.00	$379.55	93.3	27200	2
PAYCO	682	12.5	60.0	185.48	$376.52	$0.00	$376.52	92.5	27000	2
KELTGEN	2550	13.1	59.0	182.18	$369.83	$0.00	$369.83	90.9	27500	4
PIONEER	3475	15.0	60.0	204.58	$415.31	$0.00	$415.31		28500	2
CHECK AVERAGES		14.9	59.4	198.48	$402.91	$0.00	$402.91	99.0	27600	2.1
VARIETY AVERAGES		15.2	58.5	200.70	$407.42	$0.53	$406.89	100.0	27337	5

DATE PLANTED-MAY 8, 1990
PLANING POPULATION-28400
PLANTER-JOHN DEERE MAX-EMERGE
FERTILIZER-200# N,30# PHOS,35# SULFUR, 10#
HERBICIDE: 2 PT. MARKSMAN,1#BLADEX

1990 GOLDEN PLAINS CORN VARIETY DEMONSTRATION
Larry & Merle Gardner Farm*

Sixty different varieties from 21 companies
Location: 10 miles east of Yuma
Check Variety: Pioneer 3475
Soil Temperature at Planting: 45 degrees
Soil Texture: loamy sand moisture good
Seeding Rate: 32000 plants per acre
Tillage: Disked, chiseled
Planted: May 2 with 2 MaxEmerge, 12 row planters depth 1 1/2" Seed treatment graphite Diazanon
Insecticide: Chemigated; Lorsban for lst gen. corn borer, Penncapp M for western bean cutworm, Cygon and Asana for spider mites aerial application.
Herbicide: Bladex + Microtech Lasso
Fertilizer: 205# N, 47# P205, 20# K20, 15# S1 1/2 qt. zn
Last Irrigation: lst of Sept.
The Season: unusually cool the month of May (only 100 GDD first 21 days) followed by high temperatures June to mid July; then a cool August followed by high temperatures in early September. "A rollercoaster summer". The first light frost was Sept. 23 with hard freeze Oct. 9. 2517 GDD May 2 Oct. 9.
Harvested: Oct. 29-30 with a John Deere 7700 8 row header picking 6 rows: Harvestability scores and comments are from combine owner operator Gerland Klein. Average harvest stand count 24,170 plants per acre. Price and drying charges obtained from Farmers Union Co op in Wray. Harvest Data Yields are adjusted to 15.5% moisture and are then adjusted for field variability using the Check variations and averages to adjust the yields of the entered varieties ie:

$$\frac{\text{Overall tester average}}{\text{Tester A and B average}} \times \text{Entered Variety} = \text{Adjusted Field Variability Yield}$$

Net Value Index: Is a percentile comparison of the net value of the individual varieties compared to the average net value of the test plot.
Acknowledgments: Insecticide provided by: PennWalt; Penncapp M 1 qt/A chemigated for western bean cutworm Combine provided by Gerland Klein Check Variety Pioneer 3475 provided by Pioneer International through sales representative, Richard Nelson.
Planting Crew: Kyle Koch Thoro Bred; Steve Edwards Golden Harvest; Ben Schomp Producers; Bob Waltemath Fontenelle; Tom Teague Golden Acres; Bob Hardenberger Triumph; Steve Henderson Agripro; Extension Agents Gary Lancaster, Emery Anderson, Ron Meyer, Clyde Richardson, & Dick Travis Merle, Larry, Hazel and Ray Gardner
Stand Counters: Eldon Fisher, Dick Travis and Clyde Richardson Extension Agents
Harvest Crew: Bill Gilbert Supercrost; Ben Schomp Producers; Steve Edwards Golden Harvest; Bob Waltemath Fontenelle; Pat Jack McCurdy; Kyle Koch Thor O Bred; Gilbert Perry Agripro; Tom Teague Golden Acres; Herman Enninga Cargill; Brad Koontz Cheeseman; Craig Weitzel Cheeseman; Dennis Atwell Payco; Rob Kircher Northrup King; Gerland Klein Combine operator; Norbert Klein, Larry, Merle, Hazel and Cindy Gardner, and Emilo Richardson; Extension Agents Ron Meyer, Emery Anderson, Perry Brewer, Eldon Fisher and Clyde Richardson.

* Crop production and economic data were prepared by Emery Anderson and Clyde Richardson. The data from the Golden Plains Corn Variety Demonstration is provided by Colorado State University Golden Plains Area Cooperative Extension.

1990 GOLDEN PLAINS CORN VARIETY DEMONSTRATION
LARRY AND MERLE GARDNER FARM

COMPANY	VARIETY	DAYS TO MATURE	PERCENT MOISTURE	TEST WEIGHT	YIELD	GROSS VALUE @ $2.09	DRYING CHARGE	NET VALUE	NET RETURN INDEX	*HARVEST-ABILITY COMMENTS AND SCORE		PLANTS/ ACRE	% LODGE/ EARDROP
PIONEER(CHECK)	3475	114	17.4	58.0	220.11	$460.04	$8.11	$451.93			10	23896	0.0
CARGILL	3427	100	14.5	54.5	195.58	$408.77	$0.00	$408.77	104.7		10	30368	0.0
NORTHRUP KING	N-4350	100	18.6	58.0	191.19	$399.58	$13.10	$386.48	99.0		10	28376	0.0
GOLDEN HARVEST	H-2344	100	13.3	56.0	201.40	$420.93	$0.00	$420.93	107.8	TOPS	9	29870	0.0
AGRIPRO	364	100	16.9	56.0	193.86	$405.17	$0.00	$405.17	103.8		10	29870	0.0
GOLDEN HARVEST	H-2343	101	14.8	55.5	196.27	$410.20	$0.00	$410.20	105.1		10	25389	0.0
PIONEER(CHECK)	3475	114	18.3	58.0	214.97	$449.29	$12.45	$436.84			10	25887	0.0
SIGCO	1701	101	17.1	58.0	190.33	$397.79	$6.33	$391.46	100.3	TOPS	9	24394	0.0
GOLDEN ACRES	X9001	102	15.0	55.5	186.35	$389.47	$0.00	$389.47	99.8		10	26385	1.9
PAYCO	687	102	15.9	58.0	187.97	$392.87	$0.00	$392.87	100.7		10	26385	0.0
PIONEER	3714	103	15.7	57.0	200.52	$419.10	$0.00	$419.10	107.4		10	26385	0.0
PIONEER(CHECK)	3475	114	17.6	57.0	201.77	$421.70	$8.69	$413.01			10	26385	0.0

COMPANY	VARIETY	DAYS TO MATURE	PERCENT MOISTURE	TEST WEIGHT	YIELD	GROSS VALUE @ $2.09	DRYING CHARGE	NET VALUE	NET RETURN INDEX	*HARVEST-ABILITY COMMENTS AND SCORE		PLANTS/ ACRE	% LODGE/ EARDROP
SIGCO	1814	103	21.0	56.0	193.76	$404.96	$22.43	$382.53	98.0	TOPS	9	24394	0.0
GOLDEN HARVEST	H-2404	104	15.7	58.0	193.69	$404.82	$0.00	$404.82	103.7		9	28874	0.0
NC+	3088	105	15.8	56.0	198.62	$415.13	$0.00	$415.13	106.4		10	27878	0.0
ASGROW/OsGOLD	626	105	17.6	55.0	189.33	$395.70	$8.03	$387.67	99.3		10	21407	0.0
PIONEER(CHECK)	3475	114	16.8	56.0	200.38	$418.79	$0.00	$418.79			10	23896	0.0
JACQUES	5700	105	17.3	57.0	195.09	$407.74	$7.03	$400.71	102.7		10	29870	0.0
ASGROW/OsGOLD	578	105	17.6	55.0	184.56	$385.74	$7.78	$377.95	96.8	TOPS	9	25887	0.0
SUPERCROST	2979	105	17.2	57.0	195.29	$408.15	$6.63	$401.52	102.9		10	27381	0.0
PIONEER(CHECK)	3475	114	17.7	56.0	199.48	$416.92	$9.01	$407.91			10	24394	0.0
FONTANELLE	4140	106	18.4	56.0	167.73	$350.55	$9.90	$340.65	87.3		10	24394	0.0
NORTHRUP KING	N-4545	105	17.7	55.0	203.71	$425.76	$9.04	$416.71	106.8		10	28376	0.0
SUPERCROST	3130	105	18.0	55.0	193.66	$404.75	$9.80	$394.95	101.2		10	28376	0.0
AGRIPRO	424	106	19.0	54.0	179.62	$375.41	$12.88	$362.53	92.9	TOPS	9	25389	0.0
PRODUCERS	620	107	18.7	55.0	196.07	$409.78	$12.82	$396.97	101.7	TOUGH,SL.	8	26883	0.0
THOR-O-BRED	SSX-420	107	17.8	55.0	195.85	$409.32	$9.10	$400.22	102.5		10	27878	0.0
PIONEER(CHECK)	3475	114	17.9	56.0	201.93	$422.04	$9.98	$412.06			10	22900	0.0
McCURDY	5222	107	18.2	56.0	192.68	$402.71	$10.44	$392.27	100.5	TOPS	9	25887	0.0
SINDELAR	XO-110	107	15.8	56.0	167.95	$351.01	$0.00	$351.01	89.9	SL	9	26883	0.0
CARGILL	4327	107	17.1	56.0	184.37	$385.34	$5.84	$379.50	97.2		10	22900	0.0
PAYCO	729	107	18.2	56.0	171.92	$359.32	$9.32	$350.00	89.7	TOPS	9	22402	0.0
ORO	EXP-903	108	18.6	54.0	197.22	$412.19	$12.33	$399.86	102.5	TOPS	9	28874	0.0
PIONEER(CHECK)	3475	114	18.5	56.0	195.06	$407.68	$12.13	$395.55			10	24891	0.0
PIONEER(CHECK)	3475	114	17.3	58.0	192.46	$402.24	$7.08	$395.17			10	28874	0.0
CHEESMAN	494	108	17.6	57.0	188.92	$394.85	$7.88	$386.98	99.1	SL	9	32857	0.0
PIONEER	3417	108	18.1	57.0	203.86	$426.07	$10.58	$415.49	106.5		10	29372	0.0
PRODUCERS	626	108	17.9	57.0	201.71	$421.58	$9.64	$411.93	105.5		10	26883	0.0
FONTANELLE	4230	108	19.0	56.0	198.98	$415.86	$14.05	$401.81	102.9		10	31861	0.0
GOLDEN ACRES	7016	108	19.5	55.0	198.46	$414.78	$16.12	$398.66	102.1		10	30865	0.0
PIONEER(CHECK)	3475	114	16.4	57.0	202.88	$424.02	$0.00	$424.02			10	30865	0.0
JACQUES	6770	108	17.7	56.0	197.97	$413.76	$8.74	$405.03	103.8		10	31861	0.0
PIONEER	3578	108	17.5	56.0	212.97	$445.11	$8.53	$436.58	111.9		10	27381	1.8
PRODUCERS	707	109	20.9	54.5	189.51	$396.07	$21.36	$374.71	96.0		10	25887	0.0
PAYCO	872	109	20.4	56.0	207.36	$433.38	$21.06	$412.31	105.6		10	27381	0.0
CHEESMAN	497	109	21.8	53.5	181.19	$378.70	$21.05	$357.65	91.6		10	24394	0.0
PIONEER(CHECK)	3475	114	17.3	57.0	196.26	$410.18	$7.22	$402.96			10	26385	0.0
ASGROW/OsGOLD	706	109	21.2	53.0	196.36	$410.40	$23.57	$386.83	99.1		10	26883	0.0
SINDELAR	XO-109	109	17.9	56.0	174.52	$364.74	$8.47	$356.27	91.3	SL	9	22402	0.0
TRIUMPH	1265	110	22.0	52.5	193.98	$405.43	$26.82	$378.60	97.0		10	25389	0.0
CHEESEMAN	447	110	21.9	52.0	184.16	$384.90	$25.06	$359.83	92.2		10	27381	0.0
CARGILL	SX-269	110	16.2	55.0	201.64	$421.43	$0.00	$421.43	108.0		10	26385	0.0
PIONEER(CHECK)	3475	114	16.4	58.0	205.09	$428.63	$0.00	$428.63			10	25887	0.0
McCURDY	6222	110	21.5	55.0	187.70	$392.30	$24.53	$367.77	94.2		10	27878	0.0
FONTANELLE	4435	110	19.6	54.0	196.37	$410.41	$17.12	$393.29	100.8		10	33355	0.0
THOR-O-BRED	SSX-422	110	18.9	56.0	198.17	$414.18	$14.20	$399.98	102.5		10	28874	0.0
SUPERCROST	A3051	110	20.2	54.0	203.10	$424.47	$20.43	$404.04	103.5		10	30368	0.0
THOR-O-BRED	SSX-426	110	22.4	52.0	181.61	$379.56	$34.60	$344.96	88.4		10	22900	0.0
PIONEER(CHECK)	3475	114	17.1	57.0	208.14	$435.02	$6.79	$428.23			10	27878	0.0
TRIUMPH	1040	110	20.0	56.0	193.53	$404.48	$18.84	$385.64	98.8		10	27381	0.0
NORTHRUP KING	N-6330	110	20.2	53.0	187.08	$390.99	$19.07	$371.92	95.3		10	22402	0.0
TRIUMPH	1270	110	20.8	52.0	182.78	$382.02	$21.16	$360.86	92.5		10	27381	0.0
NC+	3813	110	16.7	56.0	199.97	$417.93	$0.00	$417.93	107.1		10	29870	0.0
ORO	120	112	23.5	53.0	190.30	$397.73	$43.02	$354.70	90.9		10	25389	0.0
PIONEER(CHECK)	3475	114	16.1	59.0	210.19	$439.30	$0.00	$439.30			10	28376	0.0
AGRIPRO	525	112	20.3	55.0	202.97	$424.21	$21.16	$403.05	103.3		10	30368	0.0
ORO	EXP-803	112	20.6	56.0	200.23	$418.47	$22.26	$396.21	101.5		10	26883	0.0
NC+	4131	112	19.0	57.0	192.32	$401.95	$14.37	$387.58	99.3		10	28874	0.0
PIONEER	3475	114	15.9	58.0	203.12	$424.52	$0.00	$424.52	108.8		10	27381	1.8
SINDELAR	XO-306	116	18.3	57.0	140.02	$292.64	$7.86	$284.78	73.0	TOPS, SL	8	25887	0.0
PIONEER(CHECK)	3475	114	15.3	58.0	208.10	$434.93	$0.00	$434.93			10	27381	0.0
DEKALB PFIZER	DK-535	103	15.1	55.0	202.90	$424.06	$0.00	$424.06	108.7		10	27381	0.0
DEKALB PFIZER	DK-547	104	16.4	57.0	196.71	$411.12	$0.00	$411.12	105.3	SL	9	28376	1.8
DEKALB PFIZER	DK-572	107	16.3	57.0	192.25	$401.81	$0.00	$401.81	102.9		10	27381	0.0
PIONEER(CHECK)	3475	114	14.4	57.0	207.62	$433.92	$0.00	$433.92			10	24394	0.0
CHECK AVERAGES		114	17.0	57.2	204.30	$426.98	$5.43	$421.55	108.0	0	10	26153	0.00
VARIETY AVERAGES		107	18.3	55.5	192.12	$401.54	$11.24	$390.30	100	0	9.7	24170	0.06

* HARVESTABILITY COMMENTS EXPLANATION: TOPS-BROKEN TOPS;TOUGH- TOUGH THRESHING;SL-SLIGHT LODGING.
SCALE OF HARVESTABILITY: 1(POOR———GOOD)10 "GREAT HARVESTING CONDITIONS. THE LEAVES WERE OFF AND CONDITIONS WERE EXCELLENT EXCEPT FOR THE MINOR PROBLEMS AS NOTED"—GERLAND KLEIN

COLORADO DRY BEAN PERFORMANCE TESTS CONDUCTED BY COLORADO STATE UNIVERSITY

James W. Echols, Extension Agronomy
Colorado State University
Fort Collins, Colorado 80523

Extension and research personnel at Colorado State University have conducted yield performance tests in 1990 at Burlington, Eaton, Julesburg and Yuma. Plots were planted and harvested with precision equipment owned and operated by Colorado State University. All data were obtained under field conditions where test plots were surrounded by beans being grown commercially. This was done to get the closest comparison possible to farmers' conditions and to expose varieties to diseases, insects and other hazards experienced by farmers.

This information should enable growers and processors of dry beans to more efficiently manage their production practices. Ultimately, the consumer benefits by enjoying a highly nutritious food at a reasonable price. Funding for these experiments was provided by Colorado State University, the Colorado Dry Bean Administrative Committee and private industry.

If you have suggestions or comments about this information, please contact your local Extension agent; Jim Echols, Extension Agronomist, Colorado State University (303) 491-6201; or Howard Schwartz, Extension Plant Pathologist, Colorado State University (303) 491-6987.

This program involved the following personnel (in alphabetical order):

1. Mark Brick, Plant Breeding, Agronomy
2. Bob Croissant, Extension Agronomy
3. Tim D'Amato, Weed Science
4. Jim Echols, Extension Agronomy
5. Jim Hain, Research Associate, Agronomy
6 Cindy Johnson, Research Associate, Agronomy
7. Stan Pilcher, Extension Entomology
8. Howard Schwartz, Extension Plant Pathology
9. Phil Westra, Extension Weed Science
10. Many local county agents, bean growers and dealers

DESCRIPTION OF PINTO BEANS IN EASTERN COLORADO IRRIGATED VARIETY TRIALS AND SUMMARY 1990

BILL Z (81-13197) - A new vine variety from Colorado State University developed in 1985 with rust resistance. It is a productive variety when growing conditions are good. It is similar to Olathe with regard to bacterial and white mold resistance and maturity.

CO 55241 - An experimental pinto from Colorado State University.

CO 55984 - An experimental pinto from Colorado State University.

CO 56233 - An experimental pinto from Colorado State University.

CO 59265 - An experimental pinto from Colorado State University.

CO 62709 - An experimental pinto from Colorado State University.

CO 62713 - An experimental pinto from Colorado State University.

CO 74624 - An experimental pinto from Colorado State University.

CO 74656 - An experimental pinto from Colorado State University.

CO 801744 - An experimental pinto from Colorado State University.

GH 196 - A new pinto vine variety from Idaho.

OLATHE - A vine variety developed by Colorado State University and released in 1979. It has rust resistance against most prevalent races, but is susceptible to bacterial diseases and white mold. Its maturity is slightly earlier than UI 114. Its seed size is comparable to UI 114, but its seed shape is more rounded and may split more easily unless handled carefully.

OTHELLO (GH 215) - A semi-upright, early-maturing variety released by USDA. The variety has very good yielding ability, is tolerant to fusarium disease and compaction.

PTRB 85208 - An experimental pinto from Rogers Brothers.

PTRB 88101 - An experimental pinto from Rogers Brothers.

RS 101 - An upright type selected by a farmer on the west slope. The variety is rust resistant against some races. The upright growth habit makes it more tolerant to white mold.

UI 114 - A variety developed by Idaho in 1967 with medium maturity of 95-100 days. It is good yielding unless disease pressure from rust, bacterial diseases or white mold occurs.

UI 126 - A new variety released by Idaho in 1983. It has good yield potential and is similar to UI 114 for its disease reactions.

UI 129 - A new variety released by Idaho in 1983. It has good yield potential and is similar to UI 114 for its disease reactions.

SUMMARY OF PERFORMANCE OF PINTO BEAN VARIETY TRIALS AT VARIOUS LOCATIONS IN EASTERN COLORADO, 1981-1990

The following summary compares varieties of dry beans grown at different locations. Varieties are listed in alphabetical order and only those varieties offered for sale commercially are listed. Seed of all varieties may not be available. Some varieties with good yielding ability have been discontinued because of seed size or some other characteristic. For each year at all locations tested, the yield in pounds per acre and a percent figure are shown for each variety.

This percent rating for each variety is determined by computing the average yield of all varieties in a particular test location for that year. This average is assigned a value of 100%. The yield of each variety is divided by this average yield to determine its percent of the average. Thus, varieties that have scores less than 100% performed below average.

It is important to study both the consistency of a variety at a particular location for all years tested and the performance of each variety at all locations each year. If a problem occurred in a certain location during a particular year, such as an outbreak of a certain disease epidemic, the summary will tell you how that variety compared with other varieties in the test under those conditions.

Varieties tested for a long period of time will have a higher percentage factor in the first years tested than in the most recent years. This occurs because varieties or experimental lines with the poorest performance have been eliminated each year, and higher yielding varieties have been added to the test. This decline in the percentage figure is an indication that a variety is becoming obsolete.

The value of a new variety's expensive seed can be determined by simple computations. Compare the percent figure of the variety presently grown at a particular location with the percent of the new variety at the same location. The difference will indicate by what percent superiority the new variety is. Multiply this percentage increase by the yield of the older variety, and this will tell you the per-acre increase in yield expected by using the new variety.

After harvest in 1991 and in subsequent years, the new data will by integrated into this summary sheet, and new summary sheets will be distributed. If new varieties are released, the performance data obtained while they were experimental lines will be added to the summary. The performance of varieties will be shown for a ten-year period of time.

PERFORMANCE OF PINTO BEAN VARIETIES AT EASTERN COLORADO LOCATIONS, 1981-90
CONDUCTED BY COLORADO STATE UNIVERSITY, FORT COLLINS, COLORADO

	BURLINGTON		EATON/ GREELEY		FT COLLINS		HOLYOKE		SEDGWICK OVID/ JULESBURG		WIGGINS/ FT MORGAN		YUMA		AVG %
	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	AVG %
BILL Z															
1990	1515	91	2208	93					1586	96			1678	104	96
1989	2943	109									2761	105			107
1988	2210	118	3005	108			2689	109	2403	104	2549	111			110
1987	1568	77	3135	112			1976	88	2101	116	2288	98			98
AVERAGE	2059	99	2783	104			2333	99	2030	105	2533	105	1678	104	103
NU 410															
1987	1911	94	2898	104			2791	124	1858	103	2561	109			107
1985					2422	98			2561	106	2422	98			105
1984			1505	117			2532	118	2256	101	2989	104			110
1983			2595	118			3015	105	931	114	1760	107			111
1982			2350	102			981	101	793	74	1171	99			94
1981			2424	99	3209	112	1218	75							95
AVERAGE	1911	94	2354	108	2816	105	2107	105	1680	100	2181	103			104
OLATHE															
1990	1525	92	2191	92					1510	92			1402	88	91
1989	2951	109									2597	99			104
1988	1689	90	2856	103			2414	98	2444	106	2571	112			102
1987	2000	99	2980	106			2642	117	2127	118	2444	104			109
1986	3523	103			1774	100	3124	107	2361	90	1998	97			99
1985					2277	92			2629	109	1833	103			101
1984			1045	81			2043	95	2253	101	3239	113			98
1983			2430	111			2876	100	752	92	1899	115			105
1982			2396	104			1347	138	1769	166	1450	123			133
1981			2334	95	2963	103	2410	148							115
AVERAGE	2338	99	2319	99	2338	98	2408	115	1981	109	2254	108	1402	88	106
OTHELLO															
1990	2131	129	2211	93					1834	111			1766	110	111
1989	3082	114									2930	112			113
1988	2485	132	2895	104			2759	112	2690	116	2718	118			116
1987	2156	106	2694	96			2332	103	2078	115	2350	100			104
1986	3531	103			1752	99	3054	104	2902	111	2325	113			106
AVERAGE	2677	117	2600	98	1752	99	2715	106	2376	113	2581	111	1766	110	110
RS 101															
1990	2260	136	2585	109					2301	140			2040	127	128
1989	2659	98									2874	109			104
1988	1657	88	2692	97			2383	97	2124	92	2016	88			92
1987	1788	88	2671	95			2363	105	1610	89	1937	83			92
1986							2676	91			1981	96			94
AVERAGE	2091	103	2649	100			2474	98	2012	107	2202	94	2040	127	102
UI 111															
1985					2232	91			2545	106	1544	87			95
1984			1038	81	2232	91	2200	102	2150	96	2790	98			94
1983			1935	88			2752	96	701	85	1504	91			90
1982			2114	92			1171	120	1001	94	1113	94			100
1981			2188	89	2672	93	1363	84							89
AVERAGE			1819	88	2379	92	1872	101	1599	95	1738	93			94

	BURLINGTON		EATON/ GREELEY		FT COLLINS		HOLYOKE		SEDGWICK OVID/ JULESBURG		WIGGINS/ FT MORGAN		YUMA		AVG %
	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	YIELD	% TEST AVG	AVG %
UI 114															
1990	1017	61	2126	90					1195	73			1455	91	79
1989	2742	102									2698	103			103
1988	1736	92	2851	103			2159	87	2072	90	1995	87			92
1987	1905	94	2776	99			2431	108	1937	107	2428	104			102
1986	3198	93			1556	88	2898	99	2097	80	2116	102			92
1985					2366	96			2680	111	1708	96			101
1984			1426	111			2144	100	2257	101	2697	94			102
1983			2138	97			3011	105	823	100	1532	93			99
1982			2370	103			1046	108	874	82	1056	89			96
1981			2572	105	2895	101	1321	81							96
AVERAGE	2120	88	2323	101	2272	95	2144	98	1742	93	2029	96	1455	91	96
UI 126															
1990	1418	86	2177	92					1507	92			1504	94	91
1989	2490	92									2722	104			98
1988	1800	96	2806	101			2554	103	2539	110	2297	100			102
1987	2205	109	2801	100			2243	99	1790	99	2481	106			103
1986	3632	106			1822	103	3236	111	2609	100	1822	103			105
1985					2474	100			2537	105	1788	100			102
1984			1600	124			2210	103	2203	99	2941	103			107
1983			2355	107			3132	109	842	103	1588	96			104
AVERAGE	2309	98	2348	105	2148	102	2675	105	2004	101	2234	102	1504	94	102
UI 129															
1990	1289	78	2360	100					1258	76			1282	80	84
1989	2791	103									2733	104			104
1988	1914	102	2809	101			2537	103	2472	107	2099	91			101
1987	2088	103	2807	100			2104	93	1848	102	2477	106			101
1986	3272	95			1781	100	3238	111	2626	100	2163	105			102
1985					2596	105			2705	112	1764	99			106
1984			1300	101			2174	101	2277	102	2694	94			100
1983			2307	105			2989	104	950	116	1737	102			108
1982			2505	109			1179	121	917	86	1201	102			105
1981			2625	107			1423	87				-			97
AVERAGE	2271	96	2388	103	2189	103	2235	103	1882	100	2109	101	1282	80	101
UI 196															
1990	976	59	2341	99					1172	72			1404	87	79

1990 COLORADO PINTO DRY BEAN VARIETY TRIAL, BURLINGTON GROWN ON DON SIRCY FARM

SEEDING DATE: JUNE 6 HARVEST DATE: SEPT 26

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
CO55984	2275.	58.	10.0	1502.	2.0	4.
RS 101	2260.	58.	10.3	1618.	2.3	3.
OTHELLO	2131.	60.	10.1	1492.	3.3	7.
CO62709	2083.	59.	10.1	1536.	1.7	2.
CO56233	2003.	57.	9.9	1477.	2.4	5.
CO62713	1981.	57.	10.4	1296.	4.1	3.
PTRB85208	1960.	59.	10.3	1606.	3.0	4.
PTRB88101	1933.	59.	10.1	1564.	2.1	6.
CO74656	1907.	55.	10.0	1386.	3.0	5.
CO801744	1736.	58.	10.6	1402.	2.7	5.
OLATHE	1525.	57.	10.1	1666.	3.8	7.
BILL Z	1515.	58.	10.0	1599.	2.9	6.
CO74624	1463.	57.	11.0	1467.	2.3	5.
UI 126	1418.	58.	10.5	1639.	1.5	7.
CO59265	1326.	58.	10.7	1630.	3.2	5.
UI 129	1289.	58.	10.4	1618.	1.8	6.
CO55241	1279.	56.	10.3	1816.	2.6	6.
UI 114 APRON/TERR	1054.	54.	10.3	1658.	1.8	**
UI 114	1017.	56.	10.4	1672.	1.7	8.
UI 196	976.	56.	10.3	1956.	2.0	7.
GRAND COLUMN MEAN	1657.	57.	10.3	1580.	2.5	5.3

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)***
YIELD LB/A	1656.60	12.614	16.2453	295.53

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** Disease readings not taken.

*** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means that there is a 95% chance that yield variations greater than the LSD figure are real.

1990 COLORADO PINTO DRY BEAN VARIETY TRIAL, EATON GROWN ON ED CROISSANT FARM

SEEDING DATE: MAY 25 HARVEST DATE: SEPT 8

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
CO59265	2907.	58.	10.8	1321.	3.5	2.
CO55241	2905.	60.	10.5	1412.	1.2	3.
CO55984	2691.	57.	9.1	1410.	2.9	2.
PTRB85208	2663.	59.	10.3	1518.	3.3	5.
RS 101	2585.	58.	11.0	1539.	1.4	1.
CO801744	2579.	58.	11.7	1328.	1.5	4.
CO56233	2475.	56.	9.3	1445.	3.2	2.
CO74656	2387.	56.	9.3	1422.	2.1	2.
UI 129	2360.	59.	10.5	1416.	1.9	6.
UI 196	2341.	58.	10.4	1490.	3.4	6.
OTHELLO	2211.	59.	9.2	1251.	4.3	2.
BILL Z	2208.	57.	9.6	1523.	5.3	7.
PTRB88101	2199.	57.	9.3	1410.	3.3	6.
OLATHE	2191.	57.	9.8	1546.	4.0	7.
UI 126	2177.	59.	10.0	1378.	2.2	7.
UI 114	2126.	58.	10.1	1392.	2.2	8.
CO62709	2125.	57.	8.9	1632.	2.3	2.
UI 114 APRON/TERR	1967.	58.	10.4	1387.	1.9	**
CO74624	1929.	58.	9.9	1318.	3.5	6.
GRAND COLUMN MEAN	2370.	58.	10.0	1428.	2.8	4.3

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)***	
YIELD	LB/A	2369.85	7.997	9.2339	268.03

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** Disease readings not taken.

*** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 of less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means that there is a 95% chance that yield variations greater than the LSD figure are real.

1990 COLORADO PINTO DRY BEAN VARIETY TRIAL, JULESBURG GROWN ON KEN HODGES, JR. FARM

SEEDING DATE: JUNE 7 HARVEST DATE: SEPT 10

VARIETY NAME	YIELD LB/A	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
RS 101	2301.	8.7	1588.	4.2	6.
PTRB88101	1996.	7.9	1603.	4.4	7.
PTRB85208	1940.	8.7	1679.	5.5	7.
CO801744	1875.	10.4	1458.	3.8	6.
OTHELLO	1834.	8.0	1600.	9.3	7.
UI 114 APRON/TERR	1590.	8.9	1697.	3.1	**
BILL Z	1586.	9.1	1477.	4.9	8.
OLATHE	1510.	8.4	1738.	5.6	7.
UI 126	1507.	8.5	1759.	3.7	9.
UI 129	1258.	8.4	1710.	3.5	8.
UI 114	1195.	9.4	1665.	2.5	8.
GRAND COLUMN MEAN	1647.	8.8	1655.	4.6	7.4

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)***
YIELD LB/A	1647.04	15.469	7.5532	364.11

Carry over herbicide damage caused stand problems and a higher coefficient of variations.

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** Disease readings not taken.

*** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means that is a 95% chance that yield variations greater than the LSD figure are real.

1990 COLORADO PINTO DRY BEAN VARIETY TRIAL, YUMA
GROWN ON BYRON WEATHERS FARM

SEEDING DATE: JUNE 7 HARVEST DATE: OCT 2

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
RS 101	2040.	58.	11.9	1614.	4.3	6.
CO801744	1876.	57.	14.6	1416.	3.0	4.
PTRB85208	1776.	59.	12.3	1615.	4.2	6.
OTHELLO	1766.	59.	13.1	1406.	3.9	8.
PTRB88101	1729.	58.	12.9	1501.	3.3	7.
CO59265	1688.	58.	14.1	1506.	3.9	6.
BILL Z	1678.	58.	12.8	1616.	4.0	7.
UI 126	1504.	57.	13.3	1543.	2.2	7.
UI 114	1455.	59.	14.0	1484.	3.3	8.
UI 196	1404.	57.	13.1	1633.	3.3	7.
OLATHE	1402.	56.	12.8	1561.	5.0	7.
UI 114 APRON/TERR	1301.	57.	13.9	1555.	2.8	**
UI 129	1282.	57.	12.9	1532.	2.6	8.
GRAND COLUMN MEAN	1608.	58.	13.2	1537.	3.5	6.8

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)***
YIELD LB/A	1607.92	7.099	16.8001	163.13

* White mold ratings were observations. 0 = none, 9 = worst possible infection.

** Disease readings not taken.

*** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation of other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher that 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means that is a 95% chance that yield variations greater than the LSD figure are real.

COLORADO STATE UNIVERSITY EASTERN COLORADO PINTO BEAN VARIETY TRIALS
1990 SUMMARY

Entry	Origin	Burlington	% Test Average	Eaton	% Test Average	Julesburg	% Test Average	Yuma	% Test Average	Average of 4 Locations	% Test Avg. of 4 Locations	Avg. Seeds/lb.	Avg. % Splits	Avg. Test Weight	Avg. % Moisture	Avg. White Mold
RS 101	RON SEACAT	2260	136	2585	109	2301	140	2040	127	2297	128	1590	3.1	58.0	10.5	4.0
PTRB85208	ROGERS BROS.	1960	118	2663	112	1940	118	1776	110	2085	115	1605	4.0	59.0	10.4	5.5
CO 801744	CSU	1736	105	2579	109	1875	114	1876	117	2017	111	1401	2.8	57.7	11.8	4.8
OTHELLO	USDA	2131	129	2211	93	1834	111	1766	110	1986	111	1437	5.2	59.3	10.1	6.0
PTRB88101	ROGERS BROS.	1933	117	2199	93	1996	121	1729	108	1964	110	1520	3.3	58.0	10.1	6.5
BILL Z	CSU	1515	91	2208	93	1586	96	1678	104	1747	96	1554	4.3	57.7	10.4	7.0
OLATHE	CSU	1525	92	2191	92	1510	92	1402	88	1657	91	1628	4.6	56.7	10.3	7.0
UI 126	UNV OF IDAHO	1418	86	2177	92	1507	92	1504	94	1652	91	1580	2.4	58.0	10.6	7.5
UI 129	UNV OF IDAHO	1289	78	2360	100	1258	76	1282	80	1547	84	1569	2.5	58.0	10.6	7.0
UI 114	UNV OF IDAHO	1054	64	1967	83	1590	97	1301	81	1478	81	1574	2.4	56.3	10.9	8.0
CO 55984	CSU	2275	137	2691	114	—	—	—	—	—	—	1456	2.5	57.5	9.6	3.0
CO 62709	CSU	2083	126	2125	90	—	—	—	—	—	—	1584	2.0	58.0	9.5	2.0
CO 56233	CSU	2003	121	2475	104	—	—	—	—	—	—	1461	2.8	56.5	9.6	3.5
CO 62713	CSU	1981	120	—	—	—	—	—	—	—	—	1296	4.1	57.0	10.4	3.0
C0 74656	CSU	1907	115	2387	101	—	—	—	—	—	—	1404	2.6	55.5	9.7	3.5
CO 74624	CSU	1463	88	1929	81	—	—	—	—	—	—	1393	2.9	57.5	10.5	5.5
CO 59265	CSU	1326	80	2907	123	—	—	1688	105	—	—	1486	3.5	58.0	11.9	4.3
CO 55241	CSU	1279	77	2905	123	—	—	—	—	—	—	1614	1.9	58.0	10.4	4.5
UI 114 APRON/TERR	UNV OF IDAHO	1017	61	2126	90	1195	73	1455	91	1448	79	1553	2.4	57.7	11.0	**
UI 196	UNV OF IDAHO	976	59	2341	99	1172	72	1404	87	1473	79	1743	3.3	57.0	10.6	7.0
PLOT AVG		1657		2370		1647		1608								
LSD (.05)		295.53		268.03		364.11		163.13								
C.V.		12.614		7.997		15.469		7.099								

** Disease readings not taken.

DESCRIPTION OF WHITE DRY BEANS IN EASTERN COLORADO IRRIGATED VARIETY TRIALS, 1990

AURORA - A small white small vine variety released by New York in 1973. It is resistant to rust.

BERYL - An upright, wide profile great northern from Rogers Brothers with tolerance to common bacterial blight.

FLEETWOOD - A navy bush variety released by Canada in 1976. It is resistant to viruses, many races of rust and halo blight.

GNM-052 - Experimental great northern entered by Haney Seed Company.

GNM-106 - Experimental great northern entered by Haney Seed Company.

HARRIS - A great northern vine variety released by Nebraska in 1980. It has virus and bacterial disease resistance.

IVORY - An early maturing, small vine great northern from Rogers Brothers; tolerant to BCMV, halo and common bacterial blight.

MIDLAND - Small white variety.

NARB 81228 - An experimental navy from Rogers Brothers.

NARB 83043 - An experimental navy from Rogers Brothers.

NA SCHOONER (RB83045) - A navy from Rogers Brothers.

SAPPHIRE - Vigorous great northern vine from Rogers Brothers; tolerant to BCMV, halo and common bacterial blight.

TARA - A vigorous vine great northern developed by the University of Nebraska; resistant to BCMV and common bacterial blight.

UI 425 - Great northern variety.

1990 COLORADO WHITE BEAN VARIETY TRIAL, BURLINGTON GROWN ON DON SIRCY FARM

SEEDING DATE: JUNE 6 HARVEST DATE: SEPT 26

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
BERYL (Great Northern)	2015.	50.	11.3	1755.	3.3	2.
IVORY (Great Northern)	1974.	55.	11.0	1472.	3.3	4.
HARRIS (Great Northern)	1616.	55.	11.3	1604.	3.4	8.
AURORA (Small White)	1413.	50.	11.4	3485.	0.8	3.
FLEETWOOD (Navy)	1308.	62.	12.5	2774.	1.0	4.
SAPPHIRE (Great Northern)	1138.	49.	11.1	1847.	2.3	7.
UI 425 (Great Northern)	930.	48.	11.4	1989.	2.4	7.
TARA (Great Northern)	776.	24.	11.6	1832.	2.7	8.
GRAND COLUMN MEAN	1396.	49.	11.4	2095.	2.4	5.

COLUMN GRAND MEAN	COEF VAR	F RATIO	LSD (.05)**
YIELD LB/A 1396.15	12.084	28.9271	248.15

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means there is a 95% chance that yield variations greater than the LSD figure are real.

1990 COLORADO WHITE DRY BEAN VARIETY TRIAL, JULESBURG GROWN ON KEN HODGES, JR. FARM

SEEDING DATE: JUNE 7 HARVEST DATE: SEPT 10

VARIETY NAME	YIELD LB/A	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
NA SCHOONER 83045 (Navy)	1765.	8.0	3134.	4.0	4.
HARRIS (Great Northern)	1751.	9.4	1628.	3.4	7.
MIDLAND (Small White)	1699.	7.6	3283.	2.7	6.
NA RB83043 (Navy)	1632.	6.9	3219.	3.2	3.
GNM-106 (Great Northern)	1479.	7.1	1652.	7.1	7.
AURORA (Small White)	1467.	8.9	3556.	1.6	1.
NA RB81228 (Navy)	1314.	11.7	3274.	4.5	4.
UI 425 (Great Northern)	1157.	9.8	2234.	4.6	7.
FLEETWOOD (Navy)	1120.	11.9	2944.	3.8	6.
TARA (Great Northern)	905.	10.4	1916.	2.4	8.
GNM-052 (Great Northern)	788.	8.3	2599.	8.5	7.
GRAND COLUMN MEAN	1371.	9.1	2676.	4.2	5.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)**
YIELD LB/A	1370.59	19.550	6.4944	386.90

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means that is a 95% chance that yield variations greater than the LSD figure are real.

COLORADO STATE UNIVERSITY - EASTERN COLORADO WHITE DRY BEAN VARIETY TRIALS
1990 SUMMARY

Entry	Origin	YIELD (lbs/A) Burlington	% Test Average	Julesburg	% Test Average	Average of 2 Locations	% Test Avg. of 2 Locations	Avg. Seeds/lb.	Avg. % Splits	Avg. Test Weight	Avg. % Moisture	Avg. White Mold
HARRIS	UNV OF NEBRASKA	1616	116	1751	128	1684	122	1616	3.4	55.0*	10.4	7.5
AURORA	NEW YORK	1413	101	1467	107	1440	104	3521	1.2	50.0*	10.2	2.0
FLEETWOOD	CANADA	1308	94	1120	82	1214	88	2859	2.4	62.0*	12.2	5.0
UI 425	UNV OF IDAHO	930	67	1157	84	1044	76	2112	3.5	48.0*	10.6	7.0
TARA	UNV OF NEBRASKA	776	56	905	66	841	61	1874	2.6	24.0*	11.0	8.0
BERYL	ROGERS BROTHERS	2015	144	—	—	—	—	1755	3.3	50.0	11.3	2.0
IVORY	ROGERS BROTHERS	1974	141	—	—	—	—	1472	3.3	55.0	11.0	4.0
SAPPHIRE	ROGERS BROTHERS	1138	82	—	—	—	—	1847	2.3	49.0	11.1	7.0
NA SCHOONER 83045	ROGERS BROTHERS	—	—	1765	129	—	—	3134	4.0	—	8.0	4.0
MIDLAND	ASGROW SEED CO	—	—	1699	124	—	—	3283	2.7	—	7.6	6.0
NA RB 83043	ROGERS BROTHERS	—	—	1632	119	—	—	3219	3.2	—	6.9	3.0
GNM-106	HANEY SEED CO	—	—	1479	108	—	—	1652	7.1	—	7.1	7.0
NA RB 81228	ROGERS BROTHERS	—	—	1314	96	—	—	3274	4.5	—	11.7	4.0
GNM-052	HANEY SEED CO	—	—	788	58	—	—	2599	8.5	—	8.3	7.0
PLOT AVG		1396		1371								
LSD (.05)		248.15		386.90								
C.V.		12.084		19.550								

* TEST WEIGHTS TAKEN AT BURLINGTON ONLY

DESCRIPTION OF LIGHT RED KIDNEY BEANS IN EASTERN COLORADO IRRIGATED VARIETY TRIALS, 1990

29-21 - An experimental light red kidney from Sacramento Valley Milling.

31-19 - An experimental light red kidney from Sacramento Valley Milling.

31-21 - An experimental light red kidney from Sacramento Valley Milling.

34-33 - An experimental light red kidney from Sacramento Valley Milling.

37-16 - An experimental light red kidney from Sacramento Valley Milling.

40-23 - An experimental light red kidney from Sacramento Valley Milling.

ISABELLA - A light red kidney from Michigan.

LKRB 88702 - An experimental light red kidney from Rogers Brothers Seed.

SACRAMENTO - A light red kidney bush released by Sacramento Valley Milling in 1975. It is resistant to rust and escapes white mold.

XPB212 - An experimental light red kidney from Asgrow Seed Company.

1990 COLORADO LIGHT RED KIDNEY BEAN VARIETY TRIAL, BURLINGTON GROWN ON DON SIRCY FARM

SEEDING DATE: JUNE 6 HARVEST DATE: SEPT 26

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
SACRAMENTO	2080.	54.	11.9	933.	6.6	0.
XPB 212	2056.	54.	12.2	905.	7.8	0.
LK RB88702	1997.	55.	12.0	1050.	5.5	1.
37-16	1996.	54.	12.6	892.	7.1	1.
34-33	1916.	53.	12.3	913.	8.0	1.
31-21	1795.	54.	12.3	964.	6.5	0.
ISABELLA	1707.	55.	12.6	1012.	8.1	1.
31-19	1611.	55.	12.2	961.	7.1	1.
29-21	1598.	55.	12.3	1083.	4.7	0.
40-23	1353.	53.	12.0	971.	5.9	0
GRAND COLUMN MEAN	1811.	54.	12.2	968.	6.7	0.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)**
YIELD LB/A	1810.89	7.899	11.2648	207.56

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** A statistical analysis is conducted on the yield data from all experiments. The grand mean is the average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means there is a 95% chance that yield variations greater than the LSD figure are real.

COLORADO STATE UNIVERSITY - EASTERN COLORADO LIGHT RED KIDNEY BEANS VARIETY TRIALS - 1990 SUMMARY

YIELD (lbs/A)

Entry	Origin	Burlington	% Test Average	Yuma	% Test Average	Average of 2 Locations	% Test Avg. of 2 Locations	Avg. Seeds/lb.	Avg. % Splits	Avg. Test Weight	Avg. % Moisture	Avg. White Mold
XPB 212	ASGROW SEED CO	2056	114	3133	113	2595	114	835	5.1	55	14.2	0.5
LK RB88702	ROGERS BROTHERS	1997	110	3051	110	2524	110	970	4.5	56	14.1	0.5
34-33	SACRAMENTO VALLEY	1916	106	3098	111	2507	109	859	6.3	54	13.9	2.0
SACRAMENTO	SACRAMENTO VALLEY	2080	115	2904	104	2492	110	861	4.8	55	14.0	0.5
37-16	SACRAMENTO VALLEY	1996	110	2947	106	2472	108	835	6.1	55	14.3	1.5
31-21	SACRAMENTO VALLEY	1795	99	2724	98	2260	99	881	5.3	55	14.2	1.0
ISABELLA	MICHIGAN	1707	94	2746	99	2227	97	941	5.7	56	14.6	0.5
29-21	SACRAMENTO VALLEY	1598	88	2637	95	2118	92	999	4.1	55	14.6	0.5
31-19	SACRAMENTO VALLEY	1611	89	2437	88	2024	89	897	5.4	55	14.5	1.5
40-23	SACRAMENTO VALLEY	1353	75	2131	77	1742	76	893	4.6	54	14.5	1.0
PLOT AVG		1811		2781								
LSD (.05)		207.56		316.35								
C.V.		7.899		7.840								

DESCRIPTION OF SPECIAL MARKET CLASS BEANS IN EASTERN COLORADO IRRIGATED VARIETY TRIALS, 1990

FLAMINGO - A pink variety by Idaho Seed Bean.

HAROLD - A pink small but upright vine variety released by the USDA and various states in 1984. It is resistant to fusarium root rot, virus diseases and is drought tolerant.

ISB 462 - An experimental pink variety by Idaho Seed Bean.

MIDNIGHT - A black variety from New York.

NW 59 - A small red vine variety released by the USDA in 1979. It is resistant to viruses and root rot stress.

NW 63 - A small red vine variety released by the USDA in 1979. It is resistant to viruses and root rot stress.

ROSA - A pink vine released by the USDA in 1974. It is resistant to viruses and root rot stress.

RUFUS - A red Mexican variety from the USDA.

STUEBEN YELLOW EYE - A yellow eye variety from New York.

T-39 BLACK - A black vine variety released by California in 1975. It is resistant to viruses, rust and other diseases.

TAYLOR BUSH CRANBERRY - A bush cranberry with rust resistance.

UI 36 - A red Mexican variety from Idaho.

UI 906 - A black variety from Idaho.

VICTOR - A pink small vine variety released by the USDA and various states in 1984. It is resistant to fusarium root rot, virus diseases and is drought tolerant.

VIVA - A pink vine variety released by the USDA in 1974. It is resistant to viruses and root rot stress .

1990 COLORADO SPECIAL MARKET CLASS DRY BEAN VARIETY TRIAL, BURLINGTON GROWN ON DON SIRCY FARM

SEEDING DATE: JUNE 6 HARVEST DATE: SEPT 26

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
SB 462 (Pink)	1858.	60.	10.6	1440.	2.2	6.
FLAMINGO (Pink)	1774.	60.	10.4	1428.	3.2	6.
UI 906 (Black)	1771.	62.	10.6	3202.	3.1	1.
T39 BLACK (Black)	1564.	61.	10.9	2995.	2.2	1.
UI 36 (Red Mexican)	1553.	56.	11.2	1715.	3.4	7.
TAYLOR BUSH CRANBERRY	1464.	50.	11.3	1079.	15.9***	6
STUEBEN YELLOW EYE	1386.	60.	12.1	1208.	6.9	2.
MIDNIGHT (Black)	1234.	61.	11.0	3179.	4.1	1.
VICTOR (Pink)	1014.	59.	11.7	1961.	1.7	6.
RUFUS (Red Mexican)	892.	55.	12.2	1883.	2.2	5.
NW 63 (Small Red)	855.	58.	11.9	1970.	2.2	8.
NW 59 (Small Red)	811.	60.	12.2	2002.	1.4	8.
ROSA (Pink)	808.	58.	12.0	2061.	1.4	6.
VIVA (Pink)	804.	54.	11.8	2102.	2.3	7.
HAROLD (Pink)	747.	60.	11.6	2036.	2.0	7.
GRAND COLUMN MEAN	1236.	58.	11.4	2017.	3.6	5.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)**
YIELD LB/A	1235.67	15.137	19.1689	264.52

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** A statistical analysis is conducted on the yield data from all experiments. The grand mean is average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 or less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means there is a 95% chance that yield variations greater than the LSD figure are real.

*** Split percentage may be unusually high because combine settings are made for the average needed. This may influence yield.

1990 COLORADO SPECIAL MARKET CLASS DRY BEAN VARIETY TRIAL, EATON GROWN ON ED CROISSANT FARM

SEEDING DATE: MAY 25 HARVEST DATE: SEPT 8

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEEDS /LB	PCT SPLIT	WHITE* MOLD 0-9
VIVA (Pink)	2696.	61.	10.0	1812.	4.5	2.
NW 63 (Small Red)	2614.	63.	11.9	1555.	3.1	3.
HAROLD (Pink)	2554.	61.	11.1	1493.	3.8	3.
VICTOR (Pink)	2529.	60.	11.0	1486.	5.2	2.
FLAMINGO (Pink)	2507.	60.	9.6	1355.	5.2	3.
UI 906 (Black)	2490.	62.	9.3	2898.	4.0	0.
NW 59 (Small Red)	2489.	62.	12.4	1759.	1.8	4.
RUFUS (Red Mexican)	2481.	60.	12.2	1643.	2.9	3.
ROSA (Pink)	2427.	60.	12.7	1640.	2.5	2.
UI 36 (Red Mexican)	2425.	60.	11.3	1530.	5.8	2.
ISB 462 (Pink)	2379.	59.	10.5	1350.	5.8	3.
MIDNIGHT (Black)	2344.	61.	11.9	3179.	3.0	0.
T39 BLACK (Black)	2234.	62.	10.1	2989.	6.3	0.
STUEBEN YELLOW EYE	1943.	58.	10.8	1262.	9.8	0.
TAYLOR BUSH CRANBERRY	1909.	56.	9.8	987.	23.2***	0.
GRAND COLUMN MEAN	2401.	60.	11.0	1796.	5.8	2.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)**
YIELD LB/A	2401.35	6.868	7.2438	233.24

* White mold ratings were visual observations. 0 = none, 9 = worst possible infection.

** A statistical analysis is conducted on the yield data from all experiments. The grand mean is average of all varieties. The coefficient of variation is a mathematical evaluation of the field variation or other variation that occurred by chance. A CV of 10 of less is considered very good. A CV of higher than 10 indicates that some factor such as disease infestation that is not completely uniform. F ratio is a mathematical determination of the significance of data. LSD stands for Least Significant Difference and at .05 means there is a 95% chance that yield variations greater than the LSD figure are real.

*** Split percentage may be unusually high because combine settings are made for the average needed. This may influence yield.

COLORADO STATE UNIVERSITY - EASTERN COLORADO SPECIAL MARKET CLASS BEANS VARIETY TRIALS - 1990 SUMMARY

YIELD (lbs/A)

Entry	Origin	Burlington	% Test Average	Eaton	% Test Average	Average of 2 Locations	% Test Avg. of 2 Locations	Avg. Seeds/lb.	Avg. % Splits	Avg. Test Weight	Avg. % Moisture	Avg. White Mold
FLAMINGO	IDAHO SEED BEAN	1774	144	2507	104	2141	124	1392	4.2	60.0	10.0	3.0
UI 906	IDAHO	1771	143	2490	104	2131	124	3050	3.6	62.0	10.0	0.5
ISB 462	IDAHO SEED BEAN	1858	150	2379	99	2119	125	1395	4.0	59.5	10.6	3.0
UI 36	IDAHO	1553	126	2425	101	1989	114	1623	4.6	58.0	11.3	5.0
T39 BLACK	CALIFORNIA	1564	127	2234	93	1899	110	2992	4.3	61.5	10.5	0.5
MIDNIGHT	NEW YORK	1234	100	2344	98	1789	99	3179	3.6	61.0	11.5	0.5
VICTOR	USDA	1014	82	2529	105	1772	94	1724	3.5	59.5	11.4	4.0
VIVA	USDA	804	65	2696	112	1750	89	1957	3.4	57.5	10.9	4.5
NW 63	USDA	855	69	2614	109	1735	89	1763	2.7	60.5	11.9	5.5
TAYLOR BUSH CRANBERRY		1464	118	1909	80	1687	99	1033	19.6	53.0	10.6	3.0
RUFUS	USDA	892	72	2481	103	1687	88	1763	2.6	57.5	12.2	4.0
STUEBEN YELLOW EYE	NEW YORK	1386	112	1943	81	1665	97	1235	8.4	59.0	11.5	1.0
HAROLD	USDA	747	60	2554	106	1651	83	1765	2.9	60.5	11.4	5.0
NW 59	USDA	811	66	2489	104	1650	85	1881	1.6	61.5	12.3	4.0
ROSA	USDA	808	65	2427	101	1618	83	1851	2.0	59.0	12.4	4.0
PLOT AVG		1236		2401								
LSD (.05)		264.52		233.24								
C.V.		15.137		6.868								

* TEST WEIGHTS TAKEN AT BURLINGTON ONLY

INDEX OF SPONSORS, ENTRIES ANDLOCATIONS WHERE VARIETIES WERE TESTED IN 1990.

(X) INDICATES VARIETY WAS PLANTED AT DESIGNATED LOCATIONS.

Seed Company	Brand/Variety	Burlington Dryland		Burlington Irrigated		Fleming Dryland		Julesburg Dryland		Wray Dryland	
		Oil	Confection	Oil	Confection	Oil	Confection	Oil	Confection	Oil	Confection
AgriGene Seed Res 11331 Aurora Ave. Desmoines, IA 60322 (515) 270-2474	AgriGene AG820	X								X	
Agway Inc. P.O. Box 169 Grandin, ND 58038 (701) 484-5313	Royal Hybrid 381 Royal Hybrid 4381		X X		X X				X X		X X
Cargill Hybrid Seeds 1401 41st St. NW Fargo, ND 58102 (701) 282-8787	Cargill SF 100A Cargill SF 187 A Cargill SF 102A Cargill X 1208A	X X X X		X X X X						X X X X	
Dahlgren & Co., Inc. Box 609 Crookston, MN 50716 (218) 281-2985	Dahlgren D151 Dahlgren D0838	X	X								
DeKALB-PLANT GENETICS 3100 Sycamore Rd. DeKalb, IL 60115 (815) 756-7333	DK3861 (Master) DK399 G100 DK3890 DK3870 (Record) DK3800 (Sprint)	X X X X X X		X X X X X X							
Garst Seed Co. Box 324 Kindred, ND 58015 (701) 428-3194	Hysun 340 Hysun 354 Hysun 7622 Hysun 330	X X X X		X X X X				X X X X		X X X X	
Genetics Resources, Inc. Rt. 1, P.O. Box 248 Philo, IL 61684 (217) 684-2783	GRI 881 GRI 8803 GRI 8807 GRI 8806 GRI 89101 GRI 89102	X X X X X X		X X X X X X		X X X X X X				X X X X X X	
GroAgri Seed Co. P.O.. Box 1656 Lubbock, TX 79408 (806) 747-6225	Kaystar Brand 362 Kaystar Brand 381			X X		X X		X X			
Interstate Seed Co. P.O. Box 338 1215 Prarie Pkwy. West Fargo, ND 58038 (701) 282-7338	IS 3311 IS EXP 33265 IS EXP 73130 IS 8004 IS 920 IS 921	X X X	X X X		X	X X		X X		X X X	
Jacques Seed Co. 720 St. Croix St. Prescott, WI 54021	Commando EX 9051	X X		X X		X X		X X		X X	
Kaystar Seed P.O. Box 947 702 3rd Street SW Huron, SD 57350 (605) 352-8791	Sunbird II		X		X				X		
Pioneer Hi-Bred International, Inc. 18285 County Rd. 96 Woodland, CA 95695 (916) 666-1084	Pioneer 6240 Pioneer 6440 Pioneer XF 4615	X X X								X X X	
Triumph Seed Co., Inc. P.O. Box 1050 Ralls, TX 79395 (806) 253-2584	Triumph TRX 92 Triumph 548A Triumph 560A Triumph 565 Triumph 505C Triumph 515C Triumph 525C	X X X X	X X X	X X X X	X X X	X X X		X X X		X X X X	

1990 COLORADO DRYLAND OIL SUNFLOWER VARIETY TRIAL, BURLINGTON

SEEDING DATE: JUNE 18 HARVEST DATE: OCT 24

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	PLANT HT-IN	PLANT /AC M	PCT. LODGE	% OIL
GRI 8803	1850.	27.2	8.2	47.	14.6	1.0	43.9
CARGILL SF 187 A	1641.	26.2	7.4	40.	15.3	2.1	40.1
GRI 8807	1621.	27.5	8.2	52.	13.8	1.3	45.9
CARGILL SF 100 A	1590.	27.2	8.2	42.	14.1	1.4	38.6
PIONEER 6440	1558.	26.7	7.5	48.	14.1	1.2	42.8
GRI 8806	1543.	28.3	8.4	45.	13.9	2.8	43.1
IS EXP 33265	1539.	27.4	7.6	49.	14.4	2.0	41.0
AGRIGENE AG 820	1533.	26.7	7.6	47.	14.6	2.7	43.2
IS EXP 73130	1529.	27.0	8.6	53.	13.3	1.5	39.9
PIONEER XF 4615	1523.	26.9	7.6	46.	13.0	3.1	43.7
DEKALB-PFIZER G100	1518.	25.6	7.7	49.	14.5	2.1	42.5
DEKALB-PFIZER DK3890	1516.	26.2	7.8	46.	12.4	1.8	40.4
CARGILL SF 102 A	1508.	28.0	7.5	49.	14.1	1.3	41.9
GRI 881	1505.	27.0	7.6	46.	15.4	2.8	43.6
DEKALB-PFIZER DK3800	1495.	25.2	7.1	46.	13.9	1.3	41.2
TRIUMPH 560A	1476.	27.4	7.7	44.	14.4	1.5	41.6
IS 3311	1464.	27.6	8.0	45.	14.1	2.5	41.5
TRIUMPH 565	1460.	29.0	7.7	44.	14.2	3.1	44.1
CARGILL X 1208 A	1455.	26.4	7.9	41.	14.7	3.7	39.1
PIONEER 6240	1453.	26.2	7.5	41.	13.9	4.3	42.7
DAHLGREN DO838	1438.	27.5	7.5	47.	13.6	1.6	41.5
DEKALB-PFIZER DK3861	1436.	26.6	7.4	46.	14.3	2.4	43.5
TRIUMPH TRX 92	1421.	25.0	7.2	48.	15.3	3.5	40.9
DEKALB-PFIZER DK3870	1409.	26.3	7.2	47.	14.4	2.5	43.1
HYSUN 340	1399.	25.4	7.8	45.	14.4	4.7	40.2
GRI 89101	1397.	25.9	10.2	44.	14.1	3.5	40.2
HYSUN 354	1395.	25.7	7.5	45.	14.4	3.1	41.6
TRIUMPH 548A	1363.	26.5	7.2	45.	14.3	1.2	41.5
COMMANDO	1359.	26.0	7.8	46.	12.3	2.6	41.3
HYSUN 7622	1304.	27.4	7.8	39.	10.8	4.1	41.0
HYSUN 330	1214.	23.8	7.5	48.	14.0	2.6	38.1
EX 9051	1182.	27.5	8.3	42.	9.9	4.3	42.4
GRI 89102	1170.	25.9	8.2	52.	13.8	10.6	42.4
DEKALB-PFIZER DK399	1169.	25.0	7.6	42.	13.3	1.5	39.3
GRAND COLUMN MEAN	1454.	26.6	7.8	46.	13.9	2.7	41.7

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1453.86	12.995	2.1878	264.51

SUMMARY OF SUNFLOWER OIL VARIETY PERFORMANCE TEST BURLINGTON (DRYLAND), CO 1989-90

BRAND	VARIETY	YIELD 1990	YIELD 1989	YIELD 1988	% AVERAGE TEST 1990	% AVERAGE TEST 1989	% AVERAGE TEST 1988	% AVERAGE TEST 2-YR	% AVERAGE TEST 3-YR
CARGILL	SF 100A	1590	1612	—	109	79	—	94	—
CARGILL	SF 102A	1508	1942	—	104	96	—	100	—
CARGILL	SF 187A	1641	1846	—	113	91	—	102	—
GARST SEED	HYSUN 340	1399	2062	—	96	102	—	99	—
GARST SEED	HYSUN 354	1395	2253	—	96	111	—	104	—
JACQUES	COMMANDO	1359	2304	—	94	113	—	104	—
PIONEER	6440	1558	1717	—	107	85	—	96	—
TRIUMPH	548A	1363	2614	—	94	129	—	112	—
TRIUMPH	560A	1476	2154	—	102	106	—	104	—
TRIUMPH	565	1460	1890	—	100	93	—	97	—
AVERAGE LISTED VARIETIES		1475	2039	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		1454	2032	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS. COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO DRYLAND CONFECTION SUNFLOWER VARIETY TRIAL, BURLINGTON

SEEDING DATE: JUNE 18 HARVEST DATE: OCT 24

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEED /LB	PLANT HT-IN	PLANT /AC M	PCT. LODGE
SUNBIRD II	1524.	26.4	10.1	5731.	55.	11.3	0.0
TRIUMPH 505C	1427.	22.0	8.0	5023.	49.	12.7	1.7
IS 921	1362.	21.2	8.5	4914.	48.	13.1	3.1
IS 8004	1354.	22.0	8.1	5014.	50.	11.5	4.2
DAHLGREN D151	1285.	21.0	8.6	4859.	47.	8.5	3.4
IS 920	1255.	22.3	8.1	5250.	45.	13.2	1.7
TRIUMPH 525C	1234.	20.5	8.0	5232.	51.	11.0	3.1
TRIUMPH 515C	1177.	21.4	8.6	5041.	43.	11.8	2.1
ROYAL HYBRID 4381	1167.	21.0	8.3	4995.	49.	12.3	5.6
ROYAL HYBRID 381	1147.	21.5	8.8	4896.	46.	11.2	2.0
GRAND COLUMN MEAN	1293.	21.9	8.5	5096.	48.	11.7	2.7

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1293.14	15.573	1.4820	292.20

SUMMARY OF SUNFLOWER CONFECTION VARIETY PERFORMANCE TEST, BURLINGTON (DRYLAND), CO - 1989-90

		YIELD			% AVERAGE TEST				
BRAND	VARIETY	1990	1989	1988	1990	1989	1988	2-YR	3-YR
AGWAY, INC.	ROYAL HYBRID 381	1147	1917	—	89	99	—	94	—
KAYSTAR SEED	SUNBIRD II	1524	2259	—	118	117	—	118	—
TRIUMPH	505C	1427	1901	—	110	98	—	104	—
TRIUMPH	515C	1177	1781	—	91	92	—	92	—
AVERAGE LISTED VARIETIES		1319	1965	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		1293	1937	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS.COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO IRRIGATED OIL SUNFLOWER VARIETY TRIAL, BURLINGTON

SEEDING DATE: JUNE 26 HARVEST DATE: NOV 13

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	PLANT HT-IN	PLANT /AC M	BLOOM DATE	PCT. LODGE	% OIL
GRI 89101	3027.	36.2	6.3	66.	16.2	237.	5.4	41.4
GRI 8807	2958.	35.5	6.0	78.	17.2	240.	2.6	42.3
GRI 89102	2924.	36.6	6.4	71.	15.9	236.	4.2	42.2
DEKALB-PFIZER G100	2761.	33.9	6.0	65.	14.5	237.	5.7	42.0
TRIUMPH 565	2749.	36.8	5.8	66.	16.7	237.	3.7	45.9
GRI 881	2687.	36.8	6.1	65.	14.6	239.	4.3	41.8
DEKALB-PFIZER DK3870	2670.	33.4	5.8	65.	14.8	240.	6.4	45.8
CARGILL SF 187 A	2662.	34.2	6.1	62.	17.5	241.	2.8	43.7
DEKALB-PFIZER DK3890	2625.	34.0	6.4	61.	11.5	237.	2.0	43.0
GRI 8803	2585.	36.4	6.1	66.	16.6	236.	2.6	43.4
SUNGRO 381	2581.	36.8	5.9	66.	17.4	238.	3.9	43.2
SUNGRO 362	2536.	36.0	6.0	62.	12.8	233.	4.9	43.0
GRI 8806	2473.	35.8	6.2	67.	16.3	234.	5.4	43.1
CARGILL SF 102 A	2447.	35.5	5.9	65.	15.7	236.	4.2	45.0
HYSUN 354	2336.	33.5	5.9	63.	14.7	235.	3.8	44.4
TRIUMPH 560A	2311.	36.7	5.8	65.	15.5	239.	3.6	45.3
DEKALB-PFIZER DK399	2296.	34.6	5.9	61.	14.7	237.	2.1	44.8
HYSUN 7622	2262.	35.5	5.9	56.	11.9	234.	5.3	40.5
DEKALB-PFIZER DK3861	2226.	35.0	5.9	64.	17.7	237.	4.0	42.3
CARGILL X 1208 A	2225.	34.4	6.2	54.	15.0	236.	4.4	41.7
TRIUMPH 548A	2214.	34.3	5.9	64.	15.5	238.	3.5	44.9
CARGILL SF 100 A	2146.	34.9	6.0	59.	15.0	238.	2.1	41.4
COMMANDO	2116.	36.0	6.3	60.	12.0	234.	4.0	40.6
EX 9051	2036.	36.2	6.0	68.	11.1	235.	4.0	41.6
HYSUN 340	2017.	33.0	6.0	65.	15.3	234.	3.8	41.3
DEKALB-PFIZER DK3800	1955.	34.4	5.7	63.	15.4	238.	3.3	45.9
HYSUN 330	1946.	33.8	5.9	64.	13.6	234.	5.5	44.2
TRIUMPH TRX 92	1746.	35.3	5.9	65.	15.9	234.	5.2	40.1
GRAND COLUMN MEAN	2411.	35.2	6.0	64.	15.0	237.	4.0	43.0

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	2411.26	10.024	7.5774	338.40

SUMMARY OF SUNFLOWER OIL VARIETY PERFORMANCE TEST, BURLINGTON (IRRIGATED), CO - 1989-90

		YIELD			% AVERAGE TEST				
BRAND	VARIETY	1990	1989	1988	1990	1989	1988	2-YR	3-YR
CARGILL	SF 100A	2146	2364	—	90	102	—	96	—
CARGILL	SF 102A	2447	2160	—	102	94	—	98	—
CARGILL	SF 187A	2662	2493	—	111	108	—	110	—
GARST SEED	HYSUN 340	2017	2432	—	84	105	—	100	—
GARST SEED	HYSUN 354	2336	2286	—	98	99	—	99	—
TRIUMPH	548A	2214	2228	—	92	96	—	94	—
TRIUMPH	560A	2311	2394	—	97	104	—	101	—
TRIUMPH	565	2749	2334	—	115	101	—	108	—
AVERAGE LISTED VARIETIES		2360	2336	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		2396	2311	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS.COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO IRRIGATED CONFECTION SUNFLOWER VARIETY TRIAL, BURLINGTON

SEEDING DATE: JUNE 26 HARVEST DATE: NOV 13

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEED /LB	PLANT HT-IN	PLANT /AC M	BLOOM DATE	PCT. LODGE
TRIUMPH 505C	2474.	24.9	6.5	3760.	67.	12.	237.	8.7
SUNBIRD II	2297.	30.2	6.5	4796.	70.	12.	240.	8.0
ROYAL HYBRID 4381	2278.	24.2	6.6	3760.	68.	12.	242.	8.4
TRIUMPH 515C	2211.	25.8	6.4	4342.	65.	12.	239.	9.8
IS 8004	2121.	26.1	5.9	4033.	66.	11.	237.	7.4
ROYAL HYBRID 381	1994.	25.0	6.9	3869.	66.	12.	238.	3.8
TRIUMPH 525C	1992.	23.2	6.4	3724.	62.	9.	239.	5.1
GRAND COLUMN MEAN	2195.	25.6	6.4	4041.	66.	11.	239.	7.3

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	2195.26	13.597	1.3668	443.45

SUMMARY OF SUNFLOWER CONFECTION VARIETY PERFORMANCE TEST, BURLINGTON (IRRIGATED), CO - 1989-90

		YIELD			% AVERAGE TEST				
BRAND	VARIETY	1990	1989	1988	1990	1989	1988	2-YR	3-YR
AGWAY, INC.	ROYAL HYBRID 381	1994	1953	—	92	87	—	90	—
KAYSTAR SEED	SUNBIRD II	2297	2632	—	106	118	—	112	—
TRIUMPH	505C	2427	2283	—	112	102	—	107	—
TRIUMPH	515C	2211	2154	—	102	96	—	99	—
AVERAGE LISTED VARIETIES		2232	2256	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		2161	2240	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS.COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN*

1990 COLORADO DRYLAND OIL SUNFLOWER VARIETY TRIAL, FLEMING

SEEDING DATE: JUNE 12 HARVEST DATE: OCT 26

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	PLANT HT-IN	PLANT /AC M	PCT. LODGE	% OIL
GRI 8807	1870.	27.5	7.3	53.	10.3	0.0	42.6
GRI 89101	1799.	27.4	9.4	47.	10.8	0.0	38.8
SUNGRO 381	1797.	27.0	7.9	42.	13.1	0.0	37.9
IS EXP 33265	1653.	26.0	7.4	43.	11.1	0.0	39.4
TRIUMPH 565	1635.	28.8	6.7	42.	11.4	0.0	41.8
TRIUMPH 560A	1622.	28.7	6.3	42.	11.9	0.0	40.8
COMMANDO	1599.	26.2	6.9	42.	9.5	0.9	37.6
TRIUMPH 548A	1587.	26.1	6.6	45.	10.3	0.0	40.9
GRI 8803	1555.	27.0	7.9	44.	11.9	0.0	38.6
IS 3311	1548.	26.4	7.0	41.	12.6	0.0	38.3
SUNGRO 362	1468.	27.0	6.2	45.	11.4	0.0	37.6
EX 9051	1461.	26.8	6.8	39.	9.6	0.0	38.6
GRI 8806	1443.	26.6	7.5	38.	10.2	0.4	39.3
GRI 881	1395.	26.5	8.0	40.	11.0	0.0	38.5
GRI 89102	1362.	26.0	8.5	48.	9.9	0.3	38.4
GRAND COLUMN MEAN	1586.	26.9	7.4	43.	11.0	0.1	39.3

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1586.45	14.997	1.6058	336.46

1990 COLORADO DRYLAND OIL SUNFLOWER VARIETY TRIAL, JULESBURG

SEEDING DATE: JUNE 12 HARVEST DATE: OCT 25

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	PLANT HT-IN	PLANT /AC M	PCT. LODGE	% OIL
IS 3311	1643.	24.6	8.0	53.	14.4	3.9	37.3
HYSUN 330	1631.	23.8	8.9	52.	12.3	4.4	36.0
HYSUN 7622	1610.	25.2	7.8	51.	12.8	3.8	35.5
IS EXP 33265	1596.	24.0	7.8	54.	12.9	1.0	37.8
SUNGRO 362	1589.	24.5	7.8	51.	12.6	15.9	35.7
HYSUN 354	1534.	24.7	7.8	49.	12.6	5.9	37.7
TRIUMPH 548A	1515.	24.2	8.1	52.	14.5	1.8	38.1
SUNGRO 381	1413.	24.2	8.4	50.	14.1	2.9	37.4
EX 9051	1393.	26.0	7.9	50.	11.4	9.0	38.3
HYSUN 340	1390.	23.8	8.1	49.	13.8	6.0	37.8
COMMANDO	1387.	25.7	8.3	49.	12.2	9.3	36.2
TRIUMPH 560A	1386.	26.2	8.1	51.	14.2	7.3	39.6
TRIUMPH 565	1345.	25.3	7.8	50.	13.2	8.7	38.4
GRAND COLUMN MEAN	1495.	24.8	8.1	51.	13.1	6.2	37.4

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1494.84	14.131	1.1113	301.87

1990 COLORADO DRYLAND CONFECTION SUNFLOWER VARIETY TRIAL, JULESBURG

SEEDING DATE: JUNE 12 HARVEST DATE: OCT 25

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEED /LB	PLANT HT-IN	PLANT /AC M	PCT LODGE
ROYAL HYBRID 381	1459.	20.0	11.0	5023.	58.	10.	3.1
ROYAL HYBRID 4381	1349.	19.1	9.9	5359.	55.	13.	3.8
SUNBIRD II	1298.	22.6	9.5	6040.	64.	11.	5.3
GRAND COLUMN MEAN	1369.	20.6	10.1	5474.	59.	11.	4.0

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1368.76	16.177	0.5504	383.14

1990 COLORADO DRYLAND OIL SUNFLOWER VARIETY TRIAL, WRAY

SEEDING DATE: JUNE 23 HARVEST DATE: NOV 1

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	PLANT HT-IN	PLANT /AC M	PCT. LODGE	% OIL
HYSUN 354	1913.	28.4	5.1	57.	13.6	3.0	40.8
GRI 8806	1888.	31.2	5.4	58.	13.4	1.3	40.6
CARGILL SF 187 A	1885.	29.7	4.8	48.	14.4	0.6	37.9
AGRIGENE AG 820	1806.	28.4	5.3	57.	12.4	4.3	38.6
TRIUMPH 560A	1800.	32.0	4.9	56.	14.7	1.2	42.6
IS 3311	1774.	28.5	5.0	55.	12.2	3.6	40.2
TRIUMPH 565	1741.	30.1	4.8	54.	14.0	2.8	40.1
CARGILL SF 100 A	1735.	29.7	4.9	49.	15.1	1.5	36.8
PIONEER 6440	1730.	29.9	4.9	61.	13.2	1.4	40.3
GRI 89102	1671.	32.0	5.6	68.	14.3	12.9	40.4
GRI 89101	1660.	31.3	6.3	59.	13.0	4.0	38.4
GRI 8803	1649.	28.5	4.8	60.	14.0	1.4	40.5
PIONEER 6240	1648.	27.5	4.8	55.	14.1	3.4	36.8
IS EXP 33265	1633.	29.8	5.0	63.	13.3	0.0	39.3
COMMANDO	1621.	29.2	5.0	58.	14.1	5.1	38.3
TRIUMPH TRX 92	1579.	28.8	4.8	54.	13.3	0.6	38.2
GRI 8807	1567.	31.5	5.2	66.	13.7	3.6	42.9
CARGILL SF 102 A	1563.	32.1	5.2	64.	13.3	5.6	41.3
TRIUMPH 548A	1517.	28.4	4.9	59.	13.8	3.3	40.8
IS EXP 73130	1515.	30.0	5.4	63.	11.4	1.9	38.6
EX 9051	1498.	31.1	4.9	54.	13.2	4.3	38.5
GRI 881	1413.	30.6	5.0	55.	13.3	5.8	37.0
HYSUN 7622	1385.	28.2	4.7	51.	11.9	0.8	32.6
PIONEER XF 4615	1379.	28.5	5.2	55.	12.0	1.9	39.5
HYSUN 330	1368.	27.4	5.0	59.	11.7	4.6	36.7
HYSUN 340	1368.	27.5	4.9	57.	13.7	3.8	38.8
CARGILL X 1208 A	1074.	28.2	5.1	44.	12.5	0.0	36.3
GRAND COLUMN MEAN	1607.	29.6	5.1	57.	13.3	3.1	39.0

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1606.68	17.357	1.9477	390.45

SUMMARY OF SUNFLOWER OIL VARIETY PERFORMANCE TEST WRAY, CO - 1989-90

		YIELD			% AVERAGE TEST				
BRAND	VARIETY	1990	1989	1988	1990	1989	1988	2-YR	3-YR
CARGILL	SF 100A	1735	1200	—	99	84	—	92	—
CARGILL	SF 102A	1729	1507	—	99	106	—	103	—
CARGILL	SF 187A	1954	1487	—	112	104	—	108	—
GARST SEED	HYSUN 340	1368	1344	—	78	94	—	86	—
GARST SEED	HYSUN 354	2134	1349	—	122	95	—	109	—
INTERSTATE	IS 3311	1774	1362	—	101	96	—	99	—
INTERSTATE	IS EXP33265	1633	1493	—	93	105	—	99	—
JACQUES	COMMANDO	2019	1543	—	115	108	—	112	—
PIONEER	6440	1818	1475	—	104	104	—	104	—
TRIUMPH	548A	1748	1509	—	100	106	—	103	—
TRIUMPH	560A	1948	1446	—	111	102	—	107	—
TRIUMPH	565	1857	1512	—	106	106	—	106	—
AVERAGE LISTED VARIETIES		1810	1436	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		1750	1425	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS. COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN

1990 COLORADO DRYLAND CONFECTION SUNFLOWER VARIETY TRIAL, WRAY

SEEDING DATE: JUNE 23 HARVEST DATE: NOV 1

VARIETY NAME	YIELD LB/A	TEST WEIGHT	MOIST PCT	SEED /LB	PLANT HT-IN	PLANT /AC M	PCT LODGE
ROYAL HYBRID 381	1189.	24.0	6.3	5223.	64.	10.5	3.
ROYAL HYBRID 4381	1051.	22.6	6.3	5041.	68.	11.2	9.
GRAND COLUMN MEAN	1120.	23.3	6.3	5132.	66.	10.8	6.

COLUMN	GRAND MEAN	COEF VAR	F RATIO	LSD (.05)
YIELD LB/A	1120.00	13.075	1.7603	329.48

SUMMARY OF SUNFLOWER CONFECTION VARIETY PERFORMANCE TEST, WRAY, CO - 1989-90

		YIELD			% AVERAGE TEST				
BRAND	VARIETY	1990	1989	1988	1990	1989	1988	2-YR	3-YR
AGWAY, INC.	ROYAL HYBRID 381	1189	1054	—	106	96	—	101	——
AVERAGE LISTED VARIETIES		1189	1054	—					
AVERAGE ALL VARIETIES IN EXPERIMENT		1120	1104	—					

VARIETIES LISTED WERE PLANTED AT LEAST TWO OF THE LAST THREE YEARS.COMPARE VARIETIES ONLY WITHIN THEIR RESPECTIVE AVERAGE YEAR COLUMN

SUNFLOWER DATE OF PLANTING STUDY

Dale Ridder, Burlington

1990

Stan Pilcher, Golden Plains Extension Entomologist
Ron Meyer, Golden Plains Area Agronomist
Frank Peairs, CSU Extension Entomologist

A study to determine the optimum planting date for sunflowers within the Colorado High Plains is currently being researched. Objectives of the study include not only planting date versus sunflower yield but perhaps just as important, a planting date's influence of insect activity on sunflower. Four planting dates were studied using the confection hybrid Triumph 505C. Planting date 1 was June 5, date 2 June 11, date 3 June 18, and date 4 June 25. Plot design was completely randomized and individual plot size was 100 by 200 feet. Bloom dates were as follows: date 1 July 31, date 2 August 8, date 3 August 15, date 4 August 20. Physiological maturities were noted as follows: planting date 1 was September 5, date 2 September 10, date 3 September 13, and date 4 September 19.

Discussion:

Sunflower head moth, banded sunflower head moth, and seed weevil damage was evaluated by randomly harvesting ten 8 to 10 inch sunflower heads, dissecting each head and noting damaged seed by insect numbers and species (Graph I). Results indicate no statistical difference, however, highest numbers of seed weevil damaged seed was noted on the second planting date. Head moth number differences between planting date were also non-significant, however, damaged seed numbers decreased after the second planting date. Although these differences were not statistically different, due mainly to insect number variation between heads, it was apparent that there was less damage on the last planting date. Pheremone trap numbers of head moth number as correlated to bloom dates further substantiates a decrease in head moth number with the last planting date (Graph II).

Summary:

Based on 1-year's data, early planted sunflowers (June 5 - June 11) yield significantly higher than later planting dates (June 18 - June 25). Sunflower seed quality was also significantly higher for early planting dates. Test weight decreased while harvest moisture increased with later planting dates (Table 1).

Although only one year's worth of data has been collected, trends were noted as a response to planting date. Further study is needed in this field.

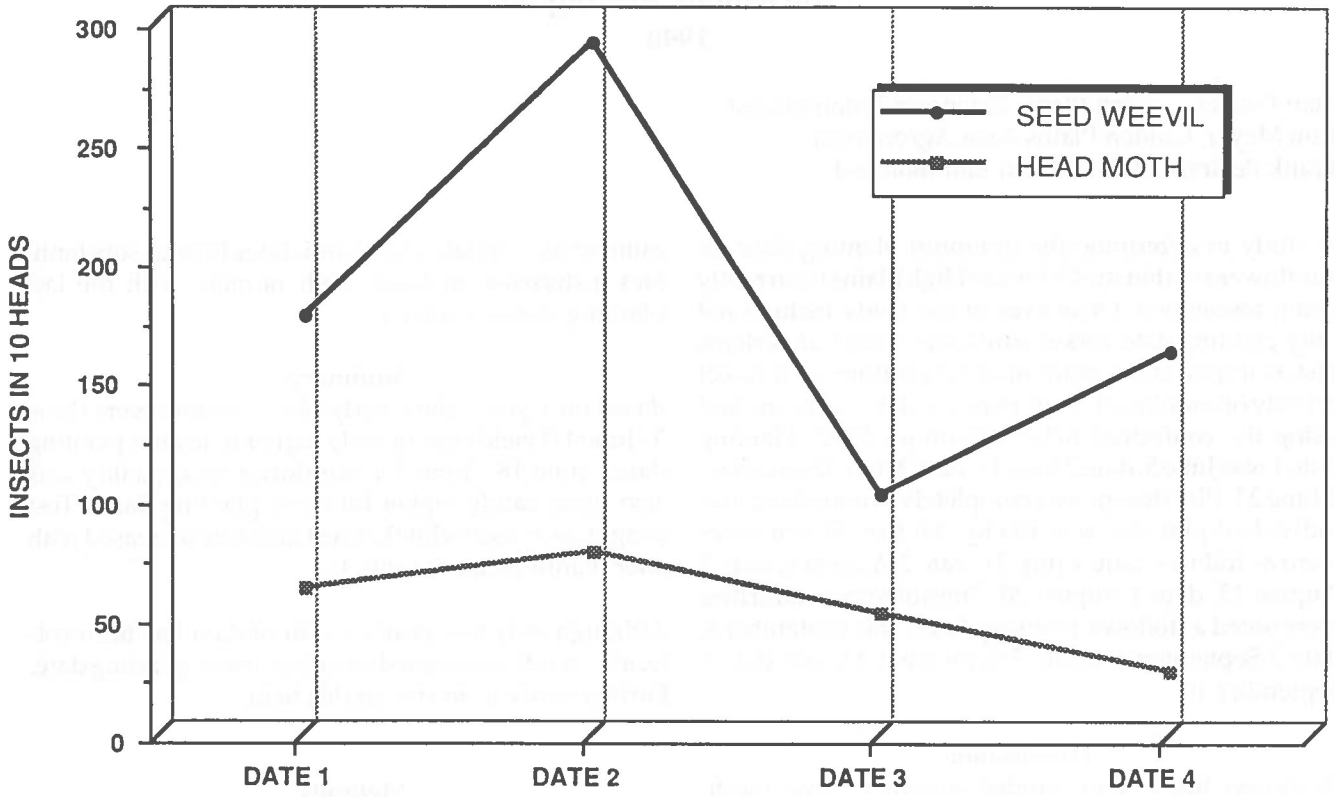
Methods:

Planter:	John Deere Maximerge (2-row) 30-inch row spacing
Population:	17,500 per acre
	Prowl 2 pints per acre
	10 heads sampled per treatment for insect counts - hand harvested
	Each plot was cultivated twice
Soil type:	Norka-Colby Silt Loam
Irrigation:	Pre-irrigated 1.5" 3.0" during growing season
Yields:	Hand harvested samples
Fertility:	40 lbs. actual N + 40 lbs. actual P205
Irrigation Type:	Center pivot

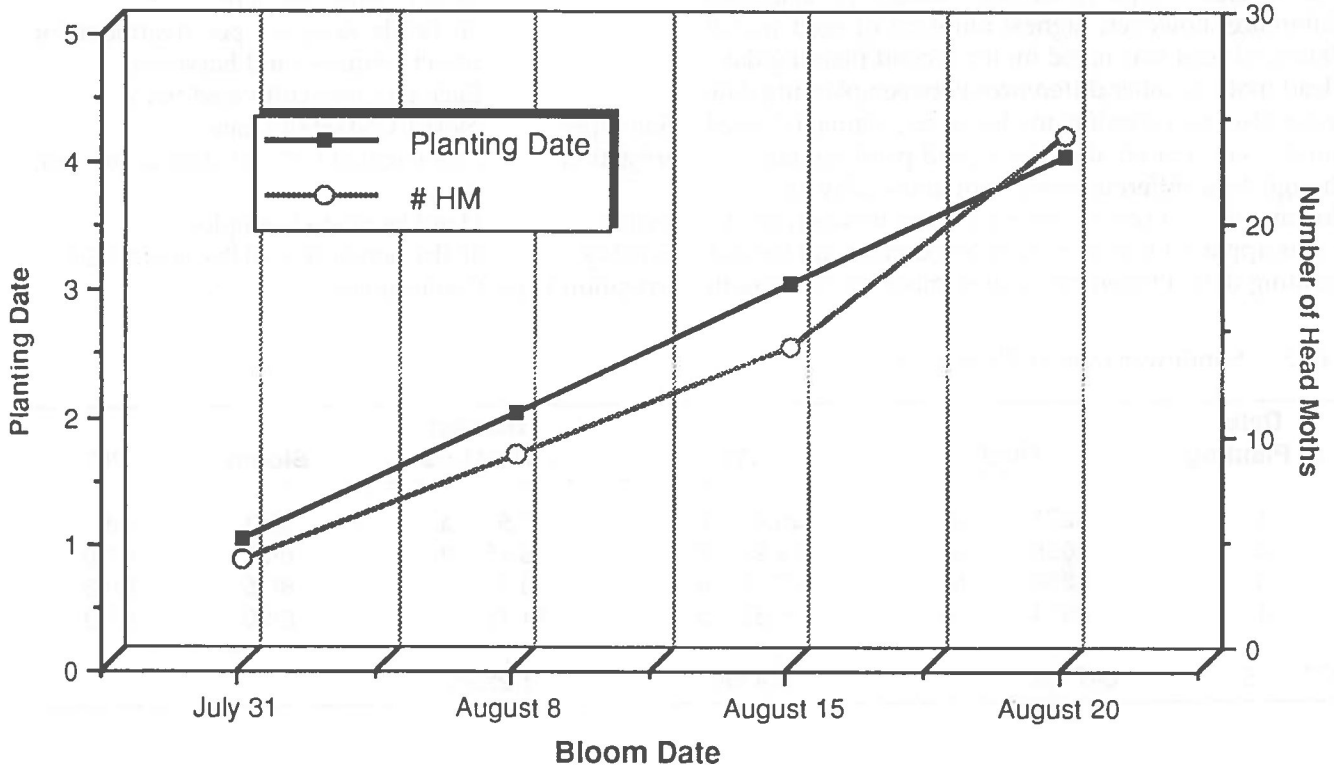
Table 1. Sunflower Date of Planting Study

Date of Planting	Yield		TW		Harvest Moisture		Bloom	PM
1	3271	a	20.8	a	7.9	a	7/31	9/5
2	3058	a	19.98	a	8.75	a	8/8	9/10
3	2260	b	20.02	a	9.3	b	8/15	9/13
4	2814	ab	16.52	b	11.73	d	8/20	9/19
LSD 0.05	647 lbs.		3.4 lbs		1.226%			

Graph I. Effect of planting date on Sunflower pests.



Graph II. Bloom date and Sunflower Head Moth and Banded Sunflower Head Moth pheremone trap numbers by date



NITROGEN AND WINTER WHEAT PRODUCTION

Ron F. Meyer, Golden Plains Area Agronomist

Wheat responds very well to nitrogen fertilization in most years, but recent research has suggested that timing nitrogen applications affects both wheat yields and protein contents.

Fall is the typical time of year to apply nitrogen fertilizer to wheat in the Golden Plains Area. Fall applied nitrogen has a major advantage in that it can be combined with seedbed preparation activities, making this an attractive time to distribute a crop's nitrogen needs. But factors affecting whether nitrogen that is applied in fall remains available include both nitrate leaching and denitrification. Leaching occurs because nitrogen is highly mobile in soil and moves with water rather freely. As a result, water moving through a soil profile can "flush" nitrogen below crop root zones, making it unavailable to the crop. Denitrification occurs naturally in soils and is simply a process that breaks nitrogen down to forms not usable by plants. This transformation can occur within two or three days in poorly aerated soil. Hence, the longer applied nitrogen remains in the soil before crops can utilize it, the greater the risk of losing it.

According to Vaughan, et. al., spring nitrogen applications to winter wheat will not only increase yields but protein contents as well. Recent data indicates spring-applied nitrogen increases grain yields more than either fall- or split-applied nitrogen. Fall applied required 20% more nitrogen than spring applied to achieve the same grain yield.

Spring applied nitrogen should not be spread after April 15. Nitrogen applied after wheat is in the jointing stage will increase grain protein, but not grain yield. An advantage to topdressing a solid or liquid nitrogen source in the spring gives producers an opportunity to evaluate winter kill losses as well as soil moisture supplies.

These researchers did, however, state that a wheat grower's primary concern should be the decision to apply nitrogen fertilizer at correct rates. Best management practices dictate soil testing for determining correct fertilizer rates. After soil tests have indicated correct nitrogen rates secondary concerns should focus on nitrogen application timing.

Source: Vaughan, B., D.G. Westfall, and K.A. Barbarik. 1990. Nitrogen rate and timing effects on winter wheat grain yield, grain protein, and economics. Journal of Production Agriculture. 3:324-325.

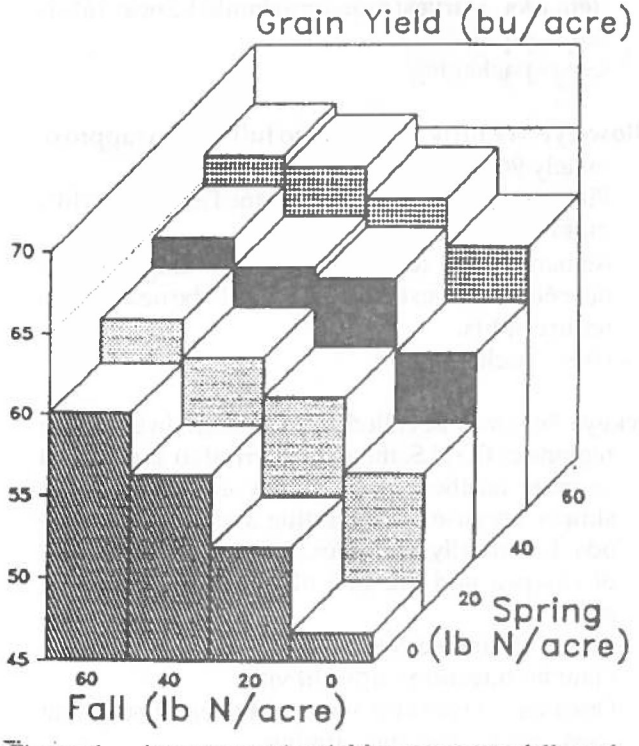


Figure 1. Average grain yield response to fall- and spring-applied N.

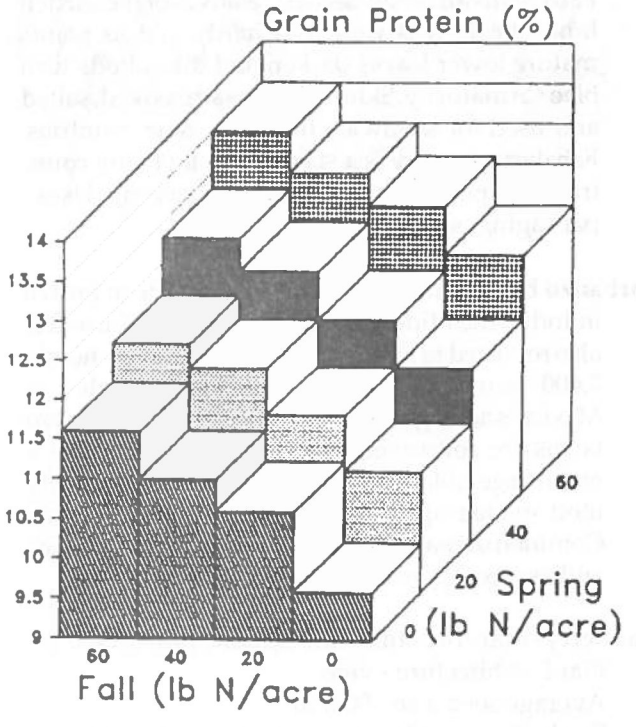


Figure 2. Average grain protein response to fall- and spring-applied N.

GOLDEN PLAINS AREA ALTERNATIVE LEGUME STUDY
Don Sircy Farm, Burlington, CO

Ron F. Meyer, Golden Plains Area Extension Agronomist
Jim Echols, CSU Agronomist
Jim Hains, CSU Technician

Planting Date: June 6 Harvest Date: September 24

Variety	Yield (lbs./acre)
Yelloweye (Steubin)	2077
Cranberry (Isabella)	1918
Blackeye Pea #46	1593
Blackeye Pea #5	1584
Red #63	1504
Black Turtle (Midnight)	1276
Black Turtle (UI906)	1214
Small Garbonzo	1153
White Aztec	1144
Tepary	979
Hopi String	818
Crouse (Dixie Lee)	730
Bell Fava	642
Black Garbonzo	572
LSD .05 = 570	

Bell Fava (Faba) - is a versatile crop that has proven yields in Manitoba, Canada. Fababean is an annual legume known botanically as Vicia Faba. Fababeans are small-seeded relatives of the garden broad bean. It is very cold hardy and as plants mature lower leaves darken and drop. Pods turn black at maturity. Skinned beans are cooked, salted and used for sandwich filling in some countries. Fababean is used as a staple food by many countries and potential markets are increasing. Uses - packaging, salads

Garbanzo bean is an ancient crop that has been grown in India, the Middle East, and parts of Africa. It is also reported to have been grown in Turkey nearly 7,400 years ago. Current markets exist due to Mexico's acreage switch to pinto beans. Garbanzo beans are consumed as a dry pulse crop or as a green vegetable. Garbanzo beans are a high quality food averaging 20% protein with only 5% fat. Common uses are in soups, vegetable combinations and as a component of fresh salads.

Cranberry - Maturity - full season (Idaho rating 95 days)
Plant architecture - vine
Average seed size - 900/lb.
Seed color - reddish brown and white mottled
Flower color - lavender
Diseases - Resistant to: CBMV1 and 15. Susceptible to: Common and halo blight, all strains anthracnose, root rot, white mold
Remarks - Harvest moisture should be near 16% to reduce splits.
Uses - packaging

Yellow-eye Maturity - Medium to full season (approximately 96 days)
Plant architecture - vigorous vine Diseases - white mold tolerant
Remarks - soil temperature at planting must be near 60°F. Harvest moisture should be near 18% to reduce splits.
Uses - packaging

Blackeye Peas may be called peas or beans. In Southern regions of the U.S. they are referred to as peas, yet in more northern regions they are called beans simply because of harvesting and storage methods. Botanically, however, they are a true variety of cowpea and are one of man's most ancient crops.
Maturity - full season
Plant architecture - upright vine
Diseases - Fusarium wilt, curly top susceptible
Uses - packaging and canning

Tepary - Wild and domesticated forms of the tepary bean have been used as food in the Americas for 5000 years. This particular bean is well adapted to arid environments where growing season humidity is low and rainfall scarce. The beans store well, and protein contents normally range from 21-32%. Nutritionally, teparies are superior to most other commercially grown legumes.
Maturity - mid season
Plant architecture - vine
Disease susceptibility - unknown
Uses - packaging

Small Red beans -
Seed color - dark red
Seed size - 1550 seeds/lb.
Maturity - mid season (91 days)
Plant architecture - vine
Diseases - Resistant - halo blight, curly top
Susceptible - common blight, anthracnose, rust, white mold
Tolerant - root rot
Uses - canning and packaging

Black Turtle -
Seed color - black
Seed size - 2475 seeds/lb.
Maturity - full season (97 days)
Plant architecture - upright bush
Diseases - Resistant - rust, anthracnose
Susceptible - common blight, curly top
Tolerant to - white mold, halo blight, root rot
Uses - black turtle soup, canning, packaging

Crouse -
Cowpea family
Maturity - full season
Plant architecture - upright vine
Diseases - wilt, mosaic, curly top
Uses - livestock feed, packaging

CONTROL OF FIELD BINDWEED WITH VARIOUS HERBICIDE COMBINATIONS

Keith Rogers, Akron
Red King, Burlington
1990

Stan Pilcher, Golden Plains Extension Entomologist
Ron Meyer, Golden Plains Extension Agronomist
Ron Kraich, Consolidated Pest District Supervisor
Philip Westra, CSU Weed Science Specialist

Treatments were applied on September 19, 1989 in Akron and October 3, 1989 in Burlington. Applications were made with a "rickshaw" type CO_2 powered sprayer calibrated to apply 14.38 gpa at 2 miles per hour and 9.50 gpa at 3 miles per hour. Plots were evaluated on June 22, 1990.

The Akron site was summer fallowed the summer of 1989. On August 20, 1989 it was double disked and bladed. On August 30, 1989 it received 0.70 inch of rainfall. At application time the bindweed runners were 6 to 10 inches long with a few flowers showing.

The Burlington site was wheat stubble that had been chiseled once during late summer and then left undisturbed. Stage of growth for bindweed at the time of spraying was advanced.

Both sites were undisturbed during the 1990 season. It is interesting to note the difference in control between site locations. Generally, all the herbicides used gave better control at Akron. This is probably due to site preparation, stage of growth, and the moisture condition. Another evaluation will be made July 1991.

FIELD BINDWEED CONTROL WITH VARIOUS HERBICIDE CONBINATIONS

Keith Rogers, Akron

1990

Stan Pilcher, Golden Plains Extension Entomologist
Ron Meyer, Golden Plains Extension Agronomist

Table 1.

Treatment	Fm Ds	Rate	Rate Unit	GPA	Percent Control 6/22/90	
Untreated Check					0.0	d
Landmaster BW Ammon Sulfate	L	1.36	lb ai/A	9.5	89.3	b
Landmaster BW Tordon 22K	L WS	1.36 .125	lb ai/A lb ai/A	9.5	98.0	a
Banvel 2,4-D	EC E	.50 .5	lb ai/A lb ai/A	14.38	93.8	ab
Banvel	EC	1	lb ai/A	14.38	91.3	b
2,4-D	E	1	lb ai/A	14.38	81.3	c
Tordon 22K	WS	.125	lb ai/A	14.38	88.0	b
Tordon 22K	WS	.25	lb ai/A	14.38	100.0	a
Tordon 22K 2,4-D	WS E	.25 1	lb ai/A lb ai/A	14.38	100.0	a
BAS 514 X-77	WP	.5 1	lb ai/A % v/v	14.38	100.0	a
Tordon 22K Banvel	WS EC	.25 .50	lb ai/A lb ai/A	14.38	100.0	a
Landmaster BW BAS 415 X-77	L WP	1.36 .50 1	lb ai/A lb ai/A % v/v	14.38	98.8	a
LSD (.05) Standard Dev. CV	= 5.5 = 3.8159 = 4 40					

Means followed by same letter do not significantly differ (Duncan's MRT, P=.05)

FIELD BINDWEED CONTROL WITH VARIOUS HERBICIDE COMBINATIONS
Red King, Burlington
1990

Stan Pilcher, Golden Plains Extension Entomologist
Ron Meyer, Golden Plains Extension Agronomist

Table 2.

Application Date: 10/03/89 Evaluation Date: 06/22/90

Treatment	Fm Amt	Fm Ds	Rate	Rate Unit	GPA	Percent Control 6-22-90	
Untreated Check						0	e
Landmaster BW Ammon Sulfate	3.1	L	1.36	lb ai/A	9.5	27	bcd
Landmaster BW Tordon 22K	3.1 2	L WS	1.36 .125	lb ai/A lb ai/A	9.5	22	cd
Banvel 2,4-D	4 3.8	EC E	.50 .5	lb ai/A lb ai/A	14.38	28	bcd
Banvel	4	EC	1	lb ai/A	14.38	23	bcd
2,4-D	3.8	E	1	lb ai/A	14.38	15	de
Tordon 22K	2	WS	.125	lb ai/A	14.38	28	bcd
Tordon 22K	2	WS	.25	lb ai/A	14.38	37	bc
Tordon 22K 2,4-D	2 3.8	WS E	.25 1	lb ai/A lb ai/A	14.38	43	b
BAS 514 X-77	50	WP	.5 1	lb ai/A % v/v	14.38	94	a
Tordon 22K Banvel	2 4	WS EC	.25 .50	lb ai/A lb ai/A	14.38	40	bc
Landmaster BW BAS 415 X-77	3.1 50	L WP	1.36 .50 1	lb ai/A lb ai/A % v/v	14.38	98	a

LSD (.05) = 18

Means followed by same letter do not significantly differ (Duncan's MRT, P=.05)

SILVERLFAF POVERTY WEED CONTROL STUDY
Robert Dvorak, Burlington
1990

Ron Meyer, Golden Plains Extension Agronomist
Philip Westra, CSU Weed Science Specialist

A study to evaluate silverleaf poverty weed (Ambrosia tomentosa Nutt.) control was initiated in a field near Burlington, Colorado. Various chemicals were applied October 3, 1989. The test site was an undisturbed perennial poverty weed stand. Stage of growth for the poverty weed at the time of spraying was advanced. Poverty weed control evaluations were done June 22, 1990. The site was undisturbed during the 1990 growing season.

A "rickshaw" type $C0_2$ powered sprayer calibrated to apply 14.38 gpa at 2 miles per hour and 9.50 gpa at 3 miles per hour.

SILVERLEAF POVERTY REED CONTROL WITH VARIOUS HERBICIDES
Robert Dvorak, Burlington, CO

Ron Meyer, Golden Plains Agronomist
Phillip Westra, CSU Weed Science Specialist

Trt. No.	Treatment Name	Form Amt.	Form Ds	Rate	Rate Unit	Poverty Weed % Control 6-22-90	
1	UNTREATED CK					0	e
2	Tordon 22K	2	WS	.25	lb. ai/A	95	a
3	Landmaster BW	3.1	L	1.36	lb. ai/A	3	de
4	Banvel	4	EC	.50	lb. ai/A	18	cd
5	Banvel	4	EC	1	lb. ai/A	40	b
6	Banvel	4	EC	2	lb. ai/A	86	a
7	Curtail	2.38	L	1.20	lb. ai/A	92	a
8	HI-DEP	3.8	EC	1	lb. ai/A	13	cde
9	SALVO	3.8	EC	1	lb. ai/A	17	cd
10	Banvel	4	EC	1	lb. ai/A	22	c
10	2,4-D	3.8	EC	1	lb. ai/A		
11	2,4-D	3.8	EC	1	lb. ai/A	8	cde
12	FallowMaster	2.1	SC	1.40	lb. ai/A	3	de
13	BAS 514	50	WP	1	lb. ai/A	17	cd
13	BAS 090			.5	% v/v		

LSD (.05) = 14

Means followed by same letter do not significantly differ (Duncan's MRT, P= .05)
Application Date = 10/03/89
Evaluation Date = 06/22/90

CROP ENTERPRISE COST ESTIMATES FOR 1990 IN NORTHEASTERN COLORADO

Emery G. Anderson, Area Extension Farm Management Specialist

Enterprise cost and return estimates for the major crops grown in northeastern Colorado are included in this section for 1990. The author interviewed twelve local producers to collect the primary data. Reference to secondary data was made to "Selected 1988-1989 Crop Enterprise Budgets For Colorado" authored by Norman P. Dalsted, et. ali and identified as DARE Information Report IR:90-1 and published in July, 1990. Reference was also made to the 1990 Proceedings of the 14th Annual Nebraska Ecofarming and Winter Wheat Conferences. This publication included an estimated costs of production section for major crops grown in southwestern Nebraska for 1990. The author is Robert N. Klein, Extension Cropping Systems Specialist, University of Nebraska, Lincoln - West Control Research and Extension Center located at North Platte, Nebraska.

Production input costs stabilized in 1986, went down moderately in 1987, then began a moderate increase of 3 to 5% in 1988. In 1989 the price index of goods and services used by farmers increased by 1.2% but in 1990 prices paid increased by 5.6% over 1989, according to Doane's Agricultural Report. A big factor in this increase has been the jump in fuel costs. This year the cost-price squeeze is on again for farmers because crop prices were down by 4.7%; again according to Doane's Agricultural Report.

In this report we have conformed to the traditional economic method of accounting for all variable and fixed costs of production, then capitalizing investment returns expected on land, buildings, machinery and equipment. The capitalization rate is based on the real interest rate, which is the observed rate of interest minus the inflation rate. This year we assumed the real rate of interest at 5%. This assumes the observed rate of interest at about 10.6% and the inflation rate at 5.6% for 1990. Then land, machinery and equipment investment costs are allocated against net receipts after all variable and fixed production costs are accounted for.

Stated another way, net receipts need to be large enough to give the operator a 5% return on the land, $5.50 per hour for labor, and a 5% return to investment in fixed assets like buildings, machinery and equipment. If net receipts are large enough to more than cover the cost of these items, the operator then has a positive return to management and the risk taken by engaging in the enterprise.

This year crops like irrigated pinto beans, irrigated sunflowers for confections and irrigated corn gave operators the best returns on their land and capital investments plus good returns to their management and the risk taken by engaging in each enterprise. Market prices for crops were down by 4.7% from last year, according to Doane's Agricultural Report, and prices paid by farmers were up by 5.6%. This means producers are once again struggling with a cost-price squeeze. Government support programs in wheat and corn helped producers realize positive management returns with their production of those crops.

From a business management standpoint farmers and ranchers must earn positive net receipts in order to provide for family living expenses, make payments on debt, earn positive returns to their investments in the farm or ranch business, and make new investments when feasible.

Included in this section are examples of how wheat and corn producers could have hedged their growing crop in the commodity futures market. In the case of a wheat crop planted in September of 1989 and harvested in July 1990, a hedge on the Kansas City Board of Trade could have earned the producer an extra 62 cents per bushel. A hedge on the growing corn crop in 1990 could have earned the producer an extra 54 cents per bushel, showing the advantage of hedging when market prices decline dramatically as they did this past year!

However, hedging on a stored wheat crop harvested in 1989 and sold in late winter of 1990 fell just short of breaking even. So the decision to hedge depends on a farmers risk-carrying ability, the outlook for production, prices, and costs, and whether a severe drop in price can be absorbed at the time crops are sold.

ACKNOWLEDGEMENTS: CROP ENTERPRISE COST ACCOUNTING

We would like to thank the following cooperators for providing crop enterprise cost and return data for 1990: Mike Vasa, Keith Sagehorn, John Sullivan, Brad Young, Melvin Ocken, Steve Millage, Garry Saylor of Phillips County; Steve and Ronda Hayes and Rod Sharp of Yuma County Norm Dalsted, Agricultural Economist of the Department of Agricultural Resource Economics, CSU; and Robert N. Klein, Extension Cropping Systems Specialist, West Central Research and Extension Center, University of Nebraska, North Platte, Nebraska.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990 IRRIGATED PINTO BEANS IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	27.75*	24 cwt	666.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Bu.	33.75	65#	36.25	1.51	
	Fertilizer, 18-46-0	Lbs.	.125	50#	6.25	.26	
	K-Mag	Lbs.	.0775	100#	7.75	.30	
	10-34-0 C. pivot strtr.	Lbs.	.096	91.25#	8.76	.37	
	Herbicide (Treflan)	Qts.	6.50	1.0	6.50	.27	
	(Eptam)	Qts.	11.00	2.0	11.00	.45	
	Irrigation: Energy	Acln	4.11	7.36	30.26	1.26	
	Labor	Hrs.	5.50	0.40	2.23	.09	
	Repair	Acre			3.65	.15	
	Lease	Acre	50.0	1.0	50.00	2.08	
	Machinery & Equipment	Acre			13.95	.58	
	Interest on Oper. Capital (4 mo. @ 12.5%)			176.60	7.35	.30	
	Total Preharvest				183.95	7.62	
	Operating, Harvest						
	Cutting Rodding		custom rate		7.00	.29	
	Rodding		custom rate		4.50	.19	
	Combine		custom rate		34.00	1.42	
	Haul		custom rate		4.00	.17	
	Int. Oper. Cap.		(4 mo. @ 12.5%)	49.50	2.06	.09	
	Total Harvest				51.56	2.15	
	Total Operating Costs				235.51	9.76	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				26.99	1.12	
	Machinery Interest, Insurance				6.54	.27	
	General Farm Overhead				14.13	.59	
	Real Estate Taxes				6.00	.25	
	Total Property & Ownership Costs:				53.66	2.24	
4.	**Total Direct Costs:**				289.17	12.05	
5.	**Net Receipts**				376.83		
6.	**Return to Operators Land, Labor, Capital**				376.83		
	Capital (@ 5.00%) = 7.23						
	Labor (@ $5.50) = 14.20						
	Land (@ 5.00%) = 40.00						
	51.43						
7.	**Return to Management and Risk**				315.40		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 15.0 cwt.				19.27		
	Breakeven Price @ 20.0 cwt.				14.45		
	Breakeven Price @ 25.0 cwt.				11.56		
	Breakeven Price @ 30.0 cwt.				9.63		

* Median Market Price, Holyoke, January-November, 1990, Holyoke, Colorado.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
IRRIGATED CORN IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Extension Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	Bu.	2.32*	170.0	394.40		
	Govt. Def. Payments(Target-2.75-2.32 .0233=.4067x.986=.40) (Div.11.11)		.40	151.0	60.40		
	Total				454.80		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Acre	27.00	1.0	24.50	.14	
	Fertilizer, Nitrogen Anhy.	Lbs.	.11	170.0	18.70	.11	
	11-52-0	Lbs.	.20	59.0	11.80	.07	
	Potash	Lbs.	.12	30.0	3.60	.02	
	Sulfur	Lbs.	.31	6.0	1.86	.01	
	Zinc	Lbs.	.24	6.0	1.44	.01	
	Herbicide (Lasso)	Lbs.	4.00	3.05	12.00	.07	
	Insecticide (Counter)	Lbs.	1.52	6.80	10.20	.06	
	Irrigation: Energy	Acln	4.11	1.20	49.32	.29	
	Repair	Acre	13.35	1.0	13.35	.08	
	Labor	Hrs.	5.50	1.43	7.88	.05	
	Lease	Acre	50.00	1.0	50.00	.29	
	Machinery Fuel & Lube, Repair	Acre		1.0	16.23	.09	
	Int. on Oper. Capital	Dols. 4 mos. @ 12%		220.97	8.84	.05	
	Total Preharvest				229.81	1.35	
	Operating, Harvest						
	Combine Fuel & Lube	Acre		1.0	7.56	.04	
	Truck Semi Fuel & Lube	Acre		1.0	6.73	.04	
	Auger	Acre		1.0	1.35	.01	
	Repairs	Acre			3.17	.02	
	Interest on Oper. Capital	Dols.	4 mo. @ 12%		.94	.01	
	Total Harvest				19.75	.12	
	Total Operating Costs				249.56	1.47	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				26.47	.16	
	Machinery Interest, Insurance				19.18	.11	
	General Farm Overhead (@.06 of Total Operating Costs)				14.38	.08	
	Real Estate Taxes				6.64	.04	
	Total Property & Ownership Costs:				66.67	.39	
4.	**Total Direct Costs:**				316.23	1.86	
5.	**Net Receipts, at Market Price**				78.17	.46	
	Net Receipts, W/Govt. Payments				138.57		
6.	**Return to Operators Land, Labor, Capital, at Mkt. Price**				78.17		
	Return to Operators Land, Labor, Capital, W/Govt. Payments				138.57		
	Capital (@ 5.00%) = 15.70						
	Labor (@ $5.50) = 15.08						
	Land (@ 5.00%) = 40.00						
	Required 70.78						
7.	**Return to Management and Risk, at Market Price**				7.39		
	Return to Management and Risk, W/Govt. Payment				67.79		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 125 Bu.				2.53		
	Breakeven Price @ 150 Bu.				2.11		
	Breakeven Price @ 175 Bu.				1.81		
	Breakeven Price @ 200 Bu.				1.58		

* Season Average Price, January thru November, 1990, Holyoke, Colorado

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
IRRIGATED ALFALFA IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average:**	Ton	75.50	5.5	415.25		
2.	**Direct Costs:**						
	Operating - Preharvest:						
	Allocate Seed Est. (5 years)	Lbs.	2.34	15	7.02	1.27	
	Fertilizer, Nitrogen	Lbs.	.21	15	3.15	.57	
	P205	Lbs.	.23	40	9.20	1.67	
	Potash	Lbs.	.10	55	5.50	1.00	
	Sulfate	Lbs.	.50	10	5.00	.91	
	Zinc	Lbs.	.89	3.25	2.89	.52	
	Boron	Lbs.	.796	2.50	1.99	.36	
	Herbicide, Velper L	Pt.	6.50	2.00	13.00	2.36	
	Irrigation Energy	Acln	3.33	18.0	59.94	10.89	
	Labor	Hrs.	5.50	1.36	7.50	1.36	
	Repair	Acre			7.69	1.40	
	Lease	Acre			50.00	9.09	
	Interest, Operating Capital		4 mo. @ .125	172.88	7.20	1.31	
	Total Preharvest				180.08	32.74	
	Operating - Harvest (custom)						
	Windrower	Acre	7.00	4.0	28.00	5.09	
	Baler, Giant	Acre	13.88	4.0	55.10	10.02	
	Move Bales	Acre			20.00	3.64	
	Interest, Oper. Capital	Acre	4 mo. @.125	103.10	4.30	.78	
	Total Harvest				107.40	19.53	
	Total Operating Costs				287.48	52.27	
3.	**Property and Ownership Costs:**						
	Machinery Replacement			0.0	0.00		
	Machinery Interest, Insurance			0.0	0.00		
	General Farm Overhead	Acre	.06	287.48	17.25	3.14	
	Real Estate Taxes	Acre			6.00	1.09	
	Total Property and Ownership Costs:				23.25	4.23	
4.	**Total Direct Costs:**				310.73	56.50	
5.	**Net Receipts**				104.52		
6.	**Return to Operators Capital, Land** (Labor Return Included Above)						
	Capitol (@ 5.00%) = 18.10						
	Land (@ 5.00%) = 40.00						
	Required 58.10						
7.	**Return to Management and Risk**				46.42		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 3.0 Tons Per Acre = 103.58						
	Breakeven Price @ 5.0 Tons Per Acre = 62.15						
	Breakeven Price @ 7.0 Tons Per Acre = 44.39						

* Season Average Price Alfalfa, Baled, Platte Valley, Alfalfa Center, Nebraska, Jan.-Nov. 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS -1990 DRYLAND CORN IN NORTHEAST COLORADO

Emery G. Anderson, Area Extension Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	Bu.	2.32*	65	150.80		
	Govt. Deficiency Payments			(div.11.11%)			
	(Target 2.75-2.32-.0233=.4067x.986=.40)		.40	58	23.20		
				Total	174.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed, Treatment	Nos.		13000#	9.50	.15	
	Fertilizer, Nitrogen	Lbs.	.23	75.0	17.20	.26	
	10-34-0	Gals.	1.25	6.0	7.50	.12	
	Herbicide (Atrazine)	Lbs.	2.23	1.25	2.79	.04	
	(Prowl)	Gal .	25.48	.25	6.38	.10	
	Insecticide (Furadan)	Lbs.	1.52	2.0	3.04	.05	
	Machinery Fuel & Lube	Acre			3.64	.06	
	Machinery Repairs	Acre			2.19	.03	
	Total Preharvest				52.24	.80	
	Operating, Harvest						
	Combine Fuel & Lube	Acre			8.60	.13	
	Repairs	Acre			1.73	.03	
	Truck, Haul, Auger	Acre			4.11	.06	
	Total Harvest	Acre			14.44	.22	
	Interest on Oper. Capital	Dols.	6 mos. @12%	66.68	4.00	.06	
	Total Operating Costs				70.68	1.08	
3.	**Property and Ownership Costs:**						
	Machinery Replacement	Acre			16.92	.26	
	Machinery Interest, Insurance	Acre			11.28	.17	
	General Farm Overhead	Acre	(@.06 of Total Oper. Costs)		4.24	.07	
	Real Estate Taxes	Acre			3.32	.05	
	Total Property & Ownership Costs:				35.76	.55	
4.	**Total Direct Costs:**				106.44	1.64	
5.	**Net Receipts, at Market Price**				44.36		
	Net Receipts, W/Govt. Payments				67.56		
6 .	**Return to Operators Land, Labor, Capital, at Mkt . Price**				44.36		
	Return to Operators Land, Labor, Capital, W/Govt. Payments				67.56		
	Capital (@ 5.00%) = 6.00						
	Labor (@ $5.50) = 2.50						
	Land (@ 5.00%) = 20.00						
	Required 28.50						
7.	**Return to Management and Risk, at Market Price**				15.86		
	Return to Management and Risk, W/Govt. Payments				39.06		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 25 Bu.				4.26		
	Breakeven Price @ 50 Bu.				2.13		
	Breakeven Price @ 75 Bu.				1.42		
	Breakeven Price @100 Bu .				1.06		

* Season Average Price, Holyoke, January thru November, 1990

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
DRYLAND WHEAT IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	Bu.	2.93*	40.0	117.20		
	Govt. Deficiency Payments			5% div.			
	(Target-4.00-2.68=1.32)(5 mo. ave.)	Bu.	1.32	38.0	50.16		
				Total	167.36		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Lbs.		50.0	4.50	.11	
	Fertilizer Nitrogen	Lbs.	.11	60.0	6.60	.17	
	Phosphate	Lbs.	.21	20.0	4.20	.11	
	Sulfur	Lbs.	.19	8.0	1.52	.04	
	Herbicide, 2,4-D	Gal.	12.50	.25	3.13	.08	
	Custom Application	Acre	3.25	1.0	3.25	.08	
	Machinery Fuel & Lube	Acre		1.0	4.00	.10	
	Machine Repairs	Acre		1.0	2.34	.06	
	Total Preharvest				29.54	.75	
	Operating, Harvest						
	Custom Combine	Acre		1.0	14.50	.36	
	Truck Haul	Acre		1.0	5.00	.13	
	Interest on Oper. Capital (@ 12%, 6 mo.)				2.94	.07	
	Total Harvest				22.44	.56	
	Total Operating Costs				51.98	1.31	
3.	**Property and Ownership Costs:**						
	Machinery Replacement Dols.				14.97	.37	
	Machinery Interest, Insurance Dols.				7.76	.19	
	General Farm Overhead Dols.				2.94	.07	
	Real Estate Tax				2.75	.07	
	Total Property & Ownership Costs:				28.42	.70	
4.	**Total Direct Costs:**				80.40	2.01	
5.	**Net Receipts, at Market Price**				36.80		
	Net Receipts, W/Govt. Payments				86.96		
6.	**Return to Operators Land, Labor, Capital, at Mkt. Price**				36.80		
	Return to Operators Land, Labor, Capital, W/Govt. Payments				86.96		
	Capital (@ 5.00%) = 5.26						
	Labor (@ $5.50) = 4.61						
	Land (@ 5.00%) = 40.00						
	Required 49.87						
7.	**Return to Management and Risk, at Market Price**				(-13.07)		
	Return to Management and Risk, W/Govt. Payments				37.09		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 20 Bu.				4.02		
	Breakeven Price @ 25 Bu.				3.22		
	Breakeven Price @ 30 Bu.				2.68		
	Breakeven Price @ 35 Bu.				2.30		
	Breakeven Price @ 40 Bu.				2.01		

* Season Average Price, Wheat, Holyoke, Colorado, January-November, 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
IRRIGATED WHEAT IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	Bu.	2.93*	65	190.45		
	Govt. Deficiency Payments			5% Div.			
	Target P. $4.00-2.68=1.32 (5 mo. Ave.)	Bu.	1.32	61.75	81.51		
				Total	271.96		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Bu.	5.50	1.0	5.50	.08	
	Fertilizer, Nitrogen	Lbs.	.11	80.0	8.80	.14	
	Phosphate	Lbs.	.21	20.00	4.20	.06	
	Sulfur	Lbs.	.19	10.0	1.90	.03	
	Herbicide (2,4-D)	Lbs.	12.50	.25	3.13	.05	
	Irrigation Energy	AcIn	4.17	6.00	25.02	.38	
	Irrigation Labor	Hrs.	5.50	.50	2.75	.04	
	Irrigation Repair	Acre	6.81	1.0	6.81	.10	
	Sprinkler Lease	Acre	50.0	1.0	50.00	.77	
	Machinery Fuel & Lube	Acre	4.10	1.0	4.10	.06	
	Machine Repairs	Acre	2.00	1.0	2.00	.03	
	Total Preharvest				114.21	1.75	
	Operating, Harvest						
	Combine, Fuel & Lube	Acre		1.0	5.20	.08	
	Truck, Haul	Hrs.		1.0	4.80	.07	
	Machine Repairs	Acre			2.67	.04	
	Interest on Oper. Capital	Dols.	6 mos. @ 12.5%	126.88	7.93	.12	
	Total Operating Costs				134.81	.31	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				31.65	.49	
	General Farm Overhead (@ .06 of Total Operating Costs)				8.09	.12	
	Real Estate Taxes				6.00	.09	
	Total Property & Ownership:				45.74	.70	
4.	**Total Direct Costs:**				180.55	2.76	
5.	**Net Receipts, at Market Price**				9.90		
	Net Receipts, W/Govt. Payments				91.41		
6.	**Return to Operators Land, Labor, Capital, at Mkt. Price**				9.90		
	Return to Operators Land, Labor, Capital, W/Govt. Payments				91.41		
	Capital (@ 5.00%) = 7.49						
	Labor (@ $5.50) = 7.52						
	Land (@ 5.00%) = 40.00						
	Required 55.01						
7.	**Return to Management and Risk, at Market Price**				(-45.11)		
	Return to Management and Risk, W/Govt. Payments				36.40		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 40 Bu.				4.51		
	Breakeven Price @ 50 Bu.				3.61		
	Breakeven Price @ 60 Bu.				3.01		
	Breakeven Price @ 70 Bu.				2.58		
	Breakeven Price @ 80 Bu.				2.26		

* Season Average Price, January-November 1990, Holyoke, Colorado.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
DRYLAND MILO - CONVENTIONAL TILL

Emery G. Anderson, Golden Plains Extension Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	3.46*	22.4	77.50		
	Govt. Def. Payments						
	(Target 4.66 cwt-3.46=1.20)(div 11.11%)		1.16	19.9	23.10		
	(1.20-.0233=1.1767 x .986=1.16)			Total	100.60		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Lbs.	.90	3.22	2.90	.13	
	Fertilizer, Nitrogen	Lbs.	.15	50.00	7.50	.33	
	10-34-0	Gal.	1.26	5.00	6.30	.28	
	Zinc	Gal.	3.45	.31	1.07	.05	
	Insecticide, Greenbug		custom		6.00	.27	
	Herbicide (Atrazine)	Lbs.	2.23	1.00	2.23	.10	
	(Prowl)	Pts.	3.19	2.00	6.38	.28	
	Machinery Fuel & Lube	Acre			5.00	.22	
	Machine Repairs	Acre			3.11	.14	
	Total Preharvest				40.49	1.81	
	Operating, Harvest						
	Combine, Fuel & Lube	Acre			2.80	.12	
	Combine Repairs	Acre			1.30	.06	
	Haul, Truck				2.80	.12	
	Total Harvest				6.90	.31	
	Interest on Oper. Capital		6 mo. @ 12%	47.39	2.85	.13	
	Total Operating Costs				50.24	2.25	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				16.82	.75	
	Machinery Interest, Insurance				5.72	.25	
	General Farm Overhead (@ .06% of operating costs)				2.84	.13	
	Real Estate Taxes				3.32	.15	
	Total Property & Ownership Costs:				28.70	1.28	
4.	**Total Direct Costs:**				78.94	3.52	
5.	**Net Receipts, at Market Price**				(-1.44)		
	Net Receipts, W/Govt. Payments				21.66		
6.	**Return to Operators Land, Labor, Capital, at Mkt. Price**				(-1.44)		
	Return to Operators Land, Labor, Capital, W/Govt. Payments				21.66		
	Capital (@ 5.00%) = 4.58						
	Labor (@ $5.50) = 4.31						
	Land (@ 5.00%) = 20.00						
	Required 28.89						
7.	**Return to Management and Risk, at Market Price**				(-30.33)		
	Return to Management and Risk, W/Govt. Payments				(-7.23)		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 15 Cwt.				5.26		
	Breakeven Price @ 20 Cwt.				3.95		
	Breakeven Price @ 25 Cwt.				3.16		
	Breakeven Price @ 30 Cwt.				2.63		

* Season Average Price per cwt. January - November 1990, Holyoke, CO

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
IRRIGATED SUNFLOWERS IN NORTHEAST COLORADO (For Confections)

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	16.00*	20	320.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Nos.	$1/1000#	18000	18.36	.92	
	Fertilizer, Nitrogen	Lbs.	.15	50	7.50	.37	
	10-34-0	Gal.	1.26	5.0	6.30	.31	
	Zinc	Gal.	3.45	.31	1.07	.05	
	Herbicide, Prowl	Pts.	3.19	2.0	6.38	.32	
	Insecticide, Asana	Ozs.	1.29	7.0	9.03	.45	
	Machinery & Equipment	Acre	Custom rates		17.00	.85	
	Irrigation, Energy	AcIn	4.11	3.00	12.33	.62	
	Labor	Hrs.	5.50	1.0	5.50	.27	
	Repair	Acre			2.17	.11	
	Lease				50.00	2.50	
	Total Preharvest				135.64	6.78	
	Operating, Harvest						
	Custom Combine	Acre			15.00	.75	
	Haul	Acre			3.75	.19	
	Total Harvest				18.75	.94	
	Interest on Oper. Costs		(4 mo. @ 12%)	153.63	6.15	.31	
	Total Operating Costs				160.54	8.02	
3.	**Property and Ownership Costs:**						
	Machinery Replacement	Dols.			10.00	.50	
	Machinery Interest, Insurance	Dols.			6.50	.32	
	General Farm Overhead		(@ .06 x Total operating costs)		9.22	.48	
	Real Estate Taxes				6.62	.33	
	Total Property & Ownership Costs:				32.34	1.64	
4.	**Total Direct Costs:**				192.88	9.66	
5.	**Net Receipts**				127.12		
6.	**Return to Operators Capital, Labor, Land**				127.12		
	Capital (@ 5.00%) = 9.37						
	Land (@ $5.00%) = 40.00						
	49.37						
7.	**Return to Management and Risk**				77.75		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 10 cwt				19.29 cwt.		
	Breakeven Price @ 15 cwt				12.68 cwt.		
	Breakeven Price @ 20 cwt				9.64 cwt.		
	Breakeven Price @ 25 lbs.				7.72 cwt.		

* Contract Price, Wray, Colorado, Fall, 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
IRRIGATED SUNFLOWERS IN NORTHEAST COLORADO (For Oil)

Emery G. Anderson, Golden Plains Area Farm Managenent Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	10.00*	25.0	250.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Nos.	$1/1000#		12.00	.48	
	Fertilizer, Nitrogen	Lbs.	.15	50	7.50	.30	
	10-34-0	Gal.	1.26	5.0	6.30	.25	
	Zinc	Gal.	3.45	.31	1.07	.04	
	Herbicide, Prowl	Pts.	3.19	2.0	6.38	.25	
	Machinery & Equipment	Acre	Custom rates		17.00	.68	
	Irrigation, Energy	AcIn	4.11	3.00	12.33	.49	
	Labor	Hrs.	5.50	1.0	5.50	.22	
	Repair	Acre			2.17	.09	
	Lease				50.00	2.00	
	Total Preharvest				120.25	4.81	
	Operating, Harvest						
	Custom Combine	Acre			15.00	.60	
	Haul Acre				3.75	.15	
	Total Harvest				18.75	.75	
	Interest on Oper. Costs		(4 mo. @ 12%)	139.00	5.56	.22	
	Total Operating Costs				144.56	5.78	
3.	**Property and Ownership Costs:**						
	Machinery Replacement	Dols.			10.00	.40	
	Machinery Interest, Insurance	Dols.			6.50	.26	
	General Farm Overhead		(@ .06x Total operating costs)		8.34	.33	
	Real Estate Taxes				6.62	.26	
	Total Property & Ownership Costs:				31.46	1.26	
4.	**Total Direct Costs:**				176.02	7.04	
5.	**Net Receipts**				73.98		
6.	**Return to Operators Capital, Land (Labor incl above)**				73.98		
	Capital (@ 5.00%) = 9.37						
	Land (@ $5.00%) = 40.00						
	49.37						
7.	**Return to Management and Risk**				24.61		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 15 cwt				11.73 cwt.		
	Breakeven Price @ 20 cwt				8.80 cwt.		
	Breakeven Price @ 25 cwt				7.04 cwt.		
	Breakeven Price @ 30 lbs.				5.87 cwt.		

* Contract Price, Wray, Colorado, Fall, 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
DRYLAND SUNFLOWERS IN NORTHEAST COLORADO (For Confections)

Emery G.Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	16.00*	10.0	160.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Nos.	$1/1000#	9500	9.50	.95	
	Fertilizer, Nitrogen	Lbs.	.15	25	3.75	.37	
	10-34-0	Gal.	1.26	1.5	1.89	.19	
	Zinc	Gal.	3.45	.31	1.07	.11	
	Herbicide, Prowl	Pts.	3.19	2.0	6.38	.64	
	Insecticide, Asana	Ozs.	1.29	7.0	9.03	.90	
	Machinery & Equipment	Acre	Custom rates inc.		17.00	1.70	
	Total Preharvest				48.62	4.86	
	Operating, Harvest						
	Custom Combine	Acre			12.00	1.20	
	Haul	Acre			2.80	.28	
	Total Harvest				14.80	1.48	
	Interest on Oper.Costs	(4 mo. @ 12%)	63.42		2.54	.25	
	Total Operating Costs				65.96	6.60	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				6.81	.68	
	Machinery Interest, Insurance				4.55	.45	
	General Farm Overhead @.06x			63.42	3.81	.39	
	Real Estate Taxes				3.32	.33	
	Total Property & Ownership Costs:				18.49	1.86	
4.	**Total Direct Costs:**				84.45	8.46	
5.	**Net Receipts**				75.55		
6.	**Return to Operators Capital, Labor, Land**				75.55		
	Capital (@ 5.00%) = 4.16						
	Land (@ $5.00%) = 20.00						
	24.16						
7.	**Return to Management and Risk**				51.39		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 8 cwt				10.56 cwt		
	Breakeven Price @ 10 cwt				8.45 cwt		
	Breakeven Price @ 12 cwt				7.04 cwt		
	Breakeven Price @ 14 lbs.				6.03 cwt		

* Contract Price, Wray.Colorado, Fall, 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
DRYLAND SUNFLOWERS IN NORTHEAST COLORADO (For Oil)

Emery G.Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	cwt.	10.00*	15.0	150.00		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Nos.	$1/1000#	9500	9.50	.63	
	Fertilizer, Nitrogen	Lbs.	.15	25	3.75	.25	
	10-34-0	Gal.	1.26	1.5	1.89	.13	
	Zinc	Gal.	3.45	.31	1.07	.07	
	Herbicide, Prowl	Pts.	3.19	2.0	6.38	.42	
	Machinery & Equipment	Acre	Custom rates inc.		17.00	1.13	
	Total Preharvest				39.59	2.64	
	Operating, Harvest						
	Custom Combine	Acre			12.00	.80	
	Haul Acre				2.80	.19	
	Total Harvest				14.80	.99	
	Interest on Oper.Costs		(4 mo.@ 12%)	54.39	2.18	.15	
	Total Operating Costs				56.57	3.77	
3.	**Property and Ownership Costs:**						
	Machinery Replacement				6.81	.45	
	Machinery Interest, Insurance				4.55	.30	
	General Farm Overhead @.06x			54.39	3.26	.22	
	Real Estate Taxes				3.32	.22	
	Total Property & Ownership Costs:				17.94	1.19	
4.	**Total Direct Costs:**				74.51	4.98	
5.	**Net Receipts**				75.49		
6.	**Return to Operators Capital, Land (Labor incl.above)**				75.49		
	Capital (@ 5.00%) = 4.16						
	Land (@ $5.00%) = 20.00						
	24.16						
7.	**Return to Management and Risk**				51.33		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 8 cwt				9.31 cwt		
	Breakeven Price @ 10 cwt				7.45 cwt		
	Breakeven Price @ 12 cwt				6.21 cwt		
	Breakeven Price @ 16 lbs.				4.66 cwt		

* Contract Price, Wray Colorado, Fall, 1990.

ESTIMATED PRODUCTION COSTS AND RETURNS - 1990
DRYLAND MILLET IN NORTHEAST COLORADO

Emery G. Anderson, Golden Plains Area Farm Management Specialist

		Unit	Price or Cost/Unit	Quantity	Value or Cost/Ave.	Cost Per/Unit	Your Farm
1.	**Total Receipts, Average**	Bu.	2.87*	35	100.45		
2.	**Direct Costs:**						
	Operating, Preharvest						
	Seed	Lbs.	.132	30.0	3.96	.11	
	Fertilizer, Nitrogen,	Lbs.	.23	50.0	11.50	.33	
	Herbicide, 2, 4-D	Qts.	3.12	1.25	3.90	.11	
	Custom Aerial Spraying	Acre	3.50	1.0	3.50	.10	
	Machinery & Equipment	Acre			8.29	.24	
	Total Preharvest				31.15	.88	
	Operating, Harvest						
	Haul, Truck	Hr.			3.06	.09	
	Combine Fuel & Lubrication	Acre			3.80	.11	
	Repairs	Acre			2.30	.06	
	Total Harvest				9.16	.26	
	Interest on Oper. Capital		(6 mos. @ .12%)	40.31	2.41	.07	
	Total Operating Costs				42.72	1.22	
3.	**Property and Ownership Costs:**						
	Machinery Replacement	Dols.			19.50	.56	
	Machinery Interest, Insurance	Dols.			3.17	.09	
	General Farm Overhead	Dols.	(@ .06 of Total Oper. Cost)		2.56	.07	
	Real Estate Taxes	Dols.			3.32	.09	
	Total Property & Ownership Costs:				28.55	.81	
4.	**Total Direct Costs:**				71.27	2.03	
5.	**Net Receipts**				29.18		
6.	**Return to Operators Land, Labor, Capital**				29.18		
	Capital (@ 5.00%) = 5.25						
	Labor (@ $5.50) = 3.50						
	Land (@ 5.00%) = 20.00						
	Required 28.75						
7.	**Return to Management and Risk**				$0.43		
8.	**Breakeven Prices at Various Yields**						
	Breakeven Price @ 20 Bu.				3.56		
	Breakeven Price @ 25 Bu.				2.85		
	Breakeven Price @ 30 Bu.				2.37		
	Breakeven Price @ 35 Bu.				2.03		
	Breakeven Price @ 40 Bu.				1.78		

* Season Average Price, January - November 1990, Holyoke, Colorado

1990 CROP ENTERPRISE COSTS AND RETURNS SUMMARY - Northeast Colorado

Emery G. Anderson, Golden Plains Area Extension Farm Management Specialist

Crop	Net Receipts/Acre	Management Returns*/Acre
1. Irrigated Pinto Beans	$376.83	$315.40
2. Irrigated Sunflowers (confections)	126.75	77.75
3. Irrigated Corn		
(@ market price)	78.17	7.39
(w/govt. payments)	138.57	67.79
4. Dryland Sunflowers (confections)	75.55	51.35
5. Dryland Sunflowers (oil)	75.49	51.33
6. Irrigaed Alfalfa	104.52	46.42
7. Dryland Corn (@ makt. price)	44.36	15.86
(w/govt. pymts.)	67.56	39.06
8. Dryland Wheat (@ mkt. price)	36.80	(-13.07)
(w/govt. pymts.)	86.96	37.07
9. Irrigated Wheat (@ mkt. price)	9.90	(-45.11)
(w/govt. pymts.)	91.41	36.40
10. Irrigated Sunflowers (oil)	73.98	24.61
11. Dryland Millet	29.18	0.43
12. Dryland Milo (@ mkt. prices)	(-1.44)	(-30.33)
(w/govt. pymts.)	21.66	(-7.23)

* Net Receipts and Management Return are function's of cost, price and yield, which very considerbly from farm to farm.

HEDGING EXAMPLE - CORN FARMER - 1989 GROWING CROP

Emery G. Anderson, Golden Plains Area Farm Management Specialist

May (Mo.) 15, (Day) 1990 (Yr.)
Sell, December (Mo.) Corn (Grain)
Futures @2.75/Bushel (Price)
Cash Corn (Grain) at planting time

Nov. (Mo.) 27, (Day) 1990 (Yr.)
Buy, December (Mo.) Corn (Grain)
Futures @2.18/Bushel (Price)
Sell Cash Corn (Grain) @2.00 (Price)

	Per Bushel		Per Contract	
	Cash	Futures	Cash	Futures
		2.75		13750
	2.50		12500	
		2.18		10900
	2.00		10000	
	-.50	+.57	-2500	+2850

Loss or Gain

Cost of Hedging	$2850.00
Per Contract	-121.50
Net	$2728.50

Contract Volume	5000 bu.
Margin Required	$1100.00
Main. ($300)	
Commission	$50.00
Interest @12%	$71.50
(for 6.5 mo.)	$121.50

Per Bushel Result: Cash

Cash price after harvest time: $2.00

Per Bushel Result: Hedged

Cash Price	$2.00
Hedge Gain	+.57
	2.5700
Cost of Hedge	.0243
	$2.5457

HEDGING EXAMPLE - WHEAT FARMER - 1989 GROWING CROP

Emery G. Anderson, Golden Plains Area Farm Management Specialist

Sept. (Mo.) 5, (Day) 1990 (Yr.)
Sell, July, 90 (Mo.) Wheat (Grain)
Futures @3.67/Bushel (Price)
Cash Wheat (Grain) at planting time

July (Mo.) 10, (Day) 1990 (Yr.)
Buy, July 90 (Mo.) Wheat (Grain)
Futures @3.01/Bushel (Price)
Sell Cash Wheat (Grain) @ 2.67 (Price)

	Per Bushel		Per Contract	
	Cash	Futures	Cash	Futures
Sell		3.67		18350
Cash	3.78		18900	
Buy		3.01		15050
Cash	2.67		13350	
	-1.11	+.66	-5500	+3300

Loss or Gain

Cost of Hedging	$3300.00
Per Contract	-196.80
Net	$3103.20

Contract Volume	5000 bu.
Margin Required	$1468.00
Main. ($300)	
Commission	$50.00
Interest @12%	$146.80
(for 6.5 mo.)	$196.80

Per Bushel Result: Cash

Cash price at end of Growing Season: $2.67

Per Bushel Result: Hedged

Cash Price	$2.67
Hedge Gain	+.66
	3.33
Cost of Hedge	.04
	$3.29

HEDGING EXAMPLE - WHEAT FARMER - STORAGE

Emery G. Anderson, Golden Plains Area Farm Management Specialist

July (Mo.) 11, (Day) 1989 (Yr.)
Sell, March, 90 (Mo.) Wheat (Grain)
Futures @4.37/Bushel (Price)
Cash Wheat (Grain) on hand

March (Mo.) 6, (Day) 1990 (Yr.)
Buy, July 90 (Mo.) Wheat (Grain)
Futures @3.74/Bushel (Price)
Sell Cash Wheat (Grain) @ 3.35 (Price)

	Per Bushel		Per Contract	
	Cash	Futures	Cash	Futures
Sell		4.37		21850
Cash	3.79		18950	
Buy		3.74		18700
Cash	3.35		16750	
	-.44	+.63	-2200	+3150

Loss or Gain

Cost of Hedging	$3150.00
Per Contract	-189.84
Net	$2960.84

Contract Volume	5000 bu.
Margin Required	$1748.00
Main. ($300)	
Commission	$50.00
Interest @12%	$139.84
(for 6.5 mo.)	$189.84

Per Bushel Result: Cash

Cash price at beginning of Storage Period: $3.79

Per Bushel Result: Hedged

Cash Price	$3.35
Hedge Loss	+.63
	3.9800
Cost of Hedge	-.0380
	$3.9420
Cost of Storage	.1700
Net	$3.7780

CORN BASIS - HOLYOKE

Emery G. Anderson, Golden Plains Area Farm Management Specialist

1990 CASH VERSUS DECEMBER 1990 FUTURES GROWING CROP HEDGE

TUESDAYS - 1990		HOLYOKE CASH	CBT FUTURES	BASIS
May	1	2.50	2.73	.23
	8	2.55	2.71	.16
	15	2.52	2.75	.23
	22	2.47	2.66	.19
	29	2.56	2.75	.19
June	5	2.51	2.70	.19
	12	2.66	2.86	.20
	19	2.61	2.81	.20
	26	2.61	2.83	.22
July	3	2.67	2.80	.13
	10	2.61	2.73	.12
	17	2.57	2.58	.01
	24	2.58	2.57	-.01
	31	2.57	2.55	-.02
August	7	2.55	2.49	-.06
	14	2.50	2.42	-.08
	21	2.53	2.44	-.09
	28	2.55	2.43	-.12
September	4	2.43	2.34	-.09
	11	2.41	2.36	-.05
	18	2.34	2.26	-.08
	25	2.22	2.27	.05
October	2	1.98	2.25	.27
	9	2.07	2.34	.27
	16	2.00	2.26	.26
	23	2.05	2.31	.26
	30	2.05	2.31	.26
November	6	2.05	2.30	.25
	13	2.06	2.24	.18
	20	2.01	2.27	.26
	27	2.00	2.18	.18

WHEAT BASIS - HOLYOKE

Emery G. Anderson, Golden Plains Area Farm Management Specialist

1989 Cash Versus March 1990 Futures
Kansas City Board of Trade

STORAGE HEDGE

TUESDAYS - 1990		HOLYOKE CASH	CBT FUTURES	BASIS
July	4	3.85	4.27	.42
	11	3.79	4.37	.58
	18	3.74	4.12	.38
	25	3.72	4.07	.35
August	1	3.65	4.06	.41
	8	3.68	4.10	.42
	15	3.78	4.17	.39
	22	3.76	4.10	.34
	29	3.71	4.06	.35
September	5	3.78	4.07	.29
	12	3.74	4.03	.29
	19	3.63	3.85	.22
	26	3.65	3.87	.22
October	3	3.73	3.93	.20
	10	3.71	3.94	.23
	17	3.74	3.97	.23
	24	3.72	3.98	.26
	31	3.66	3.93	.27
November	7	3.74	3.99	.25
	14	3.74	3.99	.25
	21	3.80	4.05	.25
	28	3.75	4.05	.30
December	5	3.71	4.03	.32
	12	3.75	4.08	.33
	19	3.77	4.07	.30
	26	3.77	4.09	.32
January 90	2	3.77	4.07	.30
	9	3.74	4.07	.33
	16	3.70	4.01	.31
	23	3.65	3.96	.31
	30	3.48	3.80	.32
February	6	3.46	3.81	.35
	13	3.49	3.84	.35
	20	3.48	3.81	.33
	27	3.45	3.86	.41
March	6	3.35	3.74	.39
	13	3.30	3.75	.45
	20	3.38	3.81	.43
	27	3.39	-	-

1989 Cash Versus July 1990 Futures
Kansas City Board of Trade

GROWING CROP HEDGE

TUESDAYS - 1990		HOLYOKE CASH	CBT FUTURES	BASIS
September	5	3.78	3.67	-.11
	12	3.74	3.51	-.23
	19	3.63	3.43	-.20
	26	3.65	3.43	-.22
October	3	3.73	3.49	-.24
	10	3.71	3.48	-.23
	17	3.74	3.54	-.20
	24	3.72	3.49	-.23
	31	3.66	3.47	-.19
November	7	3.74	3.56	-.18
	14	3.74	3.60	-.14
	21	3.80	3.72	-.08
	28	3.75	3.73	-.02
December	5	3.71	3.64	-.07
	12	3.75	3.67	-.08
	19	3.77	3.67	-.10
	26	3.77	3.67	-.10
January 90	2	3.77	3.68	-.09
	9	3.74	3.67	-.07
	16	3.70	3.65	-.05
	23	3.65	3.63	-.02
	30	3.48	3.56	.08
February	6	3.46	3.57	.11
	13	3.49	3.54	.05
	20	3.48	3.49	.01
	27	3.45	3.51	.06
March	6	3.35	3.44	.09
	13	3.30	3.42	.12
	20	3.38	3.47	.09
	27	3.39	3.43	.04
April	3	3.44	3.48	.04
	10	3.42	3.44	.02
	17	3.49	3.48	-.01
	24	3.42	3.43	.01
May	1	3.47	3.51	.04
	8	3.46	3.53	.07
	15	3.21	3.48	.27
	22	3.09	3.34	.25
	29	3.16	3.33	.17
June	5	3.14	3.28	.14
	12	3.09	3.32	.23
	19	3.01	3.28	.27
	26	2.92	3.26	.34
July	3	2.75	3.15	.40
	10	2.67	3.01	.34
	17	2.58	2.95	.37
	24	2.59	-	-
	31	2.48	-	-

1991 LIVESTOCK ENTERPRISE BUDGETS

Pete Fagerlin, Golden Plains Area Extension Livestock Specialist
Norm Dalsted, Colorado State University Extension Farm Management Specialist

Introduction

An enterprise is defined as a single crop or livestock commodity being produced. Most farms or ranches consist of a combination of several enterprises. An enterprise budget is a listing of all estimated income and expenses associated with a specific enterprise to help evaluate its profitability. An enterprise budget can be developed for each current or future enterprise in a farm plan. Each is developed on the basis of a common unit such as one acre or one head of livestock. This permits comparison of the profit for alternative and competing enterprises.

Enterprise budgets provide an analysis of the economic potential for a particular enterprise. Care should be taken in preparing your enterprise budget. The assumptions implicit in your preparation require considerable information, thought and analysis. For example, knowledge of the production practice, cost and quantity of required inputs, production levels and expected commodity prices are used in calculating enterprise budgets. In the case of livestock what mortality rate should be used, calf crop percent, feeding practices and rate of gain are all very important value which affect the outcome of the enterprise budget. Your production records will provide much of the information necessary to develop enterprise budgets.

Developing an Enterprise Budget: Enterprise budgets can be organized and presented in several different formats, however, they typically contain three sections: 1) Variable or operating costs; 2) Fixed costs; and 3) Income. The following are four basic steps in developing an enterprise budget.

1. The first step is to estimate variable costs. In the case of a grain crop such expenses would include seed, fertilizer, chemicals, fuel, labor, etc. The quantities to be used and associated costs are generally known with greater certainty than commodity prices. If a producer - has a good record keeping system arriving at estimates for these costs can be reasonably determined.

2. The second step is the development and assessment of fixed costs. Fixed costs include but are not limited to machinery replacement, land, debt payments, lease payments and overhead charges like insurance, taxes and interest. At times, identifying fixed costs associated with an enterprise may be difficult, particularly when more than one crop or livestock enterprise is involved.

3. The third step in the process is to estimate the total production and expected commodity price. Both of these values will obviously have a great effect on enterprise profitability and great care needs to be taken in arriving at these values. The estimated yield should be the average yield expected under normal environmental and management situations. Since enterprise budgets are used for forward planning, the commodity price should be your best estimate of the average price expected during the next year or marketing period.

4. The last step is determining your net returns (profits) for the given enterprise. Net returns represent that income which is left for the farmer/rancher and his family to live on, pay debts, invest or save.

Livestock Enterprise Budgets

Livestock budgets follow the same general format as crop budgets but are often more difficult to complete because:

1. First there is the problem of accounting for multiple outputs such as calves, and cull cows, bulls or replacement heifers for a beef cow enterprise or lambs, wool and cull ewes or rams for a sheep enterprise.

2. A second problem is a proper accounting for the cost of raising or purchasing replacement animals to maintain a breeding herd.

3. Thirdly is the problem of determining a proper charge for farm raised feed, pasture or crop residues used in the livestock enterprise.

Weaknesses of the Enterprise Budgets

The primary weakness of the budget is that it presents income and cost data for only one situation. The use of computerized budgets will allow you to ask many "what if" questions, thus allowing greater flexibility of the enterprise budget as a management decision tool. You need to modify computerized enterprise budgets to fit your specific situation. The use of computers allows you to address more situations than is possible by hand calculations. With computerized budgets you can look at a range of production situations and reduce the

potential risks associated with a specific enterprise.

Finally, the enterprise budget ignores the impact of one enterprise on other enterprises. Enterprises may exhibit complimentary, supplementary or competitive relationships. These relationships require attention when completing an enterprise budget. For example, a dairy enterprise may compete for a limited labor supply, particularly when it causes delays in planting or harvesting of grain crops.

Break-Even Factors for the Cow/Calf Operator

While the producer has little or no control over market prices, he does have at least some control over the price needed to break even. Three factors of break-even prices for the cow/calf producer are: 1) Annual cow costs; 2) Percent calf crop; and 3) Weaning weights. Break-even selling prices for weaned calves are presented in Table 1.

Factors affecting annual cow costs are expenses for feed, pasture or range leases, vet and medicine, marketing, utilities, labor, fuel, machinery and facility repairs, interest, depreciation, property taxes, etc. These costs can be monitored through your bookkeeping system, which would require proper allocation of costs if this is a multiple enterprise operation. Analysis over time might identify areas where costs can be reduced.

Percent calf crop is the number of calves weaned per 100 cows exposed the previous breeding season. The two major factors affecting this are: 1) Failure to conceive at breeding, and 2) Death loss at or near birth. Calving difficulties play an important role in both areas through actual losses at birth and by delaying the subsequent rebreeding.

Weaning weight is significantly influenced by the age of the calf at weaning. Calves born in the first three weeks of the calving season average 70 pounds heavier than those born in the last three weeks. Once a cow starts calving late, she tends to always calve late unless she is left open for a year.

Obviously, there are numerous factors affecting percent calf crop and weaning weights. However, three pieces of information, kept on an annual basis for each cow, can provide a basis for evaluating the current status of the herd and suggest areas for improvement: 1) Calving date; 2) Calving ease; and 3) Actual weaning weights.

Summary

During the 1990's agricultural producers will face difficult economic conditions. Efficient use of capital, land and productive resources is imperative. Enterprise budgets are a tool Colorado producers can use to assist them in making management decisions involving production, financial requirements and marketing strategies. Although enterprise budgets have been used primarily for production planning, like identifying the most profitable enterprise to produce, they also provide valuable information about dollar needs and the timing of those needs. Marketing decisions must be made before a farmer/rancher selects the enterprises he will produce. If the costs of production are known, with an acceptable degree of certainty, the producer can exercise various marketing strategies to ensure a price which will cover production expenses. Many producers have been concerned primarily with production. With increased costs of inputs, including money, producers must concern themselves with financial and marketing management decisions. These decisions are implicit when a production decision is made. Enterprise budgets are a tool to help evaluate some of these important management decisions.

Tables 2 through 13 contain enterprise budgets (Cost-Return Projections) for various classes of livestock. The Cost-Return Projections have been taken from the Kansas Farm Management Handbook, Department of Economics, Cooperative Extension Service, Kansas State University, Manhattan, revised 1991.

TABLE 1. BREAK-EVEN SELLING PRICES FOR CALVES OF VARYING WEANING WEIGHTS AND PERCENTAGES OVER A RANGE OF ANNUAL COW COSTS

Weaning Percent	Weaning Weight	Annual Cow Costs					
		$250	$300	$350	$400	$450	$500
		Break-even Price for Calves ($/lb)*					
70%	400	$0.89	$1.07	$1.25	$1.43	$1.61	$1.79
	500	0.71	0.86	1.00	1.14	1.29	1.43
	600	0.60	0.71	0.83	0.95	1.07	1.19
75%	400	0.83	1.00	1.17	1.33	1.50	1.67
	500	0.67	0.80	0.93	1.07	1.20	1.33
	600	0.56	0.67	0.78	0.89	1.00	1.11
80%	400	0.78	0.94	1.09	1.25	1.41	1.56
	500	0.63	0.75	0.88	1.00	1.13	1.25
	600	0.52	0.63	0.73	0.83	0.84	1.04
85%	400	0.74	0.88	1.03	1.18	1.32	1.47
	500	0.59	0.71	0.82	0.94	1.06	1.18
	600	0.49	0.59	0.69	0.78	0.88	0.98
90%	400	0.69	0.83	0.97	1.11	1.25	1.39
	500	0.56	0.67	0.78	0.89	1.00	1.11
	600	0.46	0.56	0.65	0.74	0.83	0.93
95%	400	0.66	0.79	0.92	1.05	1.17	1.32
	500	0.53	0.63	0.74	0.84	0.95	1.05
	600	0.44	0.53	0.61	0.70	0.79	0.88

*Break-even price for calves is calculated by: $\frac{\text{Annual Cow Costs Divided by Weaning Weight}}{\text{Weaning Percent (as a decimal)}}$

TABLE 2. COST-RETURN PROJECTION FOR BEEF COWS (PER COW)

	Examples Total	Examples Cash Flow	Your Farm Total	Your Farm Cash Flow
VARIABLE COSTS PER COW:				
1. Summer Pasture (6 months)	$103.45	$103.45		
2. Crop Residue (1,240 lbs. x $.005/lb)	6.20			
3. Hay-Forage (3,010 lbs. x $60/ton)	90.30	90.30		
4. Grain				
5. Protein (120 lbs.) and Salt (60 lbs.)	21.60	21.60		
6. Labor (8 hrs. x $6.00/hr.)	48.00	4.80		
7. Veterinary, Drugs, and Supplies	11.40	11.40		
8. Breeding Charge	10.00			
9. Marketing Costs (3% of sales)	13.45	13.45		
10. Utilities, Fuel and Oil	18.00	18.00		
11. Building and Equipment Repairs	22.00	22.00		
12. Miscellaneous	9.75	9.75		
13. Interest on 1/2 Variable Costs @ 12%	21.24	10.96		
A. TOTAL VARIABLE COSTS	$375.39	$315.71		
FIXED COSTS PER COW:				
14. Depreciation on Building and Equipment	$53.50	$XXX		
15. Interest on Buildings and Equipment[1] @ 12%	40.50	62.42		
16. Insurance on Buildings and Equipment @ .25%	1.69	1.69		
17. Interest on Breeding Stock @ 12%	75.84	45.50		
18. Insurance on Breeding Stock @ 1%	6.32	6.32		
B. TOTAL FIXED COSTS	$177.85	$115.93		
C. TOTAL COSTS PER COW (A + B)	$553.24	$431.64		
RETURNS PER COW:				
19. Steers 500 lbs. x 46% x $102/cwt	$234.60			
20. Heifers: 475 lbs. x 30% x $95/cwt	135.38			
21. Cul Cows: 1,000 lbs. x 14% x $53/cwt.	78.40			
D. GROSS RETURNS/COW	$448.38			
E. RETURN OVER VARIABLE COSTS (D-A)	$72.99	$132.67		
F. RETURN OVER TOTAL COSTS (D-C)	$-104.86	$16.74		
G. AVERAGE SELLING PRICE NEEDED/CWT.				
22. To Cover Variable Costs (A-21) ÷ 24	$79.62	$132.67		
23. To Cover total Costs (C-21) ÷ 24	$127.30	$94.70		
H. TOTAL FEED COSTS (Lines 1-5)	$221.55	$215.35		
24. Cwt of Calf Sold Per Cow	3.73			
I. NET TURNOVER(D÷INVESTMENT)[2]	34.31%			
J. NET RETURN ON INVESTMENT (F+13+15+17) ÷ INVESTMENT[2]	2.50%			

[1] Total budget assumes one-half the original cost of buildings and equipment at an interest rate of 12%. The cash flow column assumes principal and interest on buildings and equipment to be 33% of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total value of breeding stock and buildings-equipment.

TABLE 3. COST-RETURN PROJECTION—GRAZING YEARLING BEEF

	Steers		Heifers		Your Farms	
	Total	Cash Flow	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:						
1. Pasture (5 months @ $12/mo)	$60.00	$60.00	$60.00	$60.00		
2. Silage (__ lbs.@ $__/T.)						
3. Hay (__ lbs.@$__/T.)						
4. Grain (__lbs. @ $__/bu.)						
5. Protein (__lbs. @ $__/T.)						
6. Vitamins-Minerals (20 lbs. @ $.03/lb)	60	.60	.60	.60		
7. Feed Processing (__bu. @ $.25/bu.)						
8. Labor (.75 hr @ $6.00/hr.)	4.50	.45	4.50	.45		
9. Veterinary, Drugs and Supplies	6.00	6.00	6.00	6.00		
10. Marketing Costs						
11. Hauling						
12. Utilities, Fuel, Oil	1.50	1.50	1.50	1.50		
13. Buildings-Equipment Repair	1.00	1.00	1.00	1.00		
14. Miscellaneous	2.25	2.25	2.25	2.25		
15. Interest on Purchased Livestock + 1/2 Variable Costs @ 12% (150 days)	28.73	17.26	26.84	16.04		
A. TOTAL VARIABLE COSTS	$104.72	$89.06	$102.69	$87.84		
FIXED COSTS PER HEAD:						
16. Depreciation on Equipment & Facilities	$2.00	$XXX	$2.00	$XXX		
17. Interest on Equipment&Facilities[1] @12%	1.80	2.77	1.80	2.77		
18. Insurance on Equipment & Facilities @ .25%	.08	.08	.08	.08		
B. TOTAL FIXED COSTS	$3.88	$2.85	$3.88	$2 85		
C. TOTAL COSTS PER HEAD (A + B)	$108.60	$91.91	$106.57	$106.57		
RETURNS PER HEAD:						
19. Market Animals:						
Steers: 775 lbs. @ $84/cwt	$651.00					
Heifers: 775 lbs. @ $80/cwt			$620.00			
20. Less Cost of Animal:						
Steers: 580 lbs. @ $93/cwt	-539.40					
Heifers: 580 lbs. @ $86/cwt			-498.80			
21. Less Death Loss: 2% of Line 20	-10.79		-9.98			
D. GROSS RETURN/HEAD	$100.81		$111.22			
E. RETURNS OVER VARIABLE COSTS (D - A)	$-3.91	$-11.75	$-8.53	$-23.38		
F. RETURNS OVER TOTAL COSTS (D - C)	$-7.79	$-8.90	$-4.65	$-20.53		
G. AVERAGE SELLING PRICE NEEDED:						
22. To Cover Variable Cost and Feeder (A + 20 + 21) ÷ (Selling Weight)	$84.50	$82.49	$78.90	$76.98		
23. To Cover Total Cost and Feeder (C + 20 + 21) ÷ (Selling Weight)	$85.01	$82.85	$79.40	$77.35		
H. TOTAL FEED COST (Lines 1 through 7)	$60.60	$60.60	$60.60	$60.60		
24. Cwt. Produced	1.95		1.95			
25. Feed Cost Cwt. (H ÷ 24)	$31.08	$31.08	$31.08	$31.08		
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	17.70%		21.03%			
J. NET RETURN ON INVESTMENT {(F + 15 + 17) ÷ INVESTMENT}[2]	-4.02%		6.30%			

[1] Total column is one-half the investment in equipment and corrals at an interest rate of 12 percent. The cash flow column assumes principal and interest to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total cost of purchased animal and value of equipment and corrals.

TABLE 4. COST-RETURN PROJECTION-DRYLOT BACKGROUND OF BEEF

	Steers		Heifers		Your Farms	
	Total	Cash Flow	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:						
1. Pasture (__months@ __/month)						
2. Silage (__lbs. @ $16/T.)	$41.60	$41.60	$38.40	$38.40		
3. Hay (__lbs. @ $60/T.)						
4. Grain (__lbs. @ $1.65/bu.)	25.79	25.79	24.30	24.30		
5. Protein (__lbs. @ $210/T.)	28.88	28.88	26.25	26.25		
6. Vitamins-Minerals (20 lbs. @ $.03/lb.)	.60	.60	.60	.60		
7. Feed Processing (__bu. @ $.25/bu.)	3.91	3.91	3.68	3.68		
8. Labor (3.85 hrs. @ $6.00/hr)	23.10	2.31	23.10	2.31		
9. Veterinary, Drugs, and Supplies	9.40	9.40	9.40	9.40		
10. Marketing costs (3% of Line 19)						
11. Hauling						
12. Utilities, Fuel, Oil	3.90	3.90	3.90	3.90		
13. Buildings-Equipment Repairs	5.30	5.30	5.30	5.30		
14. Miscellaneous	4.10	4.10	4.10	4.10		
15. Interest on Purchased Livestock + 1/2 Variable Costs @ 12% (165 days)	29.52	17.37	26.26	15.41		
A. TOTAL VARIABLE COSTS	$176.10	$143.16	$165.29	$133.65		
FIXED COSTS PER HEAD:						
16. Depreciation on Equipment & Facilities	$29.00	$XXX	$29.00	$XXX		
17. Interest on Equip. and Facilities' @ 12%	22.50	34.68	22.50	34.68		
18. Insurance on Equip. & Facilities @ .25%	.94	.94	.94	.94		
B. TOTAL FIXED COSTS	$52.44	$35.62	$52.44	$35.62		
C. TOTAL COSTS PER HEAD (A + B)	$228.54	$178.78	$217.73	$169.27		
RETURN PER HEAD						
19. Market Animals:						
Steers: 750 lbs. @ $88/cwt	$660.00					
Heifers: 700 lbs. @ $85/cwt			$595.00			
20. Less cost of Animal:						
Steers: 450 lbs. @ $103/cwt	-463.50					
Heifers: 425 lbs. @ $96/cwt			-408.00			
21. Less Death Loss: 2% of Line 20	-9.27		-8.16			
D GROSS RETURN/HEAD	$187.23		$178.84			
E. RETURNS OVER VARIABLE COSTS (D - A)	$-11.13	$-44.07	$-13.55	$-45.19		
F. RETURNS OVER TOTAL COST (D - C)	$-41.31	$8.45	$-38.89	$9.57		
G. AVERAGE SELLING PRICE NEEDED:						
22. To Cover Variable Cost & Feeder (A + 20 + 21) ÷ (Selling Weight)	$86.52	$82.12	$83.06	$78.54		
23. To Cover Total Cost & Feeder (C + 20 + 21) ÷ (Selling Weight)	$93.51	$86.87	$90.56	$83.63		
H. TOTAL FEED COST (Lines 1 through 7)	$100.78	$100.78	$93.23	$93.23		
24. Cwt. Produced	3.0		2.75			
25. Feed Cost Cwt (H ÷ 24)	$33.59	$33.59	$33.90	$33.90		
I ASSET TURNOVER (D ÷ INVESTMENT)[2]	22.33%		22.84%			
J. NET RETURN ON INVESTMENT ((F + 15 + 17) ÷ INVESTMENT)[2]	1.28%		1.26%			

[1] Total column is one-half the investment in buildings and facilities at an interest rate of 12 percent. The cash flow column assumes principal and interest to be 33 percent of a 5-year amortized loan at an interest rate of 12%.

[2] Investment equals total cost of purchased animal and value of buildings and facilities.

TABLE 5. COST-RETURN PROJECTION-FINISHING BEEF

	Steers		Heifers		Your Farms	
	Total	Cash Flow	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:						
1. Pasture (__months@ __/mo.)						
2 Silage (__lbs. @ $16/T.)	11.20	11.20	11.20	11.20		
3. Hay (__lbs. @ $60/T.)						
4. Grain (__lbs. @ $1.65/bu.)	73.66	73.66	63.34	63.34		
5. Protein (__lbs. @ $210/T.)	13.65	13.65	12.60	12.60		
6. Vitamins-Minerals (30 lbs. @ $.03/lb.)	.90	.90	.90	.90		
7. Feed Processing (__bu. @ $.25/bu.)	11.16	11.16	9.60	9.60		
8. Labor (3.0 hrs. @ $6.00/hr.)	18.00	1.80	18.00	1.80		
9. Veterinary, Drugs, and Supplies	7.50	7.50	7.50	7.50		
10. Marketing Costs						
11. Hauling						
12. Utilities, Fuel, Oil	3.25	3.25	3.25	3.25		
13. Buildings-Equipment Repairs	4.00	4.00	4.00	4.00		
14. Miscellaneous	3.25	3.25	3.25	3.25		
15. Interest on Purchased Livestock + 1/2 Variable Costs @ 12% (130/125 days)	31.72	18.82	27.52	16.31		
A. TOTAL VARIABLE COSTS	$175.79	$146.69	$158.66	$131.25		
FIXED COSTS PER HEAD:						
16. Depreciation on Buildings and Equipment[1]	$29.50	$XXX	$29.50	$XXX		
17. Interest on Buildings and Equip[1] @ 12%	22.50	34.68	22.50	34.68		
18. Ins. on Buildings and Facilities @ .25%	.94	.94	.94	.94		
B. TOTAL FIXED COSTS	$52.94	$35.62	$52.94	$35.62		
C. TOTAL COSTS PER HEAD (A + B)	$228.73	$182.31	$211.60	$166.87		
RETURNS PER HEAD:						
19. Market Animal:						
Steer: 1,100 lbs. @ $78.50/cwt.	$863.50					
Heifers: 975 lbs. @ $78/cwt.			$760.50			
20. Less Cost of Animal:						
Steers: 750 lbs. @ $88/cwt	-660.00					
Heifers: 700 lbs. @ $85/cwt			-595.00			
21. Less Death Loss: 1% of Line 20	-6.60		-5.95			
D. GROSS RETURN PER HEAD	$196.90		$159.55			
E. RETURNS OVER VARIABLE COSTS (D - A)	$21.11	$50.21	$.89	$28.30		
F RETURNS OVER TOTAL COSTS (D - C)	$-31.83	$14.59	$-52.04	$-7.32		
G. AVERAGE SELLING PRICE NEEDED:						
22. To Cover Variable Cost and Feeder (A + 20 + 21) ÷ (Selling Weight)	$76.58	$73.94	$77.91	$75.10		
23. To Cover Total Cost and Feeder (C+20+21) ÷ (Selling Weight)	$81.39	$77.17	$83.34	$78.75		
H. TOTAL FEED COST (Lines 1 through 7)	$110.57	$110.57	$97.64	$97.64		
24. Cwt. Produced	3.50		2.75			
25. Feed Cost Cwt. (H ÷ 24)	31.59	31.59	35.51	35.51		
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	19.02%		16.45%			
J. NET RETURN ON INVESTMENT {(F + 15 + 17) ÷ INVESTMENT)}[2]	2.16%		-.21%			

[1] Total column is one-half the investment in buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[1] Investment equals total cost of purchased animal and value of buildings and equipment.

TABLE 6. COST-RETURN PROJECTION—DRYLOT BACKGROUNDING AND FINISHING BEEF

	Steers		Heifers		Your Farms	
	Total	Cash Flow	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:						
1. Pasture (__months @ __/mo.)						
2. Silage (__lbs. @ $16/T.)	52.80	52.80	49.60	49.60		
3. Hay (__lbs. @ $60/T.)						
4. Grain (__lbs. @ $1.65/bu.)	99.45	99.45	87.66	87.66		
5. Protein (__lbs. @ $210/T.)	42.53	42.53	38.85	38.85		
6. Vitamins-Minerals (50 lbs. @ $.03/lb.)	1.50	1.50	1.50	1.50		
7. Feed Processing (__bu. @ $.25/bu.)	15.07	15.07	13.28	13.28		
8. Labor (6.70 hrs. @ $6.00/hr.)	40.20	4.02	40.20	4.02		
9. Veterinary, Drugs, and Supplies	8.65	8.65	8.65	8.65		
10. Marketing Costs						
11. Hauling						
12. Utilities, Fuel, Oil	4.90	4.90	4.90	4.90		
13. Buildings-Equipment Repairs	7.30	7.30	7.30	7.30		
14. Miscellaneous	3.30	3.30	3.30	3.30		
15. Interest on Purchased Livestock + 1/2 Variable Costs @ 12% (295/285) days	59.13	34.41	50.88	29.50		
A. TOTAL VARIABLE COSTS	$334.83	$273.93	$306.12	$248.56		
FIXED COSTS PER HEAD:						
16. Depreciation on Equipment & Facilities	$33.75	$XXX	$33.75	$XXX		
17. Interest on Equipment & Facilities[1] @ 12%	27.30	42.07	27.30	42.07		
18. Insurance on Equip. & Facilities @ .25%	1.14	1.14	1.14	1.14		
B. TOTAL FIXED COSTS	$62.19	$43.21	$62.19	$43.21		
C. TOTAL COSTS PER HEAD (A + B)	$397.02	$317.14	$368.31	$291.77		
RETURNS PER HEAD:						
19. Market Animal:						
Steers: 1,100 lbs. @ $78.50/cwt	$863.50					
Heifers: 975 lbs. @ $78/cwt			$760.50			
20. Less Cost of Animal:						
Steers: 450 lbs. @ $103/cwt.	-463.50					
Heifers: 425 lbs. @ $96/cwt.			-408.00			
21. Less Death Loss: 2% of Line 20	-9.27		-8.16			
D. GROSS RETURN PER HEAD	$390.73		$344.34			
E. RETURNS OVER VARIABLE COSTS (D - A)	$55.90	$116.80	$38.22	$95.78		
F. RETURNS OVER TOTAL COSTS (D - C)	$-6.29	$73.59	$-23.97	$52.57		
G. AVERAGE SELLING PRICE NEEDED:						
22. To Cover Variable Cost and Feeder (A + 20 + 21) ÷ (Selling Weight)	$73.42	$67.88	$74.08	$68.18		
23. To Cover Total Cost and Feeder (C+20+21) ÷ (Selling Weight)	$79.07	$71.81	$80.46	$72.61		
H. TOTAL FEED COST (Lines 1 through 7)	$211.35	$211.35	$190.89	$190.89		
24. Cwt. Produced	6.50		6.50			
25. Feed Cost Cwt. (H ÷24)	$32.52	$32.52	$34.71	$34.71		
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	42.54%		39.90%			
J. NET RETURN ON INVESTMENT {(F + 15 + 17) ÷ INVESTMENT)}[2]	8.73%		6.28%			

[1] Total column is one-half the investment in buildings and facilities at an interest rate of 12 percent. The cash flow column assumes principal and interest to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total cost of purchased animal and value of buildings and equipment.

TABLE 7. COST-RETURN PROJECTION—COMMERCIALLY FINISHED BEEF

	Steers		Heifers		Your Farms	
	Total	Cash Flow	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:						
1. Feedlot Ration Charge, $105.35/ton						
7.5 lb. Conversion, Steers - 400 lb. gain	158.04	158.04	143.80	143.80		
7 8 lb Conversion, Heifers - 350 lb gain						
2.						
3. Yard Charge ($.05/day)	6.50	6.50	6.25	6.25		
4.						
5 Processing Charge	5.00	5.00	5.00	5.00		
6.						
7. Pregnancy Check and Abortion			2.00	2.00		
8.						
9. Veterinary, Drugs, and Supplies	5.00	5.00	5.00	5.00		
10.						
11. Hauling (100 miles)	3.40	3.40	3.40	3.40		
12.						
13.						
14. Miscellaneous						
15. Interest on Purchased Livestock						
+ 1/2 Variable Costs @ 12% (130/125 days)	32.46	19.47	28.20	16.92		
A. TOTAL VARIABLE COSTS	$210.40	$197.41	$191.65	$180.37		
FIXED COSTS PER HEAD:						
16.						
17.						
18.						
B. TOTAL FIXED COSTS	$0.00	$0.00	$0.00	$0.00		
C. TOTAL COSTS PER HEAD (A + B)	$210.40	$197.41	$191.65	$180.37		
RETURNS PER HEAD						
19. Market Animal:						
Steers: 1,150 lbs. @ $78.50/cwt	$902.75					
Heifers: 1,050 lbs. @ $78.00/cwt			$819.00			
20. Less Cost of Animal:						
Steers: 750 lbs. @ $88.00/cwt.	$-660.00					
Heifers: 700 lbs. @ $85.00/cwt.			$-595.00			
21. Less Death Loss: 1% of Line 20	$-6.60		$-5.95			
22. Less Marketing Cost:						
D. GROSS RETURN PER HEAD	$236.15		$218.05			
E. RETURNS OVER VARIABLE COSTS (D - A)	$25.75	$38.74	$26.40	$37.68		
F. RETURNS OVER TOTAL COSTS (D - C)	$25.75	$38.74	$26.40	$37.68		
G. AVERAGE SELLING PRICE NEEDED:						
23. To Cover Variable Cost and Feeder (A + 20 + 21 + 22) ÷ (Selling Weight)	$76.26	$75.13	$75.49	$74.41		
24. To Cover Total Cost and Feeder (C + 20+ 21 + 22) ÷ (Selling Weight)	$76.26	$75.13	$75.49	$74.41		
H. ASSET TURNOVER (D ÷ INVESTMENT)[1]	35.78%		36.65%			
I. NET RETURN ON INVESTMENT {(F + 15) ÷ INVESTMENT)}[1]	8.82%		9.18%			

[1] Asset turnover is the percentage of investment recovered by total returns. Inverting this measure allows different enterprises to be compared on the basis of capital required to generate a dollar of gross income. Net return on investment is the percentage return on investment. This measure enables comparisons to be made between other enterprises as well as other investment alternatives. Investment equals total cost of purchased livestock.

TABLE 8. COST-RETURN PROJECTION—PER DAIRY COW AT 16,600 POUNDS OF MILK SOLD (REPLACEMENTS RAISED)

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER COW:				
1. Feed	$1033.24	$1033.24		
2. Labor (45 hrs. @ $6.00/hr.)	270.00	27.00		
3. Veterinary, Drugs, and Supplies	50.00	50.00		
4. Breeding Charge*	22.00	22.00		
5. Marketing and Hauling Costs*	230.00	230.00		
6. Utilities*	82.00	82.00		
7. Fuel, Oil and Auto Expense*	30.00	30.00		
8. Building-Equipment Repairs*	85.00	85.00		
9. Dues and Fees*	32.00	32.00		
10. Interest on 1/2 Variable Costs @ 12%	110.05	57.28		
A. TOTAL VARIABLE COSTS	$1944.29	$1648.52		
FIXED COSTS PER COW:				
11. Depreciation on Buildings and Equipment	$261.26	$XXX		
12. Interest on Buildings and Equipment[1] @ 12%	162.00	249.67		
13. Insurance on Buildings and Equipment @ .25%	6.75	6.75		
14. Interest on Breeding Stock @ 12%	168.00	100.80		
15. Insurance on Breeding Stock @ 1%	14.00	14.00		
B. TOTAL FIXED COSTS	$612.01	$371.22		
C. TOTAL COSTS PER COW (A + B)	$2556.30	$2019.74		
RETURNS PER COW:				
16. Milk Sales: 16,600 lbs. x $11.50/cwt	$1909.00			
17. Calves Sold: 40% x $100	40.00			
18. Cull Cows: 1,200 lbs. x 1/3 x $52	233.08			
D. GROSS RETURNS/COW	$2172.08			
E. RETURNS OVER VARIABLE COSTS (D - A)	$227.79	$523.56		
F. RETURNS OVER TOTAL COSTS (D - C)	$-384.22	$152.34		
G. TOTAL RETURN PER CWT. OF MILK SOLD (D ÷ 166 CWT.)	$13.08	$13.08		
H. TOTAL COST/CWT. MILK SOLD (C ÷ 166 CWT.)	$15.40	$12.17		
I. ASSET TURNOVER (D+ INVESTMENT)[2]	52.98%			
J. NET RETURN ON INVESTMENT {(F + 10 + 12 + 14) + INVESTMENT)}[2]	1.36%			

* Based on 1988 Farm Management Association Farms plus inflation from 1989 to 1991.

[1] Total column is one-half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total value of breeding stock and buildings-equipment.

TABLE 9. COST-RETURN PROJECTION—DAIRY HERD REPLACEMENT

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEIFER:				
1. Feed - to 24 Months of Age	$452.29	$452.29		
2. Labor (15 hrs. @ $6.00/hr.)	90.00	9.00		
3. Veterinary, Drugs, and Supplies	6.50	6.50		
4. Breeding Costs for A.I.Services	16.00	16.00		
5. Transportation and Marketing Costs				
6. Fuel, Oil and Repairs	8.50	8.50		
7. Building Repairs~	3.50	3.50		
8. Interest on 1/2 Variable Costs @ 12%	34.61	17.85		
A. TOTAL VARIABLE COSTS	$611.40	$513.64		
FIXED COSTS PER HEIFER:				
9. Depreciation on Buildings and Equipment	$15.00	$XXX		
10. Interest on Buildings and Equipment[1] @12%	18.00	27.74		
11. Insurance on Buildings and Equipment @ .25%	.75	.75		
12. Interest on Average Investment in Heifer @12%	78.00	46.80		
B. TOTAL FIXED COSTS	$111.75	$75.29		
C. TOTAL COSTS PER HEIFER (A + B)	$723.15	$588.93		
RETURNS PER HEIFER:				
13. Spring Heifer: .9 head x $900	$810.00			
14. Non-Breeder or Cull: .1 head x 900 lbs. @ $72	64.80			
15. Calf Purchased or Raised	-100.00			
16. Less Death Loss: 15% of Line 15	-15.00			
D. GROSS RETURNS PER HEIFER	$759.80			
E. RETURNS OVER VARIABLE COSTS (D - A)	$148.40	$246.16		
F. RETURNS OVER TOTAL COSTS (D - C)	$-36.65	$170.87		
G. ASSET TURNOVER (D ÷ INVESTMENT)[2]	79.98%			
H. NET RETURN ON INVESTMENT {(F + 8 + 10 + 12) ÷ INVESTMENT)}[2]	17.61%			

[1] Total column is one-half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a S-year amortized ban at an interest rate of 12 percent.

[2] Investment equals total investment in dairy heifer and value of buildings and facilities for the two year period.

TABLE 10. COST-RETURN PROJECTION—EWE AND LAMB

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER EWE:				
1. Pasture(214 days$.10/day)	$21.40	$21.40		
2. Sorghum Silage (.39T x $16/Ton)	6.24	6.24		
3. Alfalfa Hay(.21 T x$60/Ton)	12.60	12.60		
4. Grain Sorghum (7.73 bu. x $1.65/bu.)	12.75	12.75		
5. Protein (101 lbs. x $..105/lb.)	10.61	10.61		
6. Labor (2 hrs. x $6.00/hour)	12.00	1.20		
7. Veterinary, Drugs, and Supplies	4.00	4.00		
8. Breeding Costs	2.75	2.75		
9. Marketing Costs (3% of Line 21)	2.57	2.57		
10. Shearing	2.00	2.00		
11. Utilities, Fuel, Oil	1.00	1.00		
12. Building and Equipment Repairs	2.35	2.35		
13. Taxes and Insurance	.60	.60		
14. Miscellaneous	.50	.50		
15. Interest on 1/2 Variable Costs @ 12%	5.48	2.90		
A. TOTAL VARIABLE COSTS	$96.84	$83.46		
FIXED COSTS PER EWE:				
16. Depreciation on Buildings and Equipment	$11.25	$XXX		
17. Interest on Buildings and Equipment[1] @ 12%	10.20	15.72		
18. Insurance on Buildings and Equipment @ .25%	.43	.43		
19. Interest on Breeding Flock@ 12%	12.00	7.20		
20. Insurance on Breeding Flock @ 1%	1.00	1.00		
B. TOTAL FIXED COSTS	$34.88	$24.35		
C. TOTAL COSTS PER EWE (A + B)	$131.72	$107.81		
RETURNS PER EWE:				
21. Market Lambs: 115 lbs. x 115% x $62/cwt.	$85.56			
22. Cull Ewes: .2 x 125 lbs. x $19.80/cwt	4.95			
23. Wool and Incentive: 8.5 lbs. x $1.25/lb	10.63			
24. Ewe Replacement	-16.67			
D. GROSS RETURNS PER EWE	$84.47			
E. RETURN OVER VARIABLE COSTS (D - A)	$-12.37	$1.01		
F. RETURN OVER TOTAL COSTS (D - C)	$-47.25	$-23.34		
G. AVERAGE SELLING PRICE NEEDED PER CWT:				
25. To Cover Variable Costs (A - 22 - 23) + 24	$70.96	$61.27		
26. To Cover Total Costs (C - 22 + 23) + 24	$96.24	$78.91		
H. TOTAL FEED COSTS (Lines 1 through 5)	$63.60	$63.60		
27. Cwt. Produced	1.38			
28. Feed Cost Per Cwt. Lamb Marketed (H÷27)	$46.09	$46.09		
I. ASSET TURNOVER (D + INVESTMENT[2])	$31.29			
J. NET RETURN ON INVESTMENT ((F + 15 + 17 + 19) ÷ INVESTMENT)[2]	-7.25%			

[1] Total column is one/half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and Equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total value of breeding stock and buildings-equipment.

TABLE 11. COST-RETURN PROJECTION—FEEDER LAMBS

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD				
1. Pasture (__ days x $__/day)				
2. Silage (__lbs x $__/Ton)				
3. Alfalfa Hay (125 lbs. x $60/Ton)	3.75	3.75		
4. Grain (3.57 bu. x $1.65/bu.)	5.89	5.89		
5. Protein (13 lbs. x $210/ton)	1.37	1.37		
6. Vitamins-Minerals (3 lbs. @ $.03/lb.)	.09	.09		
7. Feed Processing (3.57 bu. @ $.25/bu.)	.89	.89		
8. Labor (.75 hrs. x $6.00/hour)	4.50	.45		
9. Veterinary, Drugs, and Supplies	1.25	1.25		
10. Marketing Costs (3% of Line 21)	2.12	2.12		
11. Hauling	.35	.35		
12. Shearing	1.75	1.75		
13. Building and Equipment Repairs	.35	.35		
14. Utilities, Fuel, Oil	.70	.70		
15. Miscellaneous	.30	.30		
16. Interest on 1/2 Variable Costs @ 12% (90 days)	1.61	.93		
A. TOTAL VARIABLE COSTS	24.92	20.19		
FIXED COSTS PER HEAD:				
17. Depreciation on Buildings and Feed Storage: ($45 ÷ 20 yrs)	$2.25	$XXX		
18. Depreciation on Buildings and Equipment ($45 ÷ 10 yrs)	4.50	XXX		
19. Interest on Buildings and Equipment[1] @ 12%	5.40	8.32		
20. Insurance on Buildings and Equipment @ .25%	.23	.23		
B. TOTAL FIXED COSTS	$12.38	$8.55		
C. TOTAL COSTS PER EWE (A + B)	$37.30	$28.74		
RETURNS PER HEAD:				
21. Market Animals: 120 lbs. @ $59/cwt	$70.80			
22. Wool: 5 lbs. @ $1.25/lb	6.25			
23. Less Cost of Animal: 60 lbs. @ $70/cwt.	-42.00			
24. Less Death Loss: (3% of Line 23)	-1.26			
D. GROSS RETURNS PER EWE	$33.79			
E. RETURN OVER VARIABLE COSTS (D -A)	$8.87	$13.60		
F. RETURN OVER TOTAL COSTS (D - C)	$-3.51	$5.05		
G. AVERAGE SELLING PRICE NEEDED PER CWT:				
25. To Cover Variable Costs and Feeder (A + 23 + 24) ÷ (Selling Wt)	$56.82	$52.87		
26. To Cover Total Costs and Feeder (C + 23 + 24) ÷ (Selling Weight)	$67.13	$60.00		
H. TOTAL FEED COSTS (Lines 1 through 7)	$11.99	$11.99		
27. Cwt. Produced		.6		
28. Feed Cost Per Cwt. Lamb Marketed (H ÷ 27)	$19.98	$19.98		
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	25.60%			
J. NET RETURN ON INVESTMENT ((F + 16 + 19) ÷ INVESTMENT)[2]	-2.65%			

[1] Total column is one-half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total cost of purchased animal and value of buildings and equipment.

TABLE 12. COST-RETURN PROJECTION—FARROW TO FINISH SWINE ENTERPRISE

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER LITTER:				
1. Grain (57.764 cwt x $2.95/cwt)	$170.40	$170.40		
2. Protein: (1229.4 lbs. x $.105/lb.)	129.05	129.05		
3. Vitamins-Minerals (182.6 lbs. x $.06/lb.)	10.96	10.96		
4. Pig Starter (117.6 lbs. x $.18/lb)	21.17	21.17		
5. Feed Processing	51.58	51.58		
6. Labor (12.5 hrs. x $6.00/hr)	75.00	7.50		
7. Veterinary, Drugs, and Supplies	12.50	12.50		
8. Marketing Costs	12.25	12.25		
9. Utilities, Fuel, and Oil	26.25	26.25		
10. Buildings and Equipment Repairs	40.75	40.75		
11. Dues and Fees	5.00	5.00		
12. Miscellaneous	1.50	1.50		
13. Interest on 1/2 Variable Costs @ 12% (6 months)	16.69	16.69		
A. TOTAL VARIABLE COSTS	$573.10	497.71		
FIXED COSTS PER LITTER				
14. Depreciation on Buildings and Equipment	$66.50	$XXX		
15. Interest on Buildings and Equipment[1] @ 12%	52.80	81.37		
16. Insurance on Buildings and Equipment @ .25%	2.20	2.20		
17. Interest on Breeding Herd @ 12%	6.00	3.60		
18. Insurance on Breeding Herd @ 1%	.50	.50		
B. TOTAL FIXED COSTS	$128.00	$87.67		
C. TOTAL COSTS PER LITTER (A + B)	$701.10	$585.38		
RETURNS PER LITTER				
19. Market Hogs: 230 lbs. x $44/cwt. x 7.7 per litter	$779.24			
20. Cull Sows: 100 lbs. x $36/cwt	$36.00			
D GROSS RETURNS PER LITTER (Line 19 + Line 20)	$815.24			
E. RETURNS OVER VARIABLE COSTS (D - A)	$242.14	$317.53		
F RETURNS OVER TOTAL COSTS (D - C)	$114 14	$229.86		
G MARKET HOG BREAKEVEN PRICE:				
21. To Cover Variable Costs {(A - 20) ÷ 23)	$30.33	$26.07		
22. To Cover Total Costs ((C - 20) + 23)	$37.56	$31.02		
H TOTAL FEED COSTS (Lines 1 through 5)	$383.16	$383.16		
23. Cwt. Pork Produced (Line 19)	17.71			
24. Feed Cost Per Cwt Pork (Line H ÷ Line 23)	$21.46			
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	75.49%			
J. NET RETURN ON INVESTMENT ((F + 13 + 15 + 17) ÷ INVESTMENT)[2]	17.56%			

[1] Total column is one/half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total value of breeding herd and buildings and equipment.

TABLE 13. COST-RETURN PROJECTION—FINISHING FEEDER PIGS

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER HEAD:				
1. Grain (9.76 bu x $1.95/bu)	$17.00	$17.00		
2. Protein: (108.7 lbs. x $.0875/lb.)	12.42	12.42		
3. Vitamins-Minerals (22.3 lbs. x $.20/lb)	4.46	4.46		
4. Feed Processing	.99	.99		
5. Labor (.5 hrs. x $6.00/hr)	5.15	5.15		
6. Veterinary, Drugs, and Supplies	3.00	3.00		
7. Marketing Costs	1.60	1.60		
8. Hauling Costs				
9. Utilities, Fuel, and Oil	1.70	1.70		
10. Buildings and Equipment Repairs	2.60	2.60		
11. Dues and Fees	.85	.85		
12. Interest on Pig and Variable Costs @ 12% (4 months)	2.16	2.16		
A. TOTAL VARIABLE COSTS	$48.27	$48.27		
FIXED COSTS PER HEAD:				
13. Depreciation on Buildings and Equipment	$7.00	$XXX		
14. Interest on Buildings and Equipment[1] @ 12%	5.40	8.32		
15. Insurance on Buildings and Equipment @ .25%	.23	.23		
B. TOTAL FIXED COSTS	$12.63	$8.55		
C. TOTAL COSTS PER HEAD (A + B)	$60.90	$53.22		
RETURN PER HEAD:				
16. Market Hogs: 230 lbs. x $44/cwt	$101.20			
17. Less Cost of Feeder Pig (40 lbs.)	$-31.00			
18. Less Death Loss (4.0% of Line 17)	$-1.24			
D. GROSS RETURNS PER HEAD (190 lb. gain)	$68.96			
E. RETURNS OVER VARIABLE COSTS (D - A)	$20.96	$24.29		
F. RETURNS OVER TOTAL COSTS (D - C)	$8.06	$15.74		
G. AVERAGE SELLING PRICE NEEDED/CWT. SOLD				
19. Variable Costs and Feeder ((A + 17 + 18) ÷ Line 16 cwt.)	$35.00	$33.43		
20. Total Costs and Feeder ((C+17+18) ÷ Line 26 cwt)	$40.50	$37.16		
H. TOTAL FEED COSTS (Lines 1 through 4)	$35.56	$35.56		
21. Cwt. Produced	1.9			
22. Feed Cost Per Cwt Produced (Line H + Line 21)	$18.72			
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	56.99%			
J. NET RETURN ON INVESTMENT ((F + 12 + 14) ÷ INVESTMENT)[2]	12.91%			

[1] Total column is one/half the original cost of buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals cost of feeder pig and buildings and equipment per batch.

TABLE 14. COST-RETURN PROJECTION—FARROWING AND MARKETING FEEDER PIGS

	Examples		Your Farm	
	Total	Cash Flow	Total	Cash Flow
VARIABLE COSTS PER LITTER:				
1. Grain: (11.606 cwt. X $2.95/cwt.)	$34.24	$34.24		
2. Protein: (282.8 lbs. X $.105/lb.)	29.69	29.69		
3. Vitamins-Minerals(50.6 lbs. X $.06/lb.)	3.04	3.04		
4. Pig Starter(117.6 lbs. X $.18/lb.)	21.17	21.17		
5. Feed Processing	10.37	10.37		
6. Labor (9hrs. X $6.00/hr.)	54.00	5.40		
7. Veterinary, Drugs, and Supplies	15.00	15.00		
8. Marketing Costs	4.00	4.00		
9. Utilities, Fuel, and Oil	23.75	23.75		
10. Buildings and Equipment Repairs	20.50	20.50		
11. Dues and Fees	2.75	2.75		
12. Miscellaneous	1.50	1.50		
13. Interest on 1/2 Variable Costs @ 12% (6 mos.)	6.60	3.09		
A. TOTAL VARIABLE COSTS	$226.61	$174.50		
FIXED COSTS PER LITTER:				
14. Depreciation on Buildings and Equipment	$46.75	$XXX		
15. Interest on Buildings and Equipment[1] @ 12%	36.60	56.40		
16. Insurance on Buildings and Equipment @ .25%	1.53	1.53		
17. Interest on Breeding Herd @12%	6.00	3.60		
18. Insurance on Breeding Herd @1%	.50	.50		
B. TOTAL FIXED COSTS	$91.38	$62.03		
C. TOTAL COSTS PER LITTER (A + B)	$317.99	$236.53		
RETURNS PER LITTER:				
19. Feeder Pig: $31/head (40 lbs./hd.) X 7.7 per litter.	$238.70			
20. Cull Sow: 100 lbs. X $36/cwt.	$36.00			
D. GROSS RETURNS/LITTER (Line 19 + Line 20)	$274.70			
E. RETURNS OVER VARIABLE COSTS (D—A)	$48.09	$100.20		
F. RETURNS OVER TOTAL COSTS (D—C)	$-43.29	$38.17		
G. AVERAGE SELLING PRICE PER HEAD TO BREAKEVEN:				
21. To Cover Variable Costs ((A- 20) ÷ 23)	$24.75	$17.99		
22. To Cover Total Costs ((C - 20) ÷ 23)	$36.62	$26.04		
H. TOTAL FEED COSTS (Lines 1 thru 5)	$98.51	$98.51		
23. Number of Head Marketed/Litter	7.7			
24. Feed Cost/Head Marketed (Line H ÷ 23)	$12.79			
I. ASSET TURNOVER (D ÷ INVESTMENT)[2]	33.91%			
J. NET RETURN ON INVESTMENT ((F + 13 + 15 + 17) ÷ INVESTMENT)[2]	.73%			

[1] Total column is one-half the investment in buildings and equipment at an interest rate of 12 percent. The cash flow column assumes principal and interest on buildings and equipment to be 33 percent of a 5-year amortized loan at an interest rate of 12 percent.

[2] Investment equals total value of breeding herd and buildings and equipment.

EASTERN COLORADO RESEARCH CENTER

Pete Fagerlin, Golden Plains Area Extension Agent (Livestock)

OVERVIEW:

The Eastern Colorado Research Center (ECRC) was purchased in 1952 by Colorado State University to conduct research in beef cattle and ranch management. Included in the purchase was 2,960 acres of deeded land and 800 acres of state-leased land. With 800 acres of abandoned cropland, 100 acres of seriously eroded blowouts and the native range in relatively poor condition, the Center offered an ideal laboratory to investigate range reseeding, blowout stabilization, range improvement practices and beef cattle management.

An active research program was initiated in 1953, with priority placed on deferred grazing and reseeding. By 1955, ECRC had become a complete operational unit that could explore problems of beef production and range management on the high plains of Eastern Colorado.

An advisory committee consisting of ranchers and extension personnel from 10 northeastern Colorado counties was established in 1953 which has had significant inputs to the activities of ECRC. Scheduled field days have been held since 1953. Tours have been arranged for cattlemen's associations, scientists, soil conservation districts, extension personnel, foreign delegations, high school and college students and other interested groups.

ECRC has served as an outdoor laboratory for graduate students interested in research in the areas of range management, ruminant nutrition, beef cattle reproduction, range biology and entomology. Undergraduate students have furthered their education while enrolled as interns at ECRC to work on special problem areas. High school students in FFA and 4-H programs have utilized ECRC for studying grass species, soil types, livestock judging and beef production practices. Throughout the year, ECRC plays a vital role in rural education and agricultural research investigations.

Currently ECRC is managed by Dave Schutz, Burdette Route, Box 59, Akron, Colorado, 80720, 303-345-6402. Research efforts are coordinated by Ken Odde, D.V.M., Ph.D., Department of Animal Sciences, Colorado State University, Fort Collins, Colorado 80523, 303-491-6923. ECRC maintains a commercial cow herd of 200 cows, utilizing this breeding herd and its offspring through yearlings, for various research activities. In addition another 200 head of feeder cattle are utilized for various drylot trials in nutrition and reproduction. Since 1980, ECRC has been the location for the Northeast Colorado Beef Improvement Center built by 150 producers in Northeast Colorado to facilitate the programs of the Great Western Beef Expo and the Northeast Colorado Bull Test Association.

FIELD DAY:

ECRC's Annual Field Day for 1991 has been set for Tuesday, May 21st. Each year the staff at ECRC, together with those conducting research studies at ECRC, discuss their findings, current investigations and tour the resources at work with those that attend the Field Day. This is an excellent opportunity for producers to be updated on ECRC's current contributions to agriculture in the high plains.

Visitors are always welcome at ECRC. ECRC is located half-way between Akron and Sterling just east of Colorado Highway 63 on County Road 57. Further information on the activities at ECRC

can be obtained by contacting either Dave Schutz at the Research Center or Ken Odde at CSU's main campus in Fort Collins.

CURRENT STUDIES:

Range Cow Supplementations: ECRC's new range beef cow supplementation facility is being used to study winter supplementation on an individual cow basis. To date, eight different supplementation practices have been evaluated.

Long Cut or Short Cut Roughages for Finishing Rations: The purpose of this trial is to evaluate the performance of feedlot cattle given alfalfa hay or wheat straw that has been processed through either a tub grinder or hay chopper. The tub grinder produces short cut roughage of lengths of less than two inches while the hay chopper produces roughage of lengths greater than four inches.

Type of Roughage Used in Finishing Rations: Alfalfa, corn silage, wheat straw and amoniated wheat straw are being evaluated as the roughage source in finishing rations.

Finishing Cattle on Self Feeders: These trials compare the use of self feeders to traditional bunk line feeding for finishing cattle performance.

Tryptophan Supplementation of Newly Arrived Feeder Cattle: This trial will help determine if rate of gain, feed efficiency or increased titers to viruses in the BRD complex will be improved in newly received stressed feeder cattle by supplementing rumen by-pass tryptophan.

Copper Supplementation of Range Cattle: Two sources of supplemental copper, copper sulfate and copper protienate, are being evaluated for their influence on range cattle performance.

Norgestomet Implants for Growing Heifers: The purpose of this trial is to evaluate the value of erodible Norgestomet implants for increasing rate of gain and inhibiting cycling in non-pregnant growing heifers.

Effect of Pre-partum Energy Levels on the Newborn Calf: This study looks at various levels of supplemental energy given cows in late gestation and its influence on calf birth weight and basal metabolism in the newborn calf with respect to its ability to produce and regulate body heat.

Calving Difficulty: This trial is designed to evaluate the effect of calving difficulty on the metabolic functions in the newborn calf.

Vitamins E and Passive Antibody Transfer: This trial is evaluating the effectiveness of Vitamin E injections given to the gestating cow to improve the placental transfer of Vitamin E and the passive transfer of antibodies to the fetus.

GOLDEN PLAINS CORN VARIETY DEMONSTRATION SUMMARY
LARRY AND MERLE GARDNER FARM

COMPANY	VARIETY	DAYS TO MAT.	1986 BU.@ $1.45 NET VALUE INDEX	1987 BU.@ $1.67 NET VALUE INDEX	1988 BU.@ $2.65 NET VALUE INDEX	1989 BU. @ $2.07 NET VALUE INDEX	1990 BU.@$ 2.09 NET VALUE INDEX	AVERAGE NET VALUE INDEX
AGRIPRO	AP-364	100				89	104	96
AGRIPRO	AP-424	107				103	93	98
ASGROW-OsGOLD	RX-626	105		100	99	106	99	101
CARGILL	4327	107				107	97	102
DEKALB-PFIZER	DK-535	103			97		109	103
DEKALB-PFIZER	DK-547	104				108	105	107
DEKALB-PFIZER	DK-572	107	105		101	102	103	103
FONTENELLE	4435	111			104	92	101	99
GOLDEN ACRES	T-E 7016	108				101	102	102
GOLDEN HARVEST	H-2344	100	103	113	102	104	108	106
GOLDEN HARVEST	H-2404	104			100	110	104	105
JACQUES	5700	105		110	94	116	103	106
NC+	3088	105				100	107	103
NC+	4131	108		111	99	114	99	106
NORTHRUP KING	N-4350	100				97	99	98
NORTHRUP KING	N4545	105			97	117	107	107
PAYCO	SX-687	102			104	108	101	104
PAYCO	SX-872	108	106	108	103	104	106	105
PIONEER	3714	103				109	107	108
PIONEER	3578	108				109	112	110
PIONEER	3475	114		117	103	104	109	108
PRODUCERS	626	108				113	106	109
SINDELAR	XO-109	109				105	91	98
SUPERCROST	3130	105			100	107	101	103
THOR O BRED	SSX-420	107		104	105	101	103	103
THOR O BRED	SSX-442	110		108	109	101	103	105
TRIUMPH	1040	110	104	106	105	98	99	102

NET VALUE INDEX=NET VALUE OF VARIETY IN RELATION TO THE AVERAGE VALUE OF THE DEMONSTRATION THAT YEAR

COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
COLORADO STATE UNIVERSITY
FORT COLLINS, COLORADO 80523