Technical Report TR00-7

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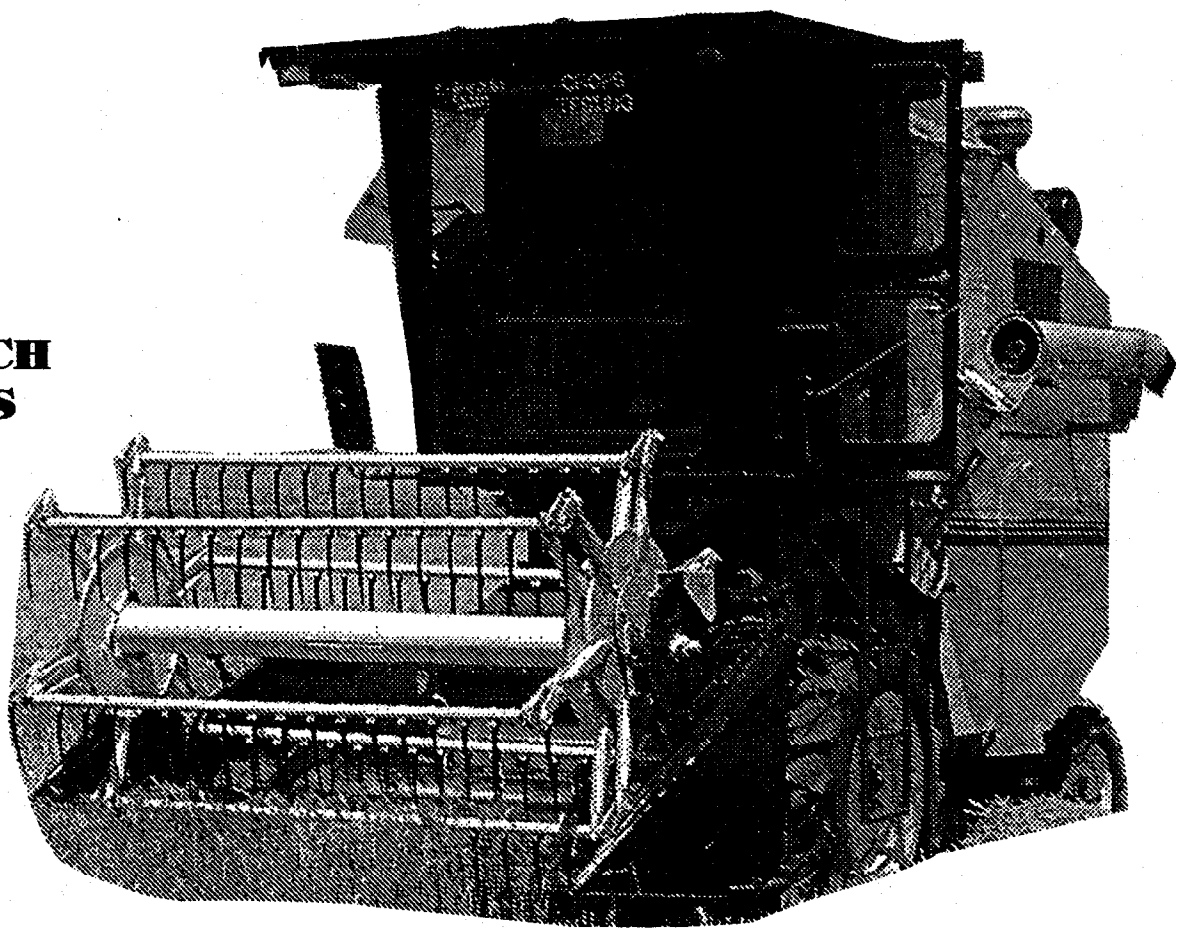
ARKANSAS VALLEY RESEARCH CENTER

Established in 1888

Rocky Ford, Colorado



1999 RESEARCH REPORTS

COLORADO AGRICULTURAL EXPERIMENT STATION

Vol. CXII

Colorado State University

Arkansas Valley Research Center
Rocky Ford, Colorado

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1999 Climatic Conditions
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado
Frank C. Schweissing, Superintendent

This is the fifth year annual precipitation has exceeded the long-term average (99 yrs.). The 19.96 inches of precipitation recorded in 1999 is greater than any other year since 1941 when 22.48 inches occurred. April (4.63") and July (6.79") had particularly high rainfall amounts. Disease problems, as for the past three years, were particularly serious for vegetable crop production.

The frost free period of 156 days between April 26 and September 29 was 2 days shorterer than average. Based on a nominal growing season of May 1 to September 30, there were 2746 corn growing degree days which is somewhat below normal.

1999 Frost Dates		1999	Average Frost Dates*		Average*
Last Spring Frost	First Fall Frost	Frost Free Period (days)	Last Spring Frost	First Fall Frost	Frost Free Period (days)
April 26 - 32°F	Sept. 29 - 25°F	156	May 1	October 6	158

Month	Temperature(F°)			Precipitation		Snowfall	10 Year Precip.	
	High	Low	Avg.	1999 inches	Normal* inches	Total inches		Inches
Jan.	72	7	37.9	0.20	0.26	0.5	1990	17.87
Feb	79	7	44.4	0.02	0.30	0.7	1991	11.62
March	81	15	47.3	1.18	0.67	7.5	1992	12.33
April	82	22	51.0	4.63	1.33	2.0	1993	11.36
May	93	33	61.5	2.16	1.84		1994	11.42
June	98	45	69.9	0.96	1.40		1995	12.64
July	102	51	80.1	6.79	2.01		1996	13.38
Aug.	98	55	75.8	2.79	1.58		1997	18.58
Sept.	95	25	65.4	0.50	0.91		1998	14.62
Oct.	91	23	54.8	0.53	0.79		1999	19.96
Nov.	82	15	46.9	0.16	0.47	2.5		
Dec.	69	5	34.6	0.04	0.32	2.5	Average	14.39
			Total	**19.96**	**11.88**	**15.7**		

*Average - 99 years

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FIELD CROPS

VEGETABLE CROPS

This research is partially supported by the Arkansas Valley Onion Growers Ass'n.

Compiled by Frank C. Schweissing

NOTICE

This publication is a compilation of reports dealing with research carried out at the Arkansas Valley Research Center. Trade names have been used to simplify reporting, but mention of a product does not constitute a recommendation nor an endorsement by Colorado State University or the Colorado Agricultural Experiment Station. In particular, pesticides mentioned in various reports may not be registered for public use. Pesticides are to be used only in accordance with the manufacturers' label.

1999 ALFALFA VARIETY PERFORMANCE TRIAL REPORT

Location: Arkansas Valley Research Center
Rocky Ford, Colorado

Stand Established: 1997

Investigator: Frank C. Schweissing, Superintendent

This is a report of the results of an irrigated alfalfa variety trial, planted August 29, 1997, after 2 years of production. There are 25 commercial and 3 public varieties included in this test.

The trial was set up as a randomized complete block, with four replications (1 plot = 75 sq. ft.). The trial will be managed to reduce factors which limit production. The plot area was fertilized with 150 lbs. of P_2O_5 per acre prior to planting and again on November 30, 1998. Sencor 75DF .50 lbs. + Gramoxone .31 lbs. AI/Acre was applied on February 16, 1999 for weed control. Furadan 4E at .75 lbs. AI/Acre was applied on April 21, 1999 for alfalfa weevil control.

Harvest dates in 1999 were June 2, July 6, August 16 and October 5. This year was again wetter than normal, particularly during April, May, July and August. Growing degree days were below normal. The trial was irrigated before the first cutting and after each of the four cuttings. All four cuttings were harvested without rain damage. The average trial yield of 6.35 tons was 1 ton greater than last seasons average. Significant differences in yield were observed for all cuttings and total yield.

Yields are reported in oven-dry weights. If you want to determine yields with a particular percent moisture, divide dry yield by 1.00 minus the percent moisture you want in your hay. Example: (Yield/(1.00-.10))=yield with 10% moisture or 6.35/.90=7.05 tons.

Decision as to the value of a particular variety for our area should be carefully considered after only two years of production.

Forage yields of 28 alfalfa varieties at the Arkansas Valley Research Center, Rocky Ford, Colorado in 1998-99.

Variety	Brand/Source	1st Cut June 2	2nd Cut July 6	3rd Cut Aug. 16	4th Cut Oct. 5	1999 Total	1998 Total	2-yr. Total
		tons/acre[1]						
WS 210*	W-L Research	2.49	1.67	1.55	1.32	7.03	5.86	12.89
WL 324	Germain's	2.54	1.57	1.27	1.14	6.52	5.74	12.26
Depend + EV	Agripro Seeds Inc.	2.39	1.67	1.40	1.17	6.63	5.60	12.23
DK 143	DeKalb Genetics Corp.	2.21	1.63	1.46	1.22	6.52	5.67	12.19
3L104*	Novartis	2.61	1.43	1.36	1.19	6.59	5.57	12.16
Cimarron 3i	Great Plains Research	2.56	1.58	1.30	1.18	6.62	5.54	12.16
Millennia	Union Seed Co.	2.47	1.57	1.35	1.25	6.64	5.48	12.12
ZX 9352*	ABI Alfalfa	2.40	1.57	1.44	1.14	6.55	5.46	12.01
631	Garst Seed Co.	2.40	1.62	1.41	1.17	6.60	5.38	11.98
Leaf Master	Union Seed Co.	2.59	1.57	1.30	1.27	6.73	5.24	11.97
ZC 9651*	ABI Alfalfa	2.33	1.62	1.25	1.19	6.39	5.56	11.95
5454	Pioneer Hi-Bred	2.36	1.59	1.32	1.22	6.49	5.43	11.92
Big Horn	Cargill Hybrid Seeds	2.46	1.58	1.30	1.14	6.48	5.41	11.89
Affinity + Z	America's Alfalfas	2.42	1.53	1.30	1.19	6.44	5.44	11.88
TMF Multi-plier II	Mycogen Seeds	2.39	1.51	1.34	1.16	6.40	5.44	11.84
3L171*	Arkansas Valley Seed	2.34	1.70	1.29	1.15	6.48	5.35	11.83
DK142	DeKalb Genetics Corp.	2.34	1.54	1.32	1.27	6.47	5.34	11.81
Innovator + Z	America's Alfalfas	2.18	1.60	1.34	1.15	6.27	5.43	11.70
DK 127	DeKalb Genetics Corp.	2.26	1.59	1.28	1.16	6.29	5.24	11.53
Archer	America's Alfalfas	2.19	1.56	1.36	1.18	6.29	5.24	11.53
Haygrazer	Great Plains Research	2.25	1.49	1.34	1.16	6.24	5.29	11.53
630	Garst Seed Co.	2.21	1.58	1.28	1.12	6.19	5.34	11.53
ZC 9650*	ABI Alfalfa	2.11	1.53	1.28	1.09	6.01	5.30	11.31
WL 325HQ	Germain's	2.19	1.50	1.24	1.08	6.01	5.25	11.26
Lahontan	USDA NV-AES	2.18	1.42	1.35	1.11	6.06	5.13	11.19
6L271*	Arkansas Valley Seed	2.04	1.44	1.46	1.17	6.11	5.07	11.18
Ranger	USDA NE-AES	1.85	1.30	1.17	0.93	5.25	4.71	9.96
Vernal	USDA WI-AES	1.91	1.41	1.17	0.90	5.39	4.51	9.90
Column Mean		2.31	1.55	1.33	1.16	6.35	5.36	11.71
LSD (0.05)		0.25	0.13	0.11	0.08	0.42	0.31	0.56
CV (%)		7.78	5.88	5.96	4.98	4.72	4.12	3.38

[1]Yields calculated on oven-dry basis. *Indicates experimental entry

Planted: August 29, 1997 at 10.2 lb.seed/acre.

1999 ALFALFA VARIETY PERFORMANCE TRIAL REPORT

Location: Arkansas Valley Research Center
Rocky Ford, Colorado

Stand Established: 1994

Investigator: Frank C. Schweissing, Superintendent

This is a report of the results of an irrigated alfalfa variety trial, planted August 30, 1994, after 5 years of production. There are 24 commercial and 3 public varieties included in this test.

The trial was set up in a randomized complete block, with four replications (1 plot = 75 sq. ft.). The trial is being managed to reduce factors which limit production. The plot area was fertilized with 150 lbs. of P_2O_5 per acre prior to planting and was topdressed with 150 lbs. of P_2O_5 per acre on November 12, 1996. Herbicides (Lexone DF 0.5 lbs. + Gramoxone .31 lbs. AI/Acre) were applied March 12, 1996, March 7, 1997, March 3, 1998 and February 16, 1999, for winter annual weed control. Furadan 4F, at 1.0, .5, and .75 lbs. AI/Acre, was applied April 20, 1996, May 12, 1998 and April 21, 1999 respectively, for alfalfa weevil control.

Four cuttings have been obtained in each of the production years. Harvest dates in 1999 were June 2, July 6, August 16 and October 5. The trial was irrigated prior to the first cutting and after each of the four cuttings. This year was again wetter than normal, particularly during April, May, July and August and growing degree days were below average. Rainfall from April through September was 17.8 inches compared to the 98 year average of 9". All four cuttings were harvested without rain damage. The overall trial average yield was 5.04 tons continuing a downward trend from previous years. Significant differences, between varieties, in yields were observed for all cuttings and total yields. Many commercial varieties are doing much better than the public varieties.

Yields are reported in oven-dry weights. If you want to determine yields with a particular percent moisture, divide dry yield by 1.00 minus the percent moisture you want in your hay. Example: (Yield /(1.00-.10))=yield with 10% moisture or 5.04/.90 = 5.60 tons.

Table 1.-Forage yields of 27 alfalfa varieties in the five-year irrigated trial at the Arkansas Valley Research Center, Rocky Ford, Colorado in 1995-99.

Variety	Brand/Source	1st Cut 6/2	2nd Cut 7/6	3rd Cut 8/16	4th Cut 10/5	1999 Total	1998 Total	1997 Total	1996 Total	1995 Total	5 Yr. Total
		tons/acre[1]									
Tahoe	Novartis	1.52	1.30	1.22	1.25	5.29	5.62	6.10	5.99	5.61	28.61
Evergreen	Arkansas Valley Seed	1.72	1.43	1.29	1.16	5.60	6.07	5.86	5.34	5.68	28.55
Reward	Drussel Seed	1.71	1.31	1.12	1.17	5.31	5.23	6.06	6.32	5.39	28.31
Legacy	Grassland West Co.	1.75	1.29	1.20	1.26	5.50	5.50	5.76	5.78	5.54	28.08
Archer	America's Alfalfas	1.37	1.30	1.36	1.09	5.12	5.52	5.80	5.88	5.71	28.03
Rushmore	Novartis	1.72	1.40	1.25	1.01	5.38	5.26	5.58	6.02	5.64	27.88
DK133	DeKalb Genetics Corp.	1.88	1.32	1.30	1.02	5.52	5.65	5.59	5.89	5.04	27.69
3B05*	Arkansas Valley Seed	1.82	1.37	1.20	1.06	5.45	5.42	5.65	5.88	5.25	27.65
Jewel	Wilbur-Ellis	1.70	1.25	1.24	1.00	5.19	5.14	5.54	5.94	5.63	27.44
Multi-Plier	Mycogen Seeds	1.55	1.24	1.09	0.95	4.83	5.17	5.74	5.96	5.54	27.24
Sure	Sharp Bros. Seed	1.80	1.32	1.18	1.01	5.31	5.19	5.58	5.67	5.44	27.19
Webfoot MPR	Great Lakes Hybrids	1.69	1.26	1.24	1.04	5.23	4.91	5.67	5.99	5.36	27.16
Ram	Great Plains Research	1.52	1.25	1.18	0.93	4.88	5.38	5.52	5.96	5.39	27.13
ICI 630	ICI Seeds	1.36	1.29	1.25	1.09	4.99	5.51	5.50	5.64	5.48	27.12
Magnum IV	Dairyland Seed	1.53	1.23	1.09	0.99	4.84	5.29	5.75	5.93	5.31	27.12
Vernal	USDA WI-AES	1.43	1.19	1.18	0.88	4.68	5.02	5.29	6.19	5.83	27.01
4J12*	Cargill Seeds	1.68	1.30	1.05	1.09	5.12	5.27	5.42	5.65	5.42	26.88
WL 323	Germain's	1.71	1.37	1.18	0.95	5.21	5.33	5.43	5.54	5.35	26.86
ABI 9237*	America's Alfalfas	1.56	1.19	1.14	1.11	5.00	5.25	5.54	5.98	5.07	26.84
Evolution	Mycogen Seeds	1.37	1.20	1.21	0.98	4.76	5.25	5.51	6.05	4.94	26.51
Lahontan	USDA NV-AES	1.36	1.17	1.23	0.96	4.72	5.43	5.54	6.13	4.54	26.36
Dominator	Agripro Seeds Inc.	1.45	1.26	1.27	1.01	4.99	4.98	5.52	5.86	5.00	26.35
ABI 923AA*	America's Alfalfas	1.37	1.32	1.14	1.13	4.96	4.92	5.41	5.95	4.64	25.88
ABI 9236*	Agripro Seeds Inc.	1.52	1.22	1.08	1.00	4.82	5.06	5.40	5.74	4.53	25.55
5454	Pioneer Hi-Bred	1.13	1.07	1.19	0.83	4.22	4.50	5.42	5.68	5.49	25.31
WL252HQ	Germain's	1.36	1.09	1.09	0.86	4.40	4.68	5.32	5.63	5.04	25.07
Ranger	USDA NE-AES	1.06	1.05	1.25	0.98	4.34	4.53	5.03	5.77	4.54	24.21
Column Mean		1.55	1.26	1.20	1.03	5.04	5.23	5.56	5.88	5.26	26.97
LSD (0.05)		0.29	0.13	0.14	0.15	0.55	0.63	0.51	0.50	0.31	1.87
CV(%)		13.39	7.54	8.31	10.15	7.79	8.52	6.56	6.10	8.10	4.94

[1] Yields calculated on oven-dry basis. *Indicates experimental entry.

Planted August 30, 1994 at 10.2 lbs. seed/acre

Chemical Control of the Alfalfa Weevil - 1999
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado

The winter months of December, January and February were somewhat dry, but were followed by greater than average moisture during March, April and May. Total precipitation for the three months was 7.97" compared to normal 3.80". The five days after application received about 4" of rainfall. Weevil populations approached the economic injury level and damage was evident in the untreated plots. Pea aphid populations were virtually non-existent.

Methods and Materials - Supporting information relating to the test plots is given below.

All insecticide treatments were applied April 27, 1999, at the time the plants were about 18" tall, with a compressed air sprayer mounted on bicycle wheels. Chemicals were applied at the rate of 25 g.p.a. at a pressure of 28 p.s.i.

Alfalfa weevil populations were determined by using a 15" sweep net covering a 180 degree arc. Two separate sweeps were taken in each plot per sampling date. This constitutes 6 sweep counts per treatment from 3 replications. Pea aphid counts were also obtained.

Results and Discussion - All insecticides reduced the larval populations below the untreated plots. The untreated plots had substantial visible damage. Pea aphids were not a factor in this trial.

Test Plot Information - 1999

Purpose - To evaluate the effectiveness of selected insecticides for control of the alfalfa weevil, *Hypera postica* (Gyll.) on alfalfa.

Data - 1. Sweep counts

Plots - 39.6' X 11' = 435.6 sq. ft. = 100^{th} acre

Design - Randomized complete block (3 replications)

Variety - AV-177 - 3^{rd} year

Herbicide - Sencor 75 DF .50 lbs. + Gramoxone 2.5E .31 lbs. AI/Acre - 2/16/99

Plant - March 12, 1997

Treat - April 27, 1999

Frank C. Schweissing

Table 1.-Chemical control of the alfalfa weevil on alfalfa. Sweep counts. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 1999.

Treatment[1]		AI[2]	Alfalfa Weevil[3]						Pea Aphid[3]		
			Larvae			Adults					
			5/4	5/12	5/18	5/4	5/12	5/18	5/4	5/12	5/18
Baythroid	2E	.035	0.00	0.00	1.00	0.17	0.67	1.00	0.00	0.33	1.50
Lorsban	4E	1.00	0.17	0.83	0.33	0.00	0.17	0.00	0.00	0.17	0.00
Warrior	1E	.03	0.33	0.33	0.67	0.00	0.83	1.33	0.00	0.00	0.33
Mustang	1.5EW	.038	0.17	0.33	1.50	0.33	1.33	1.17	0.17	0.33	2.67
Steward*	1.25SC	.11	0.00	0.67	2.67	0.00	0.33	0.33	1.00	3.33	6.00
Furadan + Pounce	4F 3.2E	.50 .05	0.17	1.50	2.17	0.00	1.00	0.50	0.17	0.67	0.50
Steward*	1.25SC	.065	0.33	1.17	5.00	0.00	0.33	0.33	2.33	4.17	6.33
Furadan	4F	.50	1.00	2.00	4.00	0.00	0.33	0.33	0.33	1.50	2.83
Pounce	3.2E	.20	1.33	4.33	4.83	0.00	0.50	1.17	0.50	0.00	1.67
Lannate	2.4E	.90	2.67	5.50	6.17	0.33	0.00	0.17	0.50	0.83	2.67
Untreated			18.67	19.17	22.17	0.00	0.17	0.50	2.17	2.33	7.33

1 - Treated - April 27, 1999
* + Dyne-amic .005 v/v

2 - Active ingredient per acre

3 - Average number per sweep, 2 separate sweeps per plot, 3 replications.

1999 Pinto Bean Trials
Arkansas Valley Research Center

This is the tenth year a variety trial has been carried out at this Center in recent years. Yields were above average and much better than the previous year with a trial average of 2749 lbs./acre compared to 2134 lbs./acre in 1998, 2461 lbs./acre in 1997,3419 lbs./acre in 1996, 1599 lbs./acre in 1995, 3129 lbs./acre in 1994, 3760 lbs./acre in 1993, 2541 lbs./acre in 1992, 2361 lbs./acre in 1991 and 2848 lbs./acre in 1990.

This was an above average year for precipitation at 19.96" and was particularly excessive in July(6.79"). Rust was not a problem in this trial. Mexican Bean Beetles caused some damage.

Test Plot Information

Purpose - To evaluate the inherent genetic ability of selected pinto bean varieties to yield under irrigated conditions of the Arkansas Valley.

Data - 1. Yields

Plot - 32' X 10'(4 rows)

Design - Randomized complete blocks (3 replications)

Varieties - 24 entries

Fertilizer - 100 lbs. P_2O_5/Acre + 20 lbs. N/acre - 10/19/98

Herbicide - Treflan 4E .75 lbs.AI/Acre - 5/18/99
Basagran 1 lb.AI/Acre - 6/29/99

Insecticide - Capture .08 lbs.AI/Acre - 8/6/99* Fungicide-none

Plant - May 21, 1999

Irrigate - 5/24, 7/16, 8/18

Harvest - Cut - 9/24; Lift-9/28; Thresh - 9/30 - 4 rows, 32' long

*Capture is not registered for use on pinto beans.

Jerry J. Johnson
James P. Hain
Frank C. Schweissing

Yields of pinto bean varieties in the 1999 trial at the Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado.

Variety	Origin	Yield	Test Average	Moisture	Seeds
		lbs./A	%	%	#/lb.
CO45188	Colo. State Univ.	3575	130	12.6	1132
Frontier	North Dakota State	3524	128	16.9	958
Cisco	Novartis Seeds, Inc.	3425	125	13.1	1102
Poncho	Novartis Seeds, Inc.	3340	122	11.8	1076
Montrose	Colo. State Univ.	3324	121	12.1	1146
CO46322	Colo. State Univ.	3207	117	12.1	1061
Bill Z	Colo. State Univ.	3201	116	11.9	1148
CO64155	Colo. State Univ.	3167	115	12.5	1137
CO74905	Colo. State Univ.	3149	115	12.0	1147
CO66032	Colo. State Univ.	3083	112	11.2	1223
Vision	Asgrow Seed Co.	2951	107	15.1	1179
CO75511	Colo. State Univ.	2832	103	11.0	1214
Buckskin	Novartis Seeds, Inc.	2750	100	11.5	1166
CO63603	Colo. State Univ.	2700	98	11.0	1150
CO74630	Colo. State Univ.	2692	98	12.4	1103
Chase	Univ. of Nebraska	2651	96	12.4	1130
CO75714	Colo. State Univ.	2615	95	12.4	1215
Buster	Asgrow Seed Co.	2518	92	11.4	1062
Maverick	North Dakota State	2463	90	11.2	1117
Burke	Wash. State Univ.	2365	86	11.1	1191
Kodiak	Mich. State Univ.	2337	85	11.5	1020
Elizabeth	Fox Bean Co.	2144	78	12.0	1133
USPT-73	WSU-ARS	1967	72	12.2	1053
Othello	USDA	1828	67	12.3	1147
Average		2749		12.3	1130
CV%		8.7			
LSD(.30)		205			

Plant - May 21, 1999

Fertilizer - 100 lbs. P_2O_5 + 20 lbs. N/Acre

Herbicide - Treflan .75 lbs. AI/Acre - 5/18/99
Basagran 1.0 lb. AI/Acre - 6/29/99

Fungicide - none Insecticide - Yes - 8/16/99 to control Mexican Bean Beetle

Harvest (thresh) - September 30, 1999

Supported in part by the Colorado Dry Bean Administrative Committee

DESCRIPTION OF PINTO BEANS

Bill Z A variety release by Colorado State University in 1985. It has a vine Type III growth habit with resistance to bean common mosaic virus and moderate tolerance to bacterial brown spot. It is a productive variety when growing conditions are good, similar to Olathe for white mold and rust susceptibility and maturity.

Buckskin A Type III variety from Novartis Seeds, Inc.

Burke A medium season variety (USWA-19) released by Washington State in 1996. It has resistance to rust and white mold.

Buster A new variety from Asgrow Seed Co. (5051) released in 1998.

Chase A vine variety released by the University of Nebraska. It is resistant to rust and white mold, moderately resistant to bacterial brown spot, but moderately susceptible to Fusarium wilt.

Cisco A variety from Novartis Seeds Inc. (RNK 354).

CO Colorado State University experimental lines with resistance to rust.

Elizabeth A variety from Fox Bean Co. with rust resistance.

Frontier A variety from North Dakota State University.

Kodiak A variety from Michigan (P94207) with rust resistance.

Maverick An upright variety that is resistant to rust, released by North Dakota State University.

Montrose A variety released from Colorado State University in 1999 (CO51715) with resistance to rust and excellent seed quality.

Othello A variety released by the USDA with a semi-upright growth habit. It is highly susceptible to rust and bacterial diseases.

Poncho A variety from Novartis Seeds, Inc. (ROG 179) susceptible to rust, but moderately resistant to some bacterial diseases.

USPT-73 An experimental line from WSU-ARS.

Vision A full season upright variety with resistance to rust released by Asgrow Seed Co.

1999 Corn Grain and Silage Variety Trial
Arkansas Valley Research Center

The average grain yield in this trial was 206 bushels per acre compare to 1998-200 bu., 1997-206 bu., 1996-219 bu., 1995-197 bu., 1994-230 bu., 1993-178 bu., 1991-209 bu. and 1990-183 bu. The average silage yield was 33 tons per acre compare to 1998-40T., 1997-32T., 1996-36T., 1995-35T., 1994-33T., 1993-27T., 1992-41%., 1991-37T., and 1990-31T. The average silking date for this trial was 1 day earlier than 1998. Grain yields were adjusted to 15.5% moisture and 56 pound bushels while silage yields were adjusted to 70% moisture. This allows direct comparison between varieties, but actual harvest moistures and silking dates indicate maturity and should be considered when choosing a variety.

Test Plot Information

Purpose - To evaluate the inherent genetic ability of selected corn varieties to yield grain and silage under irrigated conditions in the Arkansas Valley.

Data - 1. Grain yields
2. Silage yields
3. Growth factors

Plots - Grain - 32' X 10' (4rows) Harvest 2 rows
Silage - 32' X 5' (2 rows)

Design - Randomized complete blocks (3 replications)

Varieties - Grain-28 entries Silage-32 entries

Fertilizer - 50 lbs. P_2O_5/A - 10/19/98
200 lbs. N/A as NH_3 - 12/18/98

Herbicide - Dual II 1.46 lbs. + Bladex DF 1.6 lbs.AI/Acre - 4/19/99
Banvel .5 lbs.AI/Acre - 5/21/99

Insecticide - Capture .08 lbs.AI/Acre-8/6/99

Soil - Silty, clay loam, 1-1.5% o.m., pH ca. 7.8

Plant - May 10, 1999

Irrigate - 6/22, 7/9, 8/20, 9/22

Harvest - Silage - September 16, 1999 - Forage harvester
Grain - November 3, 1999 - Self-propelled two row plot combine

Jerry J. Johnson
James P. Hain
Frank C. Schweissing

Irrigated corn hybrid performance at Rocky Ford in 1999[1]

Hybrid	Yield	Grain Moisture	Test Weight	Plant Height	Density	Silking[2]
	bu/ac	%	lb/bu	in	plants/ac	date
Garst 8546	227	13.9	58.1	81	33396	200
Asgrow RX738 (RR)	226	14.3	59.7	84	31672	200
Pioneer brand 33B50	222	16.8	60.1	82	30855	198
Grand Valley SX1300	221	14.4	58.2	80	32126	199
LG Seeds LG2637	217	16.5	59.4	86	31036	202
AgriPro AP 9565	216	14.2	58.5	82	31581	198
Novartis NX6668	215	13.7	57.9	84	30855	199
DEKALB DK647 (BTY)	215	14.7	58.2	90	33578	200
Pioneer brand 33P66	214	15.8	61.1	83	30764	200
Mycogen 2725	213	13.7	58.4	83	33124	199
Pioneer brand 3237	211	21.2	60.6	81	33578	203
Garst Seed 8543 (IT)	209	13.8	58.6	80	32670	200
Grand Valley SX1333	207	14.7	61.1	86	31581	199
Grand Valley GVX5338 (RR)	206	14.0	59.7	81	31490	201
Pioneer brand 33J56	205	16.5	61.3	85	32307	199
Asgrow RX799 (BT)	203	18.5	60.0	91	33850	201
Novartis N7070 (BT)	203	13.8	58.0	82	33305	200
DEKALB DK595 (BTY)	203	13.6	59.2	82	31853	198
Asgrow RX889	201	21.9	59.8	82	32942	203
DEKALB DK611	201	14.2	59.8	84	31400	200
Novartis N7333 (BT)	198	18.5	60.1	88	32852	199
AgriPro AP 9689 (BT)	197	14.2	59.2	79	32035	199
Grand Valley GVX4601	195	23.9	59.0	97	31944	201
DEKALB DK655	194	18.6	59.9	84	31944	201
Pioneer brand 31A12	194	18.5	60.2	86	31944	200
Triumph 1866 (BT)	187	22.9	61.3	88	30310	204
Grand Valley SX1445 (RR)	180	20.2	60.3	85	30643	201
AgriPro HY 9646	176	21.4	57.1	95	31400	206
Average	**206**	**16.7**	**59.5**	**85**	**32037**	**200**
CV%	6.3					
$LSD_{(.30)}$	11					

[1]Trial conducted on the Arkansas Valley Research Center; seeded 5/10 and harvested 11/3.
[2]Julian date.

Corn silage hybrid performance at Rocky Ford in 1999[1]

Hybrid	Yield	Moisture	Plant Height	Density	Silking[2]
	t/ac	%	in	plants/ac	date
Grand Valley SX1600	38.5	59.1	95	31853	205
HYTEST HT7820	37.4	60.5	102	29494	207
AgriPro HY 9646	37.3	61.0	96	31672	206
AgriPro HS 9843	36.9	63.6	94	32126	207
HYTEST HTX76221	35.9	64.4	112	28042	209
Garst Seed 8315	35.5	64.2	96	29766	209
DEKALB DK679 (BTY)	35.4	58.7	96	30764	205
Asgrow RX897	35.0	63.9	94	29222	205
Wilson E7004	34.7	63.6	92	29584	204
Asgrow RX913	34.6	64.5	99	30492	205
Pioneer brand 31B13 (BT)	34.5	62.5	95	33850	205
Golden Harvest P33A14 (BT)	34.3	58.4	83	31581	198
Golden Harvest 6091503	34.2	62.0	89	29403	204
Grand Valley GVX252653	33.8	64.2	99	30310	208
HYTEST HTX7877	33.5	58.8	97	30764	206
Grand Valley GVX7335	33.4	64.1	95	31218	205
Pioneer brand 31G20	33.0	59.9	95	30583	205
AgriPro AP 9828	33.0	64.6	94	30220	207
Golden Harvest EX99203 (BT)	32.9	54.5	82	30764	204
Golden Harvest H-9401 (BT)	32.8	59.2	92	29403	202
Wilson E4025	32.6	59.0	89	30855	203
Golden Harvest 7041676	32.5	57.5	86	32307	200
Asgrow RX799 (BT)	32.0	57.3	91	29494	203
DEKALB DK647 (BTY)	30.7	59.5	92	31400	203
Golden Harvest EX99151	30.3	57.7	87	30401	199
Golden Harvest EX99283 (RR)	29.8	57.3	82	30946	202
AgriPro AP 9689 (BT)	29.6	57.4	79	30583	198
Golden Harvest EX98710	29.3	53.6	81	29494	198
Pioneer brand 32P75	29.1	62.3	90	30583	202
Golden Harvest EX99216	29.1	57.1	85	31672	202
Golden Harvest EX98879 (BT/RR)	27.6	53.3	81	29584	199
Golden Harvest H-2547	27.0	57.0	87	31581	199
Average	**33.0**	**60.0**	**91**	**30625**	**204**
CV%	8.3				
$LSD_{(0.30)}$	2				

[1]Trial conducted on the Arkansas Valley Research Center; seeded 5/10 and harvested 9/16.
[2]Julian date.

Table 9. 2-Yr average irrigated corn performance at Rocky Ford, 1998-99

Hybrid	Yield	Grain Moisture	Test Weight
	bu/ac	%	lb/bu
LG Seeds LG2637	215	20.8	59.2
Mycogen 2725	212	19.0	59.2
Garst Seed 8543 (IT)	212	16.7	59.3
Grand Valley SX1300	212	19.1	59.3
Novartis N7070 (BT)	209	17.4	58.6
AgriPro AP 9565	208	17.7	58.6
Novartis N7333 (BT)	204	22.0	60.5
Grand Valley SX1333	199	16.5	61.4
Pioneer brand 31A12	195	23.8	60.4
AgriPro HY 9646	182	24.2	57.5
Average	**205**	**19.2**	**59.6**

Table 30. 2-Yr average corn silage performance at Rocky Ford, 1998-99

Hybrid	Yield	Moisture
	t/ac	%
AgriPro HY 9646	41	59.9
Asgrow RX897	40	61.8
Pioneer brand 31B13 (BT)	40	59.2
AgriPro HS 9843	39	61.8
Garst Seed 8315	39	61.7
Wilson E7004	39	60.9
AgriPro AP 9828	??	??
Asgrow RX913	36	60.1
Average	**39**	**60.9**

Evaluation of Corn Borer Resistant (Bt) Hybrids to the Southwestern Corn Borer and Corn Earworm - 1999
Arkansas Valley Research Center

Eighteen corn hybrids, including 16 Bt and 2 non-Bt hybrids, were evaluated for resistance to the southwestern corn borer(SWCB), *Diatraea Grandiosella* (Dyar) and the corn earworm (CEW), *Helicoverpa zia* (Boddie). All of the Bt hybrids had reduced SWCB infestations when compared to the non-Bt hybrids. Ten of the sixteen Bt varieties were infested as much or more with CEW as one or both non-Bt varieties.

Results from the past two years (1997, 1998) have shown that in the presence of CEW infestations, without the SWCB, non-Bt hybrids yield as well or better than the Bt hybrids in the trials. This year all of the Bt hybrids produced better yields than the non-Bt hybrids (not all were significantly better) even when some of the Bt hybrids had much higher CEW infestations. The difference this year appears to be the higher SWCB infestation in the non-Bt hybrids.

The infestation (SWCB) rate for the non-Bt varieties was 20% for Mycogen 2725 and 25% for DeKalb 580RR as measured in the spring of 2000. The overwintering (1999-2000) survival rate was 74%.

Test Plot Information

Data - 1. Yields - grain
2. Insect infestation

Plot - 32' X 10' (4 rows) Harvest - 2 rows

Design - Randomized complete blocks (4 replications)

Varieties - 18 entries

Fertilizer - 100 lbs. P_2O_5/Acre - 2/23/98
150 lbs.N/Acre as NH_3 - 12/18/98

Herbicide - Dual II 1.46 lbs. + Bladex DF 1.6 lbs. AI/Acre - 4/19/99
Banvel .25 lbs. + 2,4-D .125 lbs. AI/Acre - 6/24/99

Acaricide - none

Soil - Silty, clay loam, 1-1.5% o.m., pH ca. 7.8

Plant - May 12, 1999

Irrigate - 7/1, 7/19, 9/22

Harvest - November 3, 1999 - Self propelled two row plot combine.

Frank C. Schweissing

Table 1.-Grain yields of borer resistant (Bt) and non-resistant corn hybrids. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 1999.

		Grain Yield[2]				
Hybrid[1]	Brand	Bu/Acre	Moisture %	Bu.Wt.	% Girdled[3]	% CEW[4]
714Bt	Producers	238.45	14.2	57.8	0.0	6.3
33A14(Bt)	Pioneer	235.35	14.6	59.6	>1	5.0
NX6608(Bt)	NK Brand	232.23	14.0	58.7	0.0	0.0
DK595Bty	DeKalb	229.12	13.9	59.4	0.0	17.5
H-9230Bt	Golden Harvest	225.65	14.9	58.8	0.0	1.3
AP9559Bt	Agripro	224.74	14.2	58.3	0.0	7.5
NX6567(Bt)	NK Brand	224.64	14.0	58.8	>1	2.5
7821Bt	Cargill	224.00	15.3	60.1	0.0	7.5
RX 770 RR/YG	Asgrow	222.00	16.0	57.4	>1	26.3
DK580Bty	DeKalb	219.30	13.5	57.7	0.0	1.3
8366Bt	Garst	216.97	14.1	58.1	1.0	11.3
2799(Bt)	Mycogen	213.92	14.4	59.1	2.4	15.0
H-9401Bt	Golden Harvest	213.61	17.8	60.5	0.0	7.5
RX799Bt	Asgrow	212.49	18.5	60.1	0.0	3.8
AP9689Bt	Agripro	209.08	18.7	60.3	0.0	3.8
8325Bt	Garst	206.56	17.7	58.4	1.0	15.0
2725*	Mycogen	203.83	14.1	58.8	7.5	5.0
DK580RR*	DeKalb	195.46	13.1	58.2	10.6	11.3
Column Mean		219.30				
LSD(0.10)		13.18				
CV%		5.07				

1 - Plant - May 12, 1999 *Not Bt

2 - Yield adjusted to 15.5% moisture and 56 lb. bushels

3 - Percent of all stalks girdled by Southwestern Corn Borer for each treatment.

4 - Average of 20 ears examined per plot, 4 replications, 80 ears examined per treatment for corn earworm.

Harvest - November 3, 1999

Winter Wheat Variety Trial - 1998-99
Arkansas Valley Research Center

The average yield of 84.2 bushels per acre was substantially reduced from the previous year. Range in yields was a high of 98.2 bu. to a low of 65.4 bu. per acre.

Test Plot Information

Data - 1. Grain yields
2. Growth factors

Plots - 30' X 5' (4 rows), Harvest 5' X 24'

Design - Randomized complete block (3 replications)

Variety - 21 varieties + 3 experimental lines not included in report

Fertilizer - 50 lbs. P_2O_5/Acre - 2/4/98
65 lbs. NO_3 -N in soil test

Herbicide - Bronate .5 lbs. AI/Acre - 2/26/99

Insecticide - 0

Plant - September 24, 1998 755,000 seeds/acre

Irrigate - 9/25, 4/15, 5/29

Harvest - July 8, 1999 - small plot combine

Jerry J. Johnson
James P. Hain
Frank C. Schweissing

Winter wheat irrigated performance summary for 1999.

	Location						Average
	Rocky Ford				Walsh		3-Yr
Variety*	Yield	Test Wt	Lodging**	Plant Height	Yield	Test Wt	1997/98/99
	bu/ac	lb/bu	0-9	inches	bu/ac	lb/bu	bu/ac
T81	98.2	61.0	6	40	45.4	60.9	------
G15011	97.7	61.3	1	41	40.4	56.7	------
TAM 107	94.6	61.2	2	40	48.3	60.6	92.0 [6]
QAP 7406	93.2	58.6	2	42	45.0	59.8	------
2137	93.1	59.7	1	41	53.1	60.5	96.3 [2]
QAP 7510	93.0	60.0	0	38	42.2	58.9	96.6 [1]
Custer	92.5	60.3	4	40	65.8	59.8	93.5 [3]
Arlin	86.6	60.9	2	40	41.8	62.7	------
TAM 110	85.4	61.2	4	40	43.8	60.9	88.7
Jagger	85.4	58.5	9	39	51.3	59.7	86.9
Prairie Red	82.8	59.5	5	39	46.1	59.9	93.1 [4]
G12058	82.3	61.7	5	40	52.1	61.4	------
G15048	80.6	58.3	3	39	43.3	59.8	------
Yumar	80.3	58.4	3	40	47.0	59.3	90.7
Akron	79.6	58.0	2	40	47.7	61.3	85.7
Yuma	79.4	59.8	4	40	40.7	58.9	92.4 [5]
Kalvesta	78.6	60.6	5	40	46.7	62.5	------
Halt	77.4	58.2	2	38	49.8	58.3	85.0
XH1888	77.0	57.8	8	40	41.1	61.6	------
Enhancer	65.7	57.5	9	38	40.9	59.1	------
Cossack	65.4	60.1	2	41	42.1	59.5	------
Average	**84.2**	**59.6**	**4**	**40**	**46.4**	**60.1**	
CV%	9.7				19.7		
$LSD_{(.3)}$	7.0				7.8		

* Varieties ranked by the yield for Rocky Ford.

**0=erect 9=flat scale

[1.....6] Variety rank based on 3-Yr average yields (not including Walsh).

DESCRIPTIONS OF WINTER WHEAT VARIETIES IN TRIALS - 1998-99

2137 Kansas State release (1995), originating from the Pioneer program. Semidwarf, medium-early maturity, high test weight and yield. Good winterhardiness, leaf disease resistance, below-average protein.

Akron Colorado State release (1994), from a TAM 107/Hail cross. Semidwarf, medium maturity, excellent performance record in recent years.

Arlin Hard white Kansas State release (1992), marketed through American White Wheat Producers Association. Very marginal winterhardiness, very sprout susceptible.

Cossack Cargill-Goertzen release. Tall semidwarf, medium-late maturity. Long coleoptile. Very good straw for its height. Resistant to Hessian Fly. MS-S to LR. Not recommended for SE Colorado dryland, too late maturing.

Custer A 1994 Oklahoma State release. Medium early and moderately resistant to leaf rust. Excellent yield potential, but questionable quality.

Enhancer Cargill-Goertzen release. Medium early maturity, medium height. Small seeded, watch your populations. Straw strength is OK, but very high yield potential conditions can pull it down. MS ro LR. Has a genetic leaf tip necrosis, don't worry!

G12058 Cargill-Goertzen release. Medium early maturity, medium short height, good standability, wide adaptation. MS to LR. Seems to have pretty good heat/drought tolerance

G15011 Cargill-Goertzen release. Medium height, medium maturity. Good standability, also appears to have good heat/drought tolerance. S to LR.

G15048 Cargill-Goertzen release. Has been our highest yielding wheat in Colorado. It has a short-medium height, but is medium late maturing, which can hurt it in a short grain fill year. S to LR. Good standability.

Halt Colorado State release (1994), from cross with 50% TAM 107 parentage. Russian wheat aphid resistant, semidwarf, early maturity, very good quality characteristics.

Jagger Kansas State release (1994), from a cross with 50% parentage of a Karl sister selection. Bronze-chaffed, strong straw, early maturing semidwarf. Breaks dormancy very early in spring, marginal winterhardiness.

Kalvesta Cargill-Goertzen release. Excellent milling and baking variety. Early maturing. Medium-short height. S to LR. Average standability. Good shatter resistance. Anticipated release in Fall 1999.

Prairie Red Colorado State release (1998), from CO850034/PI372129//5*TAM 107 backcross. Russian wheat aphid resistant, semidwarf, early maturity. Similar to TAM 107 in all respects, except for its RWA resistance.

QAP 7406 HybriTech. Out of business

QAP 7510 HybriTech. Out of business.

T81 Trio Research release. Well adapted to TAM 107 growing area. Average to poor for straw strength. Better leaf rust resistance than TAM 107. A TAM 108/Lancota//TAM 107 selection. Readily available from seed dealers in 2000.

TAM 107 Texas A&M release (1984), from the cross TAM 105*4/Amigo. Bronze-chaffed, early semidwarf, medium long coleoptile, excellent heat tolerance, resistant to some wheat curl mite (transmits wheat streak mosaic virus) biotypes.

TAM 110 Texas A&M release (1995), from the cross (TX71A562-6*4/Amigo) *4/Largo. Early semidwarf, resistant to Greenbug biotypes C and E.

XH 1888 HybriTech. Out of business.

Yuma Colorado State release (1991), from the cross NS14/NS25/2*Vona. Medium-early semidwarf, good straw strength, short coleoptile, good quality characteristics.

Yumar Colorado State release (1997), from crosses and backcrosses with Yuma as recurrent parent. Medium-early semidwarf, good straw strength. Similar to Yuma except for its RWA resistance.

Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 1999.

INVESTIGATOR: Frank C. Schweissing, Superintendent, Arkansas Valley Research Center, Rocky Ford, Colorado.

PURPOSE: To identify high yielding hybrids under irrigated conditions.

PLOT: Two rows with 30" spacing, 32' long. SEEDING DENSITY: 96,800 Seed/A. PLANTED: May 20. HARVESTED: September 14.

EMERGENCE DATE: 12 days after planting. SOIL TEMP: 62^0 F.

IRRIGATION: Three furrow irrigations: May 27, June 24, August 17, total applied 15 acre-in/A.

Summary: Growing Season Precipitation and Temperature/1
Arkansas Valley Research Center, Rocky Ford, Otero County.

Month	Rainfall	GDD/2	>90F	>100F	DAP/3
	in.		no. of days		
May	0.42	155	1	0	11
June	0.96	577	18	0	41
July	6.79	767	25	5	72
August	2.79	686	23	0	103
September	T	245	6	0	117
Total	10.96	2430	73	5	117

/1 Growing season from May 20 (planting) to September 14 (harvest).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

PEST CONTROL: Preemergence herbicides: bifenox 2 lbs. AI/A. Post Emergence Herbicides: None. Insecticide: None.

CULTURAL PRACTICES: Previous crop: corn. Field Preparation: chisel, field cultivator, roller pack, float. Cultivation: 2 times.

SOIL: silty-clay loam, 1-1.5% O.M., pH-ca. 7.8. FERTILIZER: 50 lbs. P_2O_5 and 150 lbs. N/Acre.

COMMENTS: Excessive moisture (6.25") in April and early May resulted in wet, cloddy compacted soils. Germination was not as good as we expect. Greater than average precipitation in July and August. No lodging. Greenbugs were not a problem.

Table 1.-Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 1999[1]

Brand	Hybrid	Forage Type[2]	Days to 50% Bloom	Stand Plts/A[3]	Plant Ht.	Stage At Harvest[4]	Stem Sugar	Dry Matter	Forage Yield[5]	Yield % of Test Avg.
			(No.)	(1000 X)	(Ins.)		(%)	(%)	(T/A)	
DEKALB	SX-8	SS	88	74.0	129	ED	13	33	43.88	145
DEKALB	ST-6E	SS	78	72.4	127	SD	6	34	35.10	116
DEKALB	FS-5	FS	87	62.9	118	ED	7	32	34.84	115
DEKALB	FS-25E	FS	91	63.2	105	LM	9	29	34.38	113
BUFFALO	Buffalo Brand	SS	75	60.7	125	SD	8	36	33.51	110
BUFFALO	Canex	FS	79	68.6	104	SD	16	31	29.92	99
BUFFALO	Grazex IIw	SS	72	63.7	116	SD	7	40	29.73	98
BUFFALO	BMR-FS	FS	82	67.2	102	SD	15	35	29.69	98
BUFFALO	Grazex II	SS	74	72.1	113	HD	6	36	29.27	97
BUFFALO	Canex II	FS	85	53.9	112	ED	14	31	29.06	96
ASGROW	XP BMR 1	FS	85	64.0	101	ED	5	28	27.75	91
BUFFALO	BMR-SS	SS	74	64.5	103	SD	11	35	26.10	86
(Check)	NB305F	FS	87	76.5	104	SD	14	25	24.74	82
MYCOGEN	2725	corn	70	37.6	77	HD	6	37	23.53	78
DEKALB	X-488	FS	82	76.0	87	HD	3	28	23.47	77
Average			80	65.2	108		9	33	30.33	
LSD (0.20)									2.97	

1 - Planted May 20, 1999; Harvest September 14, 1999

2 - Forage Type: FS, Forage Sorghum; SS, Sorghum Sudan grass 3 - Plant Population per acre June 21, 1999

4 - Seed Maturation: PM, premilk; EM, early milk; MM, midmilk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough.

5 - Forage Yield adjusted to 70% moisture content based on oven-dried samples.

Table 2.-Summary: Irrigated Forage Sorghum Hybrid Performance Tests at Rocky Ford, 1997-99.

Brand	Hybrid	Forage Yields					Yield as % of Test Average		
		1997	1998	1999	2 Year Avg.	3 Year Avg.	1997	1998	1999
		(T/A)	(T/A)	(T/A)	(T/A)	(T/A)	(%)	(%)	(%)
BUFFALO	Buffalo Brand	29.47	38.04	33.51	35.83	33.67	119	120	110
BUFFALO	Canex	22.60	29.90	29.92	29.91	27.47	91	95	99
BUFFALO	Canex II	20.94	24.69	29.06	26.88	24.90	85	78	96
BUFFALO	Grazex II	25.72	32.94	29.27	31.11	29.31	104	104	97
BUFFALO	Grazex II w	26.15	35.02	29.73	32.38	30.30	107	111	98
BUFFALO	BMR-FS	——	23.95	29.69	26.82	——	——	76	98
BUFFALO	BMR-SS	——	28.60	26.10	27.35	——	——	90	86
DEKALB	SX-8	——	40.34	43.88	42.11	——	——	128	145
DEKALB	ST-6E	——	35.72	35.10	35.41	——	——	113	116
DEKALB	FS-5	——	34.40	34.84	34.62	——	——	109	115
DEKALB	FS-25E	27.03	34.02	34.38	34.20	31.81	109	108	113
ASGROW	XP BMR 1	——	30.43	27.75	29.09	——	——	96	91
(Check)	NB305F	22.26	28.66	24.74	26.70	25.22	90	91	82
Average Test Yield		24.88	32.05	31.38	31.72	28.53			

Performance of Greenbug Resistant Grain Sorghum Hybrids in the Arkansas Valley, 1999.

INVESTIGATOR: Frank C. Schweissing, Superintendent and Entomologist,
Arkansas Valley Research Center, Rocky Ford, Colorado.

PURPOSE: To identify irrigated hybrids which will yield well under greenbug infestation.

PLOT: Four rows with 30" spacing, 32' long. SEEDING DENSITY: 79,805 Seed/A. PLANTED: May 20. HARVESTED: November 4. Two rows.

EMERGENCE DATE: 12 days after planting. SOIL TEMP: 62^0 F.

IRRIGATION: Three furrow irrigations: May 27, June 24, August 17, total applied 15 acre-in/A.

PEST CONTROL: Preemergence herbicides: bifenox 2 lbs. AI/A.
Post Emergence Herbicides: None.
Insecticides: none.

Summary: Growing Season Precipitation and Temperature/1
Arkansas Valley Research Center, Rocky Ford, Otero County.

Month	Rainfall	GDD/2	>90F	>100F	DAP/3
	in.		no. of days		
May	0.42	155	1	0	11
June	0.96	577	18	0	41
July	6.79	767	25	5	72
August	2.79	686	23	0	103
September	0.50	388	8	0	132
Total	11.46	2573	75	5	132

/1 Growing season from May 20(planting) to September 29(first freeze,25^{0}F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

CULTURAL PRACTICES: Previous crop: corn. Field Preparation: chisel, field cultivator, roller pack, float. Cultivation: 2 time.

SOIL: silty-clay loam, 1-1.5% O.M., pH-ca. 7.8. FERTILIZER: 50 lbs. P_2O_5 and 150 lbs. N/Acre.

COMMENTS: Excessive moisture (6.25") in April and early May resulted in wet, cloddy compacted soils. Germination was not as good as we expect. Greater than average precipitation in July and August. No lodging. Greenbugs were not present in sufficient numbers to cause problems.

Table 1.-Performance of Greenbug Resistant Sorghum Hybrids in the Arkansas Valley, Rocky Ford, CO., 1999.[1]

Hybrid	Brand/Source	Days to 50% Bloom	Stand	Plant Ht.	Moisture	Test Wt.	Grain[2] Yield
		(No)	Plts/A (1000X)	(In.)	(%)	(lb/bu)	(bu/A)
576	Cargill	69	44.1	43	11.8	54	99.94
627	Cargill	74	47.6	51	12.4	56	134.02
647	Cargill	75	47.6	54	12.2	56	119.86
697	Cargill	79	45.2	54	12.1	54	146.12
770y	Cargill	77	43.0	54	12.0	53	145.20
X-8854	DeKalb	78	45.6	63	12.6	55	146.36
X-941c	DeKalb	79	54.6	51	12.2	57	126.68
3636	Mycogen	74	47.2	46	11.8	54	112.05
3696	Mycogen	82	44.1	52	12.0	54	147.10
6Y83-I	NC +	79	40.0	60	12.1	55	118.46
X-757-K	NC +	83	46.7	58	12.4	54	149.03
8500	Pioneer	72	49.8	54	12.4	57	134.58
8505	Pioneer	72	49.4	54	12.2	57	124.14
1606	Novartis	79	56.2	60	12.5	55	148.25
1486	Novartis	74	51.2	46	12.0	54	120.08
399 X 2536	(check)	79	40.0	51	12.3	54	132.51
Average		76	47.0	53	12.2	55	131.52
LSD(0.10)							6.48
LSD(0.20)							5.03
CV(%)							5.94

1 - Planted May 20, 1999; Harvest November 4, 1999.

2 - Yields adjusted to 14% moisture, 56 lb. bushel.

Soybean Variety Trial - 1999
Arkansas Valley Research Center

This is the first soybean trial at the Center since 1989. The trial was established due to a renewed interest in oil crops, in part, because of a new processing plant being established at Lamar. The trials this year were generally successful even though there were heavy rains in July and a late harvest. Yields ranged from 27.5 bushels per acre to 63.7 bushels per acre and the trial average was 53.7 bushels per acre.

Test Plot Information

Purpose - To evaluate the inherent genetic ability of selected soybean varieties to yield under irrigated conditions in the Arkansas Valley.

Data - 1. Bean yields

Plots - 32' X 10' (4 rows) Harvest-2 rows

Design - Randomized complete blocks (3 replications)

Variety - 17 entries

Fertilizer - 50 lbs. P_2O_5/A - 11/20/98
3 oz. of soybean innoculant/bushel of seed - equivalent

Herbicide - Roundup 1 lb. + Dual II .98 lbs. AI/Acre - preplant

Insecticide - none

Soil - Silty, clay loam, 1-1.5 o.m., pH - ca. 7.8

Plant - May 24, 1999 174,240 seeds/Acre 30" rows

Irrigate - 6/1, 7/1, 8/12, 9/3

Harvest - October 13, 1999 Self propelled two row plot combine

Frank C. Schweissing
James P. Hain

Table 1.-Performance of soybean varieties at the Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 1999.

Variety	Brand	Yield	Test Average	Test Weight	Moisture
		Bu./A	%	lbs./bu.	%
TR4319RR	Triumph	63.7	119	53.5	7.7
CX419RR	DeKalb	59.7	111	55.5	7.7
S39-D9	NK Novartis	59.7	111	55.5	7.5
TR 3939RR	Triumph	59.4	111	54.1	7.6
9396	Pioneer	59.0	110	55.7	7.6
377RR	Producers	57.7	107	55.1	7.6
S42-K2	NK Novartis	57.3	107	55.7	7.7
93B34	Pioneer	56.9	106	55.2	7.6
94B01	Pioneer	55.9	104	55.3	7.8
93B51	Pioneer	55.1	103	54.9	7.8
5366NRR	Mycogen	53.5	100	54.7	7.6
S36-U2	NK Novartis	52.6	98	53.4	7.7
5370RR	Mycogen	52.2	97	54.4	7.6
TR4339RR	Triumph	50.7	94	55.9	7.7
J-399	Mycogen	49.7	93	55.4	7.5
CX390RR	DeKalb	42.0	78	55.6	7.7
X8135RR	Producers	27.5	51	55.7	8.0
Average		53.7			
CV%		12.0			
LSD(.10)		8.9			

Plant - May 24, 1999

Fertilizer - 50 lbs. P_2O_5/Acre Soybean innoculant - 15 oz./300 lbs. of seed

Herbicide - Roundup 1 lb. + Dual II .98 lbs. AI/Acre - preplant

Fungicide - none Insecticide - none

Harvest - October 13, 1999

Yield adjusted to 13% moisture and 60 lb. bushel.

Onion Variety Trial

Mike Bartolo
Frank Schweissing
Arkansas Valley Research Center
Colorado State University

PRODUCTION INFORMATION

Plots - planted 20' long X 2 rows (3.6') wide. 18" X 26" - 2.5" spacing. Harvest 16' of row. Each plot was replicated four times in the trial.

Planted - March 10th and 11th , 1999

Fertilizer - 100 lbs. P_2O_5/A and 21 lbs N/A as 11-52-0 - preplant. ~ 100 lbs. N/A residual.

Insect Control - Lannate (0.9 lbs AI/A) +Warrior (0.03 lbs AI/A) - June 18th
- Lannate (0.9 lbs AI/A) + Ammo (0.1 lbs AI/A) July 5th

Weed Control - Prefar (5 lbs. AI/A)-preplant,
-Goal 1.6E - .2 lbs. AI/A - May 11th , June 1st, June 17th
-Hoe - 2 times

Disease Control - 2X with Manzate 200 (1.6 lbs AI/A) + Champ 4.6 (0.75 lbs AI/A) - July 5th, July 15th (ground)
-Dithane F-45 (2.4 lbs AI/A) + Champ (0.75 lbs AI/A) - July 22nd (ground)
-Manex (1.0 lb AI/A)+Kocide (0.6 lbs AI/A) - August 4th (air)
-2X with Dithane F-45 (2.4 lbs AI/A) + Rovral (0.75 lbs AI/A) + Champ (0.75 lbs AI/A) - August 12th , August 19th (ground)
-Bravo (1.5 lbs AI/A) + Dithane F-45 (2.4 lbs AI/A) + Champ (0.75 lbs AI/A) - August 26th (ground)
-Rovral (0.75 Lbs AI/A) + Champ (0.75 lbs AI/A) - September 3rd (ground)

Irrigation - 10 times (approximately 2" each irrigation)

Harvest - September 21st

Grade - October 21st - 25th

COMMENTS

Growing conditions were fair during the 1999 growing season. The plots escaped major storm injury although heavy rains in late July and early August brought about the potential for disease outbreaks. Despite the weather conditions, the onions had average quality with only a small percentage of rots. The size of certain varieties were good but overall yields were lower than normal.

Please contact Mike Bartolo or Frank Schweissing at the Arkansas Valley Research Center (719-254-6312) for additional information.

ONION VARIETY TRIAL

Arkansas Valley Research Center

Colorado State University, Rocky Ford, Colorado, 1999

Variety	Source	Maturity (% tops down) 8-24	9-13	Colossals ≥ 4" %	Jumbos 3"-4" %	Medium 2¼"-3" %	C J M CWT/A	Pre-Pack 1¾"-2¼" %	Boilers ≤1¾" %	Total Market. CWT/A	Culls %	Total Weight CWT/A
X-201	Waldow	12	67	13.9	57.6	24.3	**468.2**	0.7	0.0	**472.2**	3.4	484.1
Tequilla	D. Palmer	7	37	9.3	59.9	25.0	**467.7**	0.0	0.0	**467.7**	5.8	496.9
X-202	Waldow	5	47	11.8	56.0	23.1	**446.9**	2.9	0.0	**460.8**	6.1	487.5
SXO-1430	Sunseeds	22	87	5.6	52.9	33.8	**441.0**	4.4	0.0	**459.3**	3.2	473.2
Vision	Petoseeds	25	85	14.7	58.3	25.9	**456.8**	0.2	0.0	**457.8**	0.9	462.8
Torero	Sunseeds	7	77	8.8	63.4	24.6	**438.5**	0.2	0.0	**439.5**	2.9	452.9
T-434	Takii	5	60	5.8	69.0	20.9	**422.2**	1.9	0.1	**430.6**	2.3	438.5
Harvest Moon	Dorsing	12	62	1.0	56.8	31.1	**425.2**	1.0	0.0	**430.1**	9.9	476.6
Sierra	D. Palmer	7	32	14.2	50.7	22.3	**407.3**	0.9	0.0	**411.8**	11.8	463.8
Colorado 6	Burrell	5	32	12.5	59.6	20.3	**402.4**	2.0	0.0	**410.3**	5.4	432.6
Mira	Asgrow	55	95	14.7	62.0	20.9	**396.4**	2.3	0.0	**405.9**	0.0	405.9
T-439	Takii	20	87	0.0	59.9	32.1	**378.6**	5.8	0.2	**405.4**	1.9	413.3
RNX 10299	Rio Colorado	22	87	7.1	61.3	24.1	**399.4**	0.4	0.0	**401.4**	7.1	430.1
Mesquite	D. Palmer	10	35	7.4	63.3	19.5	**391.5**	2.3	0.0	**399.4**	7.4	426.1
Vaquero	Sunseeds	32	92	2.4	58.6	35.2	**397.0**	2.9	0.0	**398.4**	0.8	401.4
RNX 10298	Rio Colorado	10	72	10.9	58.3	23.8	**389.5**	1.9	0.1	**397.9**	4.9	419.2
T-433	Takii	7	55	5.9	55.8	35.3	**375.2**	2.9	0.1	**387.1**	0.0	387.0
SXO-1428	Sunseeds	32	95	2.0	45.7	50.5	**376.2**	0.6	0.0	**379.1**	1.1	383.6
Envoy	Aristogenes	57	97	4.5	54.9	35.1	**356.4**	2.2	0.0	**364.8**	3.3	377.1
RNX 7176	Rio Colorado	17	75	3.9	57.5	26.3	**351.9**	3.5	0.0	**364.3**	8.8	396.9
Legend	Bejo	12	72	0.0	49.6	46.6	**348.4**	3.3	0.0	**360.3**	0.5	362.3
Bravo	Aristogenes	5	40	15.3	52.9	20.3	**357.3**	0.0	0.0	**357.3**	11.5	400.9
Quest	Petoseeds	32	95	20.9	56.7	18.0	**353.4**	0.9	0.0	**356.4**	3.5	368.2
RCS 4446	Rio Colorado	90	100	2.8	49.4	39.9	**347.9**	1.4	0.1	**353.9**	6.2	377.6
PX 901694 (w)	Petoseeds	5	60	7.6	52.2	32.6	**350.9**	0.8	0.2	**353.4**	6.4	373.7

Variety	Source	Maturity (% tops down) 8-24	9-13	Colossals ≥ 4" %	Jumbos 3"-4" %	Medium 2¼"-3" %	**C J M CWT/A**	Pre-Pack 1¾"-2¼" %	Boilers ≤1¾" %	**Total Market. CWT/A**	Culls %	Total Weight CWT/A
BGS 5153	Bejo	10	80	7.8	47.1	41.1	**351.9**	0.0	0.0	**351.9**	3.9	367.7
Kodiak	D. Palmer	60	92	4.8	59.4	28.2	**336.1**	3.3	0.4	**349.4**	3.8	363.3
Rio Rita	Rio Colorado	30	85	6.4	58.6	32.0	**334.1**	1.3	0.0	**339.5**	1.6	345.5
Regiment	Asgrow	62	100	8.5	55.6	26.4	**332.1**	0.9	0.0	**335.6**	8.5	366.7
X-400	Waldow	27	90	1.6	56.3	32.2	**326.2**	1.5	0.0	**331.6**	8.4	361.8
PX 901494 (w)	Petoseeds	7	57	2.9	61.4	24.8	**328.1**	1.1	0.0	**331.6**	9.8	366.3
Daytona	Bejo	7	57	0.0	51.3	40.7	**314.8**	2.6	0.0	**324.7**	5.4	344.0
Maritime	Aristogenes	60	92	6.6	58.3	22.5	**298.4**	6.0	0.0	**317.2**	6.5	341.5
Blanco Duro (w)	Sunseeds	20	87	0.0	46.9	44.2	**304.4**	3.1	0.0	**315.3**	5.6	332.6
PS 663395	Petoseeds	40	92	1.5	58.8	32.1	**289.5**	6.2	0.4	**311.8**	1.0	314.3
Seville	Arisotogenes	10	52	7.9	53.8	28.2	**305.4**	0.6	0.0	**307.8**	9.5	339.5
Frosty (w)	D. Palmer	20	80	0.0	38.9	52.1	**289.0**	6.1	0.4	**306.9**	2.5	315.3
X-412	Waldow	20	82	3.2	55.3	28.6	**284.1**	6.1	0.6	**305.4**	6.1	325.2
XPH-15113	Asgrow	15	75	4.0	75.4	14.7	**304.4**	0.0	0.0	**304.4**	5.8	321.7
Redwing (r)	Bejo	2	32	0.0	53.9	34.9	**297.4**	1.4	0.2	**301.9**	9.5	331.1
RCS 7227	Rio Colorado	80	97	7.8	46.9	31.9	**277.2**	6.2	0.0	**294.5**	6.9	316.8
Viper	Asgrow	30	85	0.0	62.2	27.4	**285.6**	2.1	0.0	**291.0**	8.2	314.8
Lorenzos	Vilmorin	42	100	0.0	55.6	39.2	**284.6**	1.0	0.0	**287.5**	4.1	299.9
Gladstone (w)	Bejo	10	62	0.0	44.8	42.7	**273.7**	4.8	0.0	**287.1**	7.6	311.8
Tradewind	Asgrow	30	92	0.0	45.3	44.8	**275.2**	3.9	0.0	**286.6**	5.9	303.9
Spinniker	Asgrow	32	90	0.0	51.4	40.1	**274.7**	1.0	0.0	**277.2**	7.4	297.0
XPH 15120	Asgrow	12	80	5.7	50.8	32.1	**241.0**	2.2	0.1	**248.5**	9.0	272.7
Yukon	D. Palmer	35	85	0.0	26.3	53.8	**185.1**	10.9	2.0	**208.9**	6.8	225.7
X-351	Waldow	90	100	12.1	46.4	31.6	**195.5**	5.0	0.8	**208.9**	4.1	218.2
X-817 (r)	Waldow	87	97	0.0	4.9	66.5	**146.5**	21.8	2.2	**196.0**	4.4	204.9
Red October (r)	Dorsing	30	75	0.0	24.5	53.9	**165.8**	8.7	0.2	**184.1**	12.6	208.3
X-882 (r)	Waldow	90	100	0.0	19.8	62.8	**148.5**	15.7	1.1	**172.3**	0.5	173.2
LSD (0.05) =							**97.0**			**96.6**		

Onion Storage Trial
Arkansas Valley

Mike Bartolo and Frank Schweissing
Arkansas Valley Research Center
Colorado State University

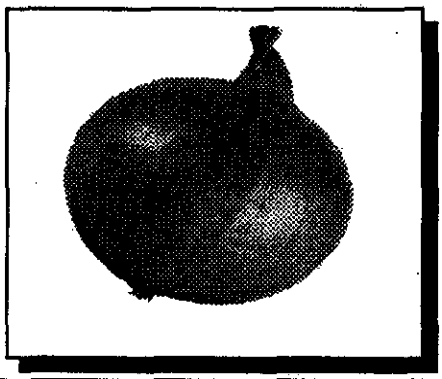
Onion storage data for varieties grown at the Arkansas Valley Research Center in Rocky Ford. Onions were harvested on September 21 and initially graded on October 21-25 , 1999. All marketable onions were then held in storage and regraded on January 5, 2000.

Variety	Source	Number of Culls on January 5		Percent culls by weight on January 5
		Sprouts	Rots	
Red October	Dorsing	25	2	11.5
Harvest Moon	"	28	2	18.9
RCS 7227	Rio Colorado	5	0	2.5
RNX 10298	"	4	0	2.9
RNX 10299	"	6	1	4.1
RCS 4446	"	15	0	8.0
Rio Rita	"	4	0	2.7
RNX 7176	"	6	0	4.0
Mesquite	D. Palmer	14	4	10.2
Tequila	"	15	7	11.9
Sierra	"	7	3	9.3
Frosty (W)	"	12	0	7.4
Kodiak	"	4	1	3.3
Yukon	"	15	3	12.5
Blanco Duro	Sunseeds	13	0	8.4
SXO - 1430	"	8	2	6.9
SXO - 1428	"	4	0	2.0
Vaquerro	"	3	3	3.5
Torero	"	8	4	5.7

Arkansas Valley onion storage data continued:

Variety	Source	Number of Culls on January 5		Percent culls by weight on January 5
		Sprouts	Rots	
Vision	Petoseeds	13	1	6.3
Quest	"	0	2	2.0
PS 663395	"	2	1	2.7
PX 901494 (W)	"	22	0	13.9
PX 901694 (W)	"	18	4	149
T-433	Takii	4	0	0.3
T-434	"	3	1	0.8
T-439	"	3	1	2.1
X - 201	Waldow	15	3	8.1
X - 202	"	15	4	7.0
X - 351	"	9	0	6.5
X- 400	"	6	0	4.8
X - 412	"	4	1	4.2
X - 817 (R)		44	0	24.2
X - 882 (R)	"	28	1	18.9
Legend	Bejo	0	0	0.0
Daytona	"	0	0	0.0
BGS 5153	"	5	1	3.2
Redwing (R)	"	9	6	9.1
Gladstone (W)	"	28	0	16.3
Mira	Asgrow	0	1	1.1
XPH - 15113	"	27	4	19.9
Regiment	"	15	1	15.8
Spinnaker	"	11	2	12.6
Tradewind	"	5	1	1.7
Viper	"	25	1	22.2
XPH 15120	"	15	6	135
Bravo	Aristogenes	24	0	19.3
Envoy	"	22	1	15.0
Maritime	"	4	1	3.4
Seville	"	18	12	26.5
Lorenzos	"	0	5	3.7
Colorado 6	"	13	2	9.8

Onion Fertility Trial



Mike Bartolo
Arkansas Valley Research Center
Colorado State University

The objective of this study was to examine the effects of conventional and slow-release fertilizers on the size and yield of onions and nitrate mobility in the soil.

Materials and Methods

The Sweet Spanish onion variety *X-202* (Waldow Seeds) was planted on March 9, 1999 on a Rocky Ford silty clay loam at the CSU Arkansas Valley Research Center. Two seed rows, spaced 18" apart, were seeded on top of 44" wide (between irrigation furrows) beds. Plots were irrigated and treated for insects, weeds, and disease as needed during the course of the season. Plots were harvested on September 21 and graded on October 19. (After the initial grading, all marketable onions were held in storage and regraded on January 5.

Urea and Meister Slow Release Fertilizer (150-day formulation) were used as the sources of nitrogen. Nitrogen, equal to 50, 100, 150, or 200 lbs per acre was applied either as a single application of Meister 150 day formulation at planting or two split applications of urea (June 8 and July 8). Fertilizers were banded two inches to the side and two inches below the seed row. As a comparison in one treatment, 100 lbs N as Meister 150 day formula was placed one inch directly below the seed row.

Soils samples were taken in the fertilizer treatments at one and two foot increments in the center of the bed at the beginning of the season (March 15) and after harvest (October 7) and will be analyzed for their nitrate-nitrogen content.

Preliminary Results and Discussion

There was not a significant difference (at the 95% confidence level) in yield due to any fertilizer treatment. However, there was a consistent trend that Mesiter slow-release fertilizer out-yielded the equivalent amount of urea. Maximum yields were realized when 100 lbs of N was applied as Meister 150 day formula.

In addition, fertilizer placement seemed to be important. Banding the slow-release fertilizers under the seed row as opposed to side-dressing, had a detrimental effect on onion stands and onion yield. As seen in previous work, banding fertilizers close to the seed may inhibit germination or seedling vigor by some kind of salt effect.

Special thanks to Bill Stephens, Helena Chemical, for supporting this research.

EFFECT OF FERTILIZER TREATMENT ON ONION YIELD AND SIZE

(Data taken at initial grading on October 19th, 1999)

Treatment	% Culls	% colossal and jumbo	Total Marketable Yield (cwt/A)
Unfertilized Control	4.9	71.8	426.9
50 lbs N as urea	10.7	73.9	458.4
100 lbs N as urea	6.2	76.0	464.8
150 lbs N as urea	9.1	75.9	455.8
200 lbs N as urea	8.5	78.3	438.4
50 lbs N as 150-day Meister	3.9	78.8	463.3
100 lbs N as 150-day Meister	6.7	80.9	490.7
150 lbs N as 150-day Meister	6.7	78.4	460.7
200 lbs N as 150-day Meister	5.9	78.1	461.4
100 lbs N as 150-day Meister below the seed row	9.8	82.1	410.9
LSD (0.05) =	6.5	8.9	74.5

EFFECT OF FERTILIZER TREATMENT ON ONION STORAGE

(Data taken at later grading on January 5th, 2000)

Treatment	# of Rots per Rep	# of Sprouts per Rep	% Culls
Unfertilized Control	1.7	4.5	11.9
50 lbs N as urea	0.5	3.5	6.8
100 lbs N as urea	1.7	4.5	12.5
150 lbs N as urea	1.0	4.0	10.1
200 lbs N as urea	1.5	5.7	12.9
50 lbs N as 150-day Meister	0.7	4.5	11.0
100 lbs N as 150-day Meister	1.0	4.0	9.3
150 lbs N as 150-day Meister	1.5	5.7	15.7
200 lbs N as 150-day Meister	0.7	6.0	11.0
100 lbs N as 150-day Meister below the seed row	1.7	4.7	15.0
LSD (0.05) =	NS	NS	7.1

PRE-SEASON SOIL TEST VALUES		
Depth	NH_4 - N (ppm)	NO_3 - N (ppm)
1 foot	5.10	10.49
2 foot	4.34	3.03

Post-Season Soil Samples will be reported at a later time.

1999 CSU ONION - Foliar Disease Management Final Report 10/15/99

Dr. Howard F. Schwartz & Kris Otto, Dept. of Bioagricultural Sciences & Pest Management, Colorado State University, Fort Collins, CO 80523-1177

The objective was to evaluate the effectiveness of various fungicides and bactericides in controlling fungal & bacterial diseases such as Purple Blotch, Botrytis Blast/Neck Rot, Xanthomonas and Pantoea Blights at the Rocky Ford Experiment Station and ARDEC in Fort Collins.

Experimental Design: Fungicide/bactericide treatments were applied in 25 gallons of water per acre with a CO_2 backpack sprayer, 8001 flat-tip nozzle (2 per bed of 2 onion lines). Plots were 3' wide by 25' in length with a 3' border (1 bed - 2 lines) of untreated/inoculated onions between each plot, replicated 3 - 4 times at each site in a randomized complete block design. The experiments were furrow irrigated at Rocky Ford, and linear sprinkler irrigated as needed at ARDEC.

FUNGICIDE SCREENING (Rocky Ford):

Treatments:	Product/Acre (unless otherwise stated):
1. Control	--
2. STO-101 + STO-102	1% + 1% (1% = 1 qt/25 gal)
3. ManKocide + Latron	2/50 lb + 0.06% v/v
4. Bravo Ultrex + Latron, Sprays 1,2,3	1.80 lb + 0.06% v/v
Ridomil/Bravo + Latron, Sprays 4,5,6	2.00 lb + 0.06% v/v
5. Fluazinam 500F	1.00 pt
6. Tilt 3.6E, Sprays 1,3,5	126 g ai/ha
Bravo 720 SC, Sprays 2,4,6	841 g ai/ha
7. Bravo 720 SC, Sprays 1,2	841 g/ha
Switch WG 625, Sprays 3,4	615 g ai/ha
Tilt 3.6E, Sprays 5,6	126 g ai/ha
8. Bravo 720 SC, Sprays 1,2,3	841 g ai/ha
Switch WG 625, Sprays 4,5,6	615 g ai/ha
9. CQ 1294 (Scala) + Latron @ 1st sign	2.00 l/ha + 0.06% v/v
10. CQ 1294 + Latron	2.00 l/ha + 0.06% v/v
11. EXP WP + Bond	4.00 lb + 0.25% total vol.
12. EXP WP + Bond	8.00 lb + 0.25% total vol.
13. EXP WP + Bond	10.00 lb + 0.25% total vol.
14. EXP AS + Bond	15.00 pt + 0.25% total vol.
15. EXP AS + Bond	20.00 pt + 0.25% total vol.
16. EXP AS + Bond	25.00 pt + 0.25% total vol.
17. Quadris + Latron, Sprays 1,2,3	0.5752 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
18. Quadris + Latron, Sprays 1,2,3	0.7669 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
19. Quadris + Latron, Sprays 1,2,3	0.9586 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
20. Quadris + Latron, Sprays 1,3,5	0.3834 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
21. Quadris + Latron, Sprays 1,3,5	0.5752 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
22. Quadris + Latron, Sprays 1,3,5	0.7669 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v

23.	Quadris + Latron, Sprays 1,3,5	0.9586 pt + 0.06% v/v
	Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
24.	Quadris + Latron, Sprays 2,4,6	0.5752 pot + 0.06% v/v
	Bravo Ultrex + Latron, Sprays 1,3,5	1.80 ib + 0.06% v/v
25.	Penncozeb 75DF + Dynamic	1.50 ib ai + 0.06% v/v

ROCKY FORD PROTOCOL :

Variety: 'X 202' planted 03-10-99 [2nd consecutive season on ground with disease history]

Spray Dates:
- 07-29 no apparent fungal disease problems, trace Xanthomonas Leaf Blight
- 08-05 trace Purple Blotch, light Xanthomonas Leaf Blight
- 08-13 ditto
- 08-20 light to moderate Purple Blotch, Xanthomonas Leaf Blight, Pantoea
- 08-26 ditto, tip death extensive
- 09-01 ditto

Disease Evaluation = % of foliage infected/killed by combined diseases; Evaluation 1 on 08-05, Evaluation 2 on 08-13, Evaluation 3 on 08-20, and Evaluation 4 on 09-08-99. The earlier evaluations were not significantly different and are not reported.

On 09-08, an estimate was made of the percentage rotten onions (50 – 70% Pantoea Bacterial Rot) in the field, with no apparent differences between any of the treatments. It also appeared that plots with greater weed pressure (purslane, bindweed, pigweed) had greater soft rot than plots with less weed pressure. A field harvest of 10' - 1 line per treatment was taken on 09-08, topped, sorted (medium, jumbo, total unsorted) and weighed as kilograms/plot for reps 1 - II.

Table 1. 1999 Rocky Ford Fungicide Screening Trial Results.

Treatment	% Disease. 08-20-99	% Disease. 09-08-99	Medium Wt kg/plot	Jumbo Wt kgb/plot	Total Wt Kg/plot
1 Control	30.00 a	70.00	5.11	0.45	6.33
2 STO + STO	25.00 ab	66.67	5.36	0	5.95
3 ManKocide	26.70 ab	71.67	5.10	0.54	6.46
4 Br + Rid/Br	20.00 bc	63.33	5.12	1.23	6.53
5 Fluazinam	20.00 bc	68.33	5.47	0.91	7.01
6 Tilt + Bravo	28.30 ab	70.00	6.44	0.50	5.98
7 Br, Sw, Tilt	23.30 abc	66.67	5.38	1.36	7.20
8 Br, Switch	21.70 abc	63.33	4.71	0.23	5.44
9 Scala	23.30 abc	61.67	5.43	1.14	7.11
10 Scala	26.70 ab	75.00	4.75	1.09	6.38
11 X-WP, low	26.70 ab	75.00	5.81	0.18	6.67
12 X-WP, mod	28.30 ab	73.33	5.33	0.86	6.83
13 X-WP, high	26.70 ab	66.67	5.97	0.68	7.20
14 X-AS, low	25.00 ab	73.33	5.56	0.77	7.02
15 X-AS, mod	28.30 ab	71.67	4.33	2.97	8.10
16 X-AS, high	26.70 ab	73.33	5.07	0.50	6.07
17 Q early,low	21.70 abc	65.00	4.20	1.23	6.15
18 Q early,mod	20.00 bc	56.67	4.48	0.91	5.75
19 Q early,high	15.00 c	56.67	6.88	0.86	8.29
20 Q alt, low	20.00 bc	65.00	5.06	0.95	6.79
21 Q alt, mod	25.00 ab	70.00	5.01	1.04	6.64
22 Q alt, mod	21.70 abc	60.00	4.74	1.18	6.51

23 Q alt, high	21.70 abc	71.67	4.68	1.36	6.68
24 Q alt, mod	21.70 abc	60.00	6.26	0.50	7.35
25 Penncozeb	23.30 abc	68.33	5.35	1.23	7.08
C. V. %:	16.93	14.95	16.78	79.97	13.24
Probability:	0.0059	> 1	0.4338	0.2836	0.3915
LSD	$_{(0.01)}$ 8.84	Non significant	n. s.	n. s.	n. s.

ROCKY FORD – Fungicide Results & Discussion:

Most of the fungicide treatments reduced disease intensity (incidence x severity) at the early evaluation, however, only treatments 18 – 20 (with Quadris) were significantly lower than the untreated control. Disease intensity became uniformly severe by the end of the season with the combined outbreaks of bacterial diseases (Xanthomonas Leaf Blight + Pantoea Blight/Soft Rot] and Purple Blotch. Yield differences were not statistically significant, however, the following treatments were at least 10 % better for the jumbo and/or total yield components: 4, 5, 7, 9 – 10, 12 – 15, and 17 – 25.

Disease pressure from the 1998 season combined with favorable conditions throughout the 1999 season, and the mixture of bacterial plus fungal pathogens proved too intense for this pesticide protocol. Future nurseries will have to be rotated to cleaner ground with more manageable disease pressure that is more consistent with grower experiences.

FUNGICIDE SCREENING (ARDEC):

Treatments:	Product/Acre (unless otherwise stated):
1. Control	--
2. STO-101 + STO-102	1% + 1% (1% = 1 qt/25 gal)
3. ManKocide + Latron	2/50 lb + 0.06% v/v
4. Bravo Ultrex + Latron, Sprays 1,2,3	1.80 lb + 0.06% v/v
Ridomil/Bravo + Latron, Sprays 4,5,6	2.00 lb + 0.06% v/v
5. Fluazinam 500F	1.00 pt
6. Tilt 3.6E, Sprays 1,3,5	126 g ai/ha
Bravo 720 SC, Sprays 2,4,6	841 g ai/ha
7. Bravo 720 SC, Sprays 1,2	841 g/ha
Switch WG 625, Sprays 3,4	615 g ai/ha
Tilt 3.6E, Sprays 5,6	126 g ai/ha
8. Bravo 720 SC, Sprays 1,2,3	841 g ai/ha
Switch WG 625, Sprays 4,5,6	615 g ai/ha
9. CQ 1294 (Scala) + Latron @ 1st sign	2.00 l/ha + 0.06% v/v
10. CQ 1294 + Latron	2.00 l/ha + 0.06% v/v
11. EXP WP + Bond	4.00 lb + 0.25% total vol.
12. EXP WP + Bond	8.00 lb + 0.25% total vol.
13. EXP WP + Bond	10.00 lb + 0.25% total vol.
14. EXP AS + Bond	15.00 pt + 0.25% total vol.
15. EXP AS + Bond	20.00 pt + 0.25% total vol.
16. EXP AS + Bond	25.00 pt + 0.25% total vol.
17. Quadris + Latron, Sprays 1,2,3	0.5752 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
18. Quadris + Latron, Sprays 1,2,3	0.7669 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
19. Quadris + Latron, Sprays 1,2,3	0.9586 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 4,5,6	1.80 lb + 0.06% v/v
20. Quadris + Latron, Sprays 1,3,5	0.3834 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v

21. Quadris + Latron, Sprays 1,3,5	0.5752 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
22. Quadris + Latron, Sprays 1,3,5	0.7669 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
23. Quadris + Latron, Sprays 1,3,5	0.9586 pt + 0.06% v/v
Bravo Ultrex + Latron, Sprays 2,4,6	1.80 lb + 0.06% v/v
24. Quadris + Latron, Sprays 2,4,6	0.5752 pot + 0.06% v/v
Bravo Ultrex + Latron, Sprays 1,3,5	1.80 lb + 0.06% v/v
25. Rovral 50WP	0.75 lb ai
26. Ronilan 50WG	0.75 lb ai
27. Experimental A	0.15 lb ai
28. Experimental C	0.30 lb ai
29.*Experimental D	0.45 lb ai
30. Experimentals A + C	0.083 lb ai + 0.167 lb ai
31. Experimentals A + C	0.117 lb ai + 0.233 lb ai
32. Experimentals A + C	0.150 lb ai + 0.300 lb ai
33. Penncozeb 75DF + Dynamic	1.50 lb ai + 0.06% v/v

[* Note: Experimental D did not mix well, was thick, clumpy, hard to get into suspension]

ONION FUNGAL/BACTERIAL COMPLEX (ARDEC only):

Treatments:	Product/Acre (unless otherwise stated):
1. Control	--
2. Maneb 75DF + Dynamic	1.50 lb ai + 0.06% v/v
3. Maneb 75DF + Dynamic	2.25 lb ai + 0.06% v/v
4. Penncozeb 75DF + Dynamic	1.50 lb ai + 0.06% v/v
5. Penncozeb 75DF + Dynamic	2.25 lb ai + 0.06% v/v
6. Cuprofix 20WG + Dynamic	0.80 lb ai + 0.06% v/v
7. Cuprofix 20WG + Dynamic	1.20 lb ai + 0.06% v/v
8. Cuprofix 20WG + Dynamic	1.60 lb ai + 0.06% v/v
9. Maneb 75DF + Cuprofix 20WG + Dynamic	1.50 lb ai + 0.80 lb ai + 0.06% v/v
10.Maneb 75DF + Cuprofix 20WG + Dynamic	1.50 lb ai + 1.20 lb ai + 0.06% v/v
11.Maneb 75DF + Cuprofix 20WG + Dynamic	1.50 lb ai + 1.50 lb ai + 0.06% v/v
12. Penncozeb 75DF + Cuprofix 20WG + Dynamic	1.50 lb ai + 1.20 lb ai + 0.06% v/v
13. Maneb 75DF + Kocide 2000 35DF + Dynamic	1.50 lb ai + 0.79 lb ai + 0.06% v/v
14. Kocide 2000 35DF + Dynamic	0.79 lb ai + 0.06% v/v
15.Maneb + Kocide 2000 + Dynamic + Halt + 5% Cu	1.50 lb ai + 0.79 lb ai + 0.06% v/v + 1 pt + 0.5 pt

ARDEC PROTOCOL:

Variety: Asgrow 'Brown Beauty' planted 03-22-99; poor stand due to winds + water loss
Asgrow 'Bravo' replanted 05-13, excellent stand (52 rows)
Spreader rows inoculated with Botrytis allii conidia on 08-27 and 09-02 (trace blast developed by early September due to hot, dry conditions)

Spray Dates: 08-17, 08-24, 08-31, 09-07, 09-14, 09-21

Disease Evaluation = % of foliage infected/killed by Botrytis; Evaluation 1 on 09-22, Evaluation 2 on 10-08.

A field sample of 20 randomly selected medium to jumbo bulbs in Reps I – II was pulled on 10-08, dried with tops in the field until 10-14, stored in the ARDEC work room at 80 F until 12-14-99, bulbs will then be cut open lengthwise to record internal rot by Botrytis and/or other storage problems.

Table 2. 1999 ARDEC Fungicide Screening Trial Results.

Treatment	% Disease. 10-08-99	% Bulb Rot. 12-14-99
1 Control	15.00	
2 STO + STO	15.00	
3 ManKocide	15.00	
4 Br + Rid/Br	15.00	
5 Fluazinam	15.00	
6 Tilt + Bravo	15.00	
7 Br, Sw, Tilt	16.25	
8 Br, Switch	15.00	
9 Scala	12.50	
10 Scala	15.00	
11 X-WP, low	15.00	
12 X-WP, mod	16.25	
13 X-WP, high	15.00	
14 X-AS, low	17.50	
15 X-AS, mod	16.25	
16 X-AS, high	17.50	
17 Q early,low	15.00	
18 Q early,mod	15.00	
19 Q early,high	15.00	
20 Q alt, low	15.00	
21 Q alt, mod	15.00	
22 Q alt, mod	15.00	
23 Q alt, high	13.75	
24 Q alt, mod	15.00	
25 Rovral	15.00	
26 Ronilan	15.00	
27 Exp A	15.00	
28 Exp C	16.25	
29 Exp D	13.75	
30 Exp A+C, l	12.50	
31 Exp A+C,m	12.50	
32 Exp A+C, h	12.50	
33 Penncozeb	15.00	

Table 3. 1999 ARDEC Fungal / Bacterial Complex - Disease Intensity Results.

Treatment	% Disease 09-22-99	% Disease. 10-08-99
1 Control	10.00 a	21.25 ab
2 Maneb low	7.50 ab	18.75 abc
3 Maneb high	7.50 ab	18.75 abc
4 Penc low	7.50 ab	20.00 abc
5 Penc high	8.75 ab	17.50 abc
6 Cupro low	6.00 ab	16.25 abc
7 Cupro mid	3.50 b	13.75 c

8 Cupro high	3.00 b	13.75 c
9 Man/Cu low	3.50 b	13.75 c
10 Man/Cu mid	3.50 b	13.75 c
11 Man/Cu hi	2.50 b	17.50 abc
12 Pen/Cu mid	2.50 b	13.75 c
13 Man/Kocide	8.75 ab	21.25 ab
14 Kocide	7.00 ab	16.25 bc
15 M/K/HltCu	6.25 ab	23.75 a
C. V. %:	56.42	20.62
Probability:	0.0140	0.0010
LSD	(0.01) 6.28	(0.01) 6.80

ARDEC – Fungicide Results & Discussion:

There was evidence of spreader row infection after the Botrytis inoculation, and some spread into the treated plots. However, there was insufficient pressure to clearly distinguish differences between the Fungicide Trial treatments for foliage infection. In addition, for the first time in 3 years we did not experience an outbreak of Downy Mildew which consistently induced 30 – 50 % disease intensity in the controls.

Later in early December, we will evaluate the bulb samples for Botrytis incidence and report those data.

It appears that the crop maturity as affected by replanting last spring, and relatively dry conditions throughout September and October reduced secondary infection opportunities by the fungal pathogens (inoculated or naturally-occurring) during 1999.

The Fungal / Bacterial Trial developed more disease pressure by addition of the bacterial pathogen, and treatments 7 - 12 reduced disease intensity on both evaluation dates. The Cuprofix and Cuprofix + EBDC tank mixes enhanced bacterial disease control, as previously reported.

BACTERICIDE SCREENING/TIMING (Rocky Ford & ARDEC):

Bactericide Screening Treatments:	Produce/Acre (unless otherwise stated):
1. Control	--
2. Maneb 75Df + Dynamic	1.50 lb ai + 0.06% v/v
3. Kocide 2000 + Manex + Dynamic	1.25 lb + 3.20 pt + 0.06% v/v
4. Ultra Champ + Latron	0.67 lb + 0.06% v/v
5. Ultra Champ + Dithane + Latron	0.67 lb + 2.00 lb + 0.06% v/v
6. Champ II + Latron	1.30 pt + 0.06% v/v
7. Champ II + Dithane + Latron	1.30 pt + 2.00 lb + 0.06% v/v
8. MFX F + Dynamic	1.30 pt + 0.06% v/v
9. MFX F + Maneb 75DF + Dynamic	2.00 lb + 1.50 lb ai + 0.06% v/v
10. MFX DF + Dynamic	2.00 lb + 0.06% v/v
11. MFX DF + Maneb 75DF + Dynamic	2.00 lb + 1.50 lb ai + 0.06% v/v
12. ManKocide + Dynamic	2.50 lb + 0.06% v/v
13. Effersan + Maneb 75DF + Dynamic	250 ppm + 1.50 lb ai + 0.06% v/v
14. Effersan + Maneb 75DF + Dynamic	500 ppm + 1.50 lb ai + 0.06% v/v
15. Effersan + Maneb 75Df + Dynamic	1000 ppm + 1.50 lb ai + 0.06% v/v
16. Effersan + Dynamic	1000 ppm + 0.06% v/v
17. Kocide 2000+Manex+Dynamic+Halt+5% Cu	1.25 lb + 3.20 pt + 0.06% v/v + 1.00 pt + 0.50 pt

Bactericide Timing Treatments (+ Dynamic):		Product/Acre (unless otherwise stated):
1. Control A		--
2. 2-weeks prebulb	Kocide 2000	1.25 lb
3. "	Kocide 2000 + Maneb	1.25 lb + 1.50 lb ai
4. Bulbing	Kocide 2000	1.25 lb
5. "	Kocide 2000 + Maneb	1.25 lb + 1.50 lb ai
6. 2-weeks postbulb	Kocide 2000	1.25 lb
7. "	Kocide 2000 + Maneb	1.25 lb + 1.50 lb ai
8. Control B		--

ROCKY FORD PROTOCOL - Xanthomonas & Pantoea Blights:

Variety:	'X 202' planted 03-13-99	
Spray Dates:	06-29	2 - 3 only in Timing, no apparent disease
	07-08	2 - 3 in Timing + Screening, trace Xanthomonas
	07-15	2 - 5 in Timing + Screening, trace Xantomonas
	07-22	2 – 5 in Timing + Screening, trace Xanthomonas & Soft Rot
	07-29	2 – 7 + Screening, trace Xanthomonas
	08-05	ditto, light to moderate Xanthomonas, trace Purple Blotch
	08-13	ditto, light to moderate Xanthomonas, trace Purple Blotch
	08-20	ditto, light to moderate Xanthomonas, trace Purple Blotch & Pantoea
	08-26	ditto, light to moderate Xanthomonas, trace Purple Blotch & Pantoea
	09-01	ditto, mod to severe Xanthomonas, mod Purple Blotch & Pantoea

Disease Evaluation = % of foliage infected/killed by Xanthomonas/Pantoea/Purple Blotch; Evaluation 1 on 08-05, Evaluation 2 on 08-13, Evaluation 3 on 08-26, and Evaluation 4 on 08-31 (Timing) or 09-08 (Screening).

A field harvest of 10' - 1 line per treatment was taken on 9-10, topped, sorted (medium, jumbo, total unsorted) and weighed as pounds/plot for reps 1 – III for the Screening and reps I – IV for the Timing Exp..

Table 4. 1999 Rocky Ford Bactericide Screening Trial Results.

Treatment	% Disease 08-05-99	% Disease. 08-13-99	% Disease 08-26-99	Total Wt Kg/plot
1 Control	13.30 abc	16.70 bcd	33.30 ab	6.71
2 Maneb	13.30 abc	20.00 ab	31.70 abc	7.51
3 Kocide + M	6.70 d	11.70 d	18.30 e	7.18
4 Ult Champ	13.30 abc	20.00 ab	30.00 abc	6.62
5 Ul Chmp+M	8.30 cd	13.30 cd	20.00 de	7.86
6 Champ II	15.00 ab	21.70 ab	33.30 ab	6.84
7 Champ II+M	11.70 bcd	16.70 bcd	26.70 bcde	8.22
8 MFXF	13.30 abc	20.00 ab	33.30 ab	6.68
9 MFXF+M	11.70 bcd	18.30 bc	23.30 cde	7.08
10 MFXDF	10.00 bcd	16.70 bcd	23.30 cde	8.05
11 MFXDF+M	10.00 bcd	18.30 bc	25.00 bcde	8.16
12 ManKocide	13.30 abc	18.30 bc	25.00 bcde	7.60
13 Eff+M, low	13.30 abc	16.70 bcd	23.30 cde	7.81
14 Eff+M, mod	15.00 ab	18.30 bc	26.70 bcde	7.09
15 Eff+M, high	11.70 bcd	16.70 bcd	28.30 abcd	7.68
16 Eff, high	18.30 a	25.00 a	36.70 a	6.86
17K+M+H+Cu	15.00 ab	21.70 ab	33.30 ab	7.66
C. V. %:	27.33	19.20	25.61	15.19
Probability:	< 0.0491	0.0150	0.1027	> 1.0000
LSD	$_{(0.05)}$ 5.69	$_{(0.05)}$ 5.81	$_{(0.10)}$ 9.81	Non sig.

Table 5. 1999 Rocky Ford Bactericide Timing Trial Results.

Treatment	% Disease 08-05-99	% Disease 08-13-99	% Disease 08-26-99	Total Wt Kg/plot
1 Control A	17.50 ab	30.00 a	70.00 a	8.06 ab
2 Pre – K	7.50 cd	17.50 bc	57.50 bc	7.33 bc
3 Pre – K+ M	5.00 d	12.50 c	50.00 c	7.85 abc
4 Bulb – K	13.75 abc	22.50 ab	65.00 ab	6.97 c
5 Bulb – K+ M	11.25 bcd	17.50 bc	60.00 abc	8.68 a
6 Post – K	15.00 ab	21.25 abc	65.00 ab	8.01 ab
7 Post – K+ M	18.75 a	23.75 ab	65.00 ab	7.29 bc
8 Control B	17.50 ab	27.50 a	70.00 a	7.76 abc
C. V. %:	27.97	23.43	14.44	10.73
Probability:	< 0.0001	< 0.0012	0.0700	0.1614
LSD	$_{(0.01)}$ 7.35	$_{(0.01)}$ 9.99	$_{(0.01)}$ 10.97	$_{(0.10)}$ 1.01

- K = Kocide 2000 @ 1.25 lb/A, M = Maneb @ 1.5 lb ai/A; Pre = 2 weeks prebulb, Bulb = bulb initiation, Post = 2 weeks post bulb initiation.
- Note: on 09-08, there was an average of 70 – 80 % foliage infection and 50 – 70 % bulb rot, regardless of treatment in the Bactericide Screening and Timing & Fungicide Screening Experiments.

ROCKY FORD – Bactericide Results & Discussion:

Screening Trial:
Treatment 3 (Kocide + Maneb) significantly reduced bacterial disease pressure throughout the season, in addition to treatments 5, 9, 10 and 13 on the final disease evaluation. Total plot yield was increased more than 20 % by treatments 7, 10 and 11; two of which were copper tank-mixed with maneb.

Comparison of treatment 3 to 17, showed that the addition of Halt + Copper solution did not improve disease control; and plot yields were 7 - 14% greater than the untreated control.

The Effersan treatments (13 – 16) were variable but generally did not demonstrate any consistent reduction in disease development, even when tank-mixed with Maneb. However, there was a tendency towards less disease on the final evaluation date (treatment 13 – low rate and treatment 15 – high rate) and improved yield (16 % and 14 %, respectively). Future work should compare the effects of low rates of Effersan tank-mixed with various fungicides/bactericides to measure any enhancement that may be provided for bacterial control by this type of disinfectant. However, reliance solely upon Effersan or other disinfectant for field disease control is not recommended.

Timing Trial:
The pre-bulb treatments with copper and copper + maneb (No. 2 and 3) again showed season-long reduction of bacterial diseases such as Xanthomonas Leaf Blight and Pantoea Blight/Bulb Rot. The tank-mix treatment was consistently better than the copper-only treatment. Delayed applications until bulbing or post-bulbing were ineffective. None of the treatments provided any yield increase in the 1999 plots, presumably due to the severe disease pressure that occurred by the end of the season. For example at harvest, there was an average of 50 – 70 % bulb rot in all treatments.

The 1999 experiments reinforce earlier studies and recommendations that the bacterial disease complex in southern Colorado and elsewhere must be addressed with an aggressive Integrated Pest Management strategy which relies upon: (1) crop rotation out of onions for at least 2 years, preferably 3 years; (2) use of clean water if possible, avoid reuse water; (3) timely applications of copper + EBDC fungicide at full rates beginning at least 2 weeks pre-bulb on a 5 – 10 day interval in good gallonage and pressure. Effective coppers have included Kocide, Champ and NuCop; and effective EBDCs have included Maneb, Manex, Dithane, Penncozeb and Mancozeb.

ARDEC PROTOCOL - Xanthomonas Leaf Blight:

Variety: 'Bravo' replanted 05-13-99
Spreader rows inoculated with *Xanthomonas campestris* bacterial cells (> 10^8 cells/ml) on 08-17 and 08-20; and a mixture of *Xanthomonas campestris & Burkholdaria gladioli* cells on 08-24 and 08-27. A trace amount of disease developed within 2 weeks, and there was greater than 20% foliage infection by 09-22.

Spray Dates:

08-04	no apparent disease problems (pre-bulb), Timing 2 - 3 only
08-11	Timing 2 - 3, Screening
08-17	Timing 2 - 5, Screening
08-24	Timing 2 - 5, Screening
08-31	Timing 2 - 7, Screening
09-07	Timing 2 - 7, Screening
09-14	Screening
09-15	Timing 2 – 7
09-21	Timing 2 – 7, Screening

Disease Evaluation = % of foliage infected/killed; Evaluation 1 on 09-22, and Evaluation 2 on 10-08.

Table 6. 1999 ARDEC Bactericide Screening Trial - Disease Intensity Results.

Treatment	% Disease 09-22-99	% Disease. 10-08-99
1 Control	6.25 abc	18.75
2 Maneb	8.75 ab	20.00
3 Kocide + M	8.75 ab	21.25
4 Ult Champ	8.25 ab	20.00
5 Ul Chmp+M	8.75 ab	21.25
6 Champ II	4.50 bc	20.00
7 Champ II+M	4.00 c	17.50
8 MFXF	5.00 bc	18.75
9 MFXF+M	5.25 bc	18.25
10 MFXDF	8.75 ab	21.25
11 MFXDF+M	4.25 c	18.25
12 ManKocide	4.50 bc	18.75
13 Eff+M, low	10.00 a	20.00
14 Eff+M, mod	8.25 abc	22.50
15 Eff+M, high	7.50 abc	20.00
16 Eff, high	8.75 ab	21.25
17K+M+H+Cu	10.00 a	20.00
C. V. %:	43.57	17.48
Probability:	0.0449	> 1.000
LSD	(0.05) 4.42	Non signf.

Table 7. 1999 ARDEC Bactericide Timing Trial - Disease Intensity Results.

Treatment	% Disease 09-22-99	% Disease 10-08--99
1 Control A	8.75 ab	22.50 a
2 Pre – K	7.50 bc	22.50 a
3 Pre - K+ M	5.75 bc	20.00 a
4 Bulb – K	7.50 bc	20.00 a
5 Bulb - K+ M	4.50 c	16.25 b
6 Post – K	11.25 a	21.25 a
7 Post - K+ M	6.25 bc	20.00 a
8 Control B	8.75 ab	21.25 a
C. V. %:	33.72	14.32
Probability:	0.0311	0.1220
LSD	(0.05) 3.71	(0.10) 3.55

- K = Kocide 2000 @ 1.25 lb/A, M = Maneb @ 1.50 lb ai/A; Pre = 2 weeks prebulb, Bulb = bulb initiation, Post = 2 weeks post bulb initiation.

ARDEC – Bactericide Results & Discussion:

Screening Trial:
Treatments 7 and 11 (copper + EBDC) significantly reduced bacterial disease pressure at the first evaluation, reinforcing the value of this type of tank mix against onion bacterial pathogens. Disease pressure subsided as daily temperatures became cooler, and after a hard freeze in late September.

Timing Trial:
The tank mix treatments (3 and 5) at pre-bulbing to early bulbing provided the most effective disease control, as previously reported.

NORTHERN COLORADO PROTOCOL – Bacterial Diseases:

A series of experiments were initiated in commercial grower fields (near the CSU Variety Trials) in Northern Colorado to compare the effectiveness of various fungicide/bactericide treatments and Effersan (50% Sodium Dichloro-s-Triazinetrione; 30% available chlorine) as a disinfectant to reduce foliage disease pressure caused by bacterial and/or fungal pathogens.

Treatments:

1. Untreated Control
2. Maneb 75DF @ 1.50 lb ai + Dynamic @ 0.06% v/v per Acre
3. Kocide 2000 @ 1.25 lb + Maneb @ 1.50 lb ai + Dynamic @ 0.06% v/v per Acre
4. Effersan @ 500 ppm + Dynamic @ 0.06% v/v per Acre
5. Effersan @ 500 ppm + Maneb 75DF @ 1.50 lb ai + Dynamic @ 0.06% v/v per Acre

Plot Design:

2 beds (2.5 feet) wide by 20 feet long, randomized complete block, 4 reps
plots sprayed with CO_2 backpack, 8003 flat-tip nozzle (2 per bed) in 25 gal water / Acre

yellow seeded onions planted and maintained with standard commercial operations by cooperators

Cooperators & Spray Dates:

I. Harold Tateyama at Ault:
07-19, 07-26, 08-02, 08-09, 08-17, 08-23, 08-30

Field Observations:
08-18 there was general tip death (abiotic), but no apparent disease pressure
08-30 same note, a trace amount of Botrytis Blast, no bacterial disease pressure, plot abandoned

II. Bob & Rob Sakata at Henderson
07-12, 07-19, 07-26, 08-02, 08-09, 08-17, 08-23

Field Observations:
08-18 no apparent foliar disease pressure, 10 % loss from Fusarium Wilt & Pink Root in all treatments
08-30 same note, a trace amount of Botrytis Blast, no bacterial disease pressure, plot abandoned

Results & Discussion:

There was insufficient foliar disease pressure to distinguish the effects of any treatment against foliar pathogens of onions. Please refer to other experiments at ARDEC and Rocky Ford during 1999.

ACKNOWLEDGEMENTS:
We gratefully acknowledge the assistance of Mike Bartolo and Frank Schweissing at Rocky Ford; Harold Tateyama at Ault; Bob and Rob Sakata at Henderson; and partial financial assistance from the CSU Agr. Experiment Station, Arkansas Valley Growers & Shippers Association, Colorado Onion Association, Elf Atochem N. A., Griffin Corporation, Novartis, Micro Flo Company, Zeneca Ag Products, Stoller, Effersan, AgroEvo, AgraQuest, BASF Corporation.

Pre-emergence Weed Control in Onions
Colorado State University - Weed Science

Project Code: ONIO029

Location: Fort Collins-ARDEC

Cooperator: American Cyanamid, Gowan, AgrEvo, COA

Site Description

Crop: Onion
Plot Width: 6.7 ft

Variety: Bravo (Asgrow)
Plot Length: 30 ft

Planting Date: 5-13-99
Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Clay Loam	2.0	7.6

Application Information

	A
Application Date	5-14-99
Time of Day	12:00
Application Method	Broadcast
Application Timing	PRE
Air Temp (°F)	63
Soil Temp (°F)	55
Relative Humidity (%)	50
Wind Velocity (mph)	5-10

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
A: Backpack CO_2	3	Flat Fan	11002	18"	20"	6.7 ft	20	30

Summary Comments

This was one of two studies conducted at CSU research centers in Fort Collins and Rocky Ford to evaluate PRE herbicides for weed control in onions. Off station experiments included only labeled products, while Experiment Station studies included Nortron, which is currently in residue trials through IR-4 for PRE and POST applications to onions. At ARDEC there was substantial pigweed pressure, so treatments that did not provide adequate control between emergence and two leaf stage had lower yields. Plots treated with Prowl at rates of 1.2, 1.5, and 2.0 lb ai/ac had yields similar to or greater than the handweeded check or Dacthal treatments. Prefar and Nortron treatments did not provide adequate pigweed control so yields were lower than the handweeded check. Stand counts for Nortron treated plots were not significantly different from the handweeded check, indicating that lower yields were due to weed competition. Following weed control evaluations, all plots except for the untreated check were keep weed free with a combination of POST herbicides and hand labor. Onion yields were low at this location because plots were replanted in May 13, the original planting date was April 10.

Colorado State University

Pre-emergence Weed Control in Onions

Trial ID: ONIO029 Investigator: Dr. Scott Nissen
Location: R. Ford/ARDEC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Onion Jumbo No./acre	Onion Medium No./acre	Onion Small No./acre	Onion Jumbo Cwt/acre	Onion Medium Cwt/acre	Onion Small Cwt/acre	Onion Market Cwt/acre
	Weed Code											
	Crop Code											
	Rating Data Type											
	Rating Unit					No./acre	No./acre	No./acre	Cwt/acre	Cwt/acre	Cwt/acre	Cwt/acre
	Rating Date					10-1-99	10-1-99	10-1-99	10-1-99	10-1-99	10-1-99	10-1-99
	PRM Data Type					ARDEC	ARDEC	ARDEC	ARDEC	ARDEC	ARDEC	ARDEC
1	Untreated					0 d	1162 g	38333 c-g	0.0 d	3.8 h	46.1 efg	3.8 g
2	Hand weeded					13939 a	66211 abc	21490 fg	106.3 a	289.4 abc	39.7 fg	395.7 a
3	Dacthal	10	LB A/A	PRE	A	12777 a	59822 a-d	36591 d-g	93.5 a	252.3 bcd	71.7 b-f	345.7 abc
4	Prefar	5.5	LB A/A	PRE	A	3485 d	33687 ef	62727 ab	28.2 cd	137.0 fg	99.9 ab	165.2 def
5	Prefar	7	LB A/A	PRE	A	0 d	39494 def	66792 a	0.0 d	144.7 efg	108.9 a	144.7 ef
6	Prowl	0.8	LB A/A	PRE	A	1162 d	58080 bcd	40656 c-f	9.0 d	236.9 cde	73.0 b-e	245.8 cde
7	Prowl	1.2	LB A/A	PRE	A	11035 ab	59822 a-d	18005 g	84.5 ab	276.6 abc	32.0 g	361.1 ab
8	Prowl	1.5	LB A/A	PRE	A	9874 abc	77246 ab	28459 efg	75.6 abc	335.5 ab	52.5 d-g	411.0 a
9	Prowl	2	LB A/A	PRE	A	9874 abc	81893 a	19747 fg	75.6 abc	357.2 a	38.4 g	432.8 a
10	Nortron	0.33	LB A/A	PRE	A	4646 cd	44722 c-f	54014 a-d	35.8 cd	174.2 d-g	85.8 abc	210.0 def
11	Nortron	0.5	LB A/A	PRE	A	1742 d	30782 f	58661 abc	14.1 d	121.6 g	96.0 abc	135.7 f
12	Nortron	1	LB A/A	PRE	A	4646 cd	44722 c-f	45303 b-e	34.6 cd	180.6 d-g	80.7 a-d	215.1 def
13	Nortron	1.5	LB A/A	PRE	A	5227 bcd	54014 cde	38914 c-g	38.4 bcd	220.2 c-f	64.0 c-g	258.6 bcd
	LSD (P=.05)					6230.5	22114.7	21301.6	47.70	95.31	32.38	106.92
	Standard Deviation					3697.1	13122.5	12640.0	28.31	56.55	19.22	63.45
	CV					61.3	26.18	31.02	61.8	26.93	28.11	24.8

Means followed by same letter do not significantly differ (P=.05, LSD)

Pre-emergence Weed Control in Onions
Colorado State University - Weed Science

Project Code: ONIO029

Location: Rocky Ford-AVRC

Cooperator: American Cyanamid, Gowan, AgrEvo, COA

Site Description

Crop: Onion
Plot Width: 6.7 ft

Variety: Bravo (Asgrow)
Plot Length: 30 ft

Planting Date: 3-21-99
Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Silty Clay Loam	1.7	7.8

Application Information

	A
Application Date	3-26-99
Time of Day	8:00-9:00 am
Application Method	Broadcast
Application Timing	PRE
Air Temp (F)	45
Soil Temp (F)	42
Relative Humidity (%)	60
Wind Velocity (mph)	0-3

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
A: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20	30

Summary Comments

This was one of two studies conducted at CSU research centers in Fort Collins and Rocky Ford to evaluate PRE herbicides for weed control in onions. Off station experiments included only labeled products, while Experiment Station studies included Nortron, which is currently in residue trials through IR-4 for PRE and POST applications to onions. At Rocky Ford there were sufficient stands of pigweed and kochia to allow for weed control evaluations, but early weed pressure did not appear to reduce onion yields. Plots treated with Prowl or Dacthal had excellent weed control, while weed control with Nortron was only fair. Prefar did not provide adequate pigweed. Following weed control evaluations, all plots were kept weed free with a combination of POST herbicides and hand labor. For that reason there were no differences in stand count or onion yields.

Colorado State University

Pre-emergence Weed Control in Onions

Trial ID: ONI0029 Investigator: Dr. Scott Nissen
Location: R. Ford/ARDEC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Onion Jumbo No./acre	Onion Medium No./acre	Onion Small No./acre	Onion Jumbo Cwt/acre	Onion Medium Cwt/acre	Onion Small Cwt/acre	Onion Market Cwt/acre
	Weed Code											
	Crop Code											
	Rating Data Type											
	Rating Unit					No./acre	No./acre	No./acre	Cwt/acre	Cwt/acre	Cwt/acre	Cwt/acre
	Rating Date					9-22-99	9-22-99	9-22-99	9-22-99	9-22-99	9-22-99	9-22-99
	PRM Data Type					R. Ford	R. Ford	R. Ford	R. Ford	R. Ford	R. Ford	R. Ford
1	Untreated					50780 ab	45226 bc	17456 a	423.3 ab	216.9 c	35.0 a	640.3 a
2	Hand weeded					49987 ab	84105 a	11902 ab	391.8 ab	386.6 a	22.7 ab	778.4 a
3	Dacthal	10	LB A/A	PRE	A	54748 a	68236 abc	9521 ab	433.8 ab	309.6 abc	17.5 ab	743.4 a
4	Prefar	5.5	LB A/A	PRE	A	49987 ab	72997 abc	9521 ab	397.1 ab	355.1 ab	19.2 ab	752.2 a
5	Prefar	7	LB A/A	PRE	A	41259 ab	92833 a	5554 b	318.4 ab	423.3 a	12.2 b	741.7 a
6	Prowl	0.8	LB A/A	PRE	A	44433 ab	75377 ab	13488 ab	344.6 ab	349.8 abc	29.7 ab	694.4 a
7	Prowl	1.2	LB A/A	PRE	A	48400 ab	42846 c	6348 b	423.3 ab	218.7 bc	15.7 ab	642.0 a
8	Prowl	1.5	LB A/A	PRE	A	41259 ab	77758 a	15076 ab	330.6 ab	351.6 abc	29.7 ab	682.2 a
9	Prowl	2	LB A/A	PRE	A	46020 ab	62682 abc	5554 b	381.4 ab	320.1 abc	10.5 b	701.5 a
10	Nortron	0.33	LB A/A	PRE	A	39672 ab	76964 ab	7935 ab	325.4 ab	344.6 abc	14.0 b	670.0 a
11	Nortron	0.5	LB A/A	PRE	A	53954 a	77758 a	7141 b	451.3 a	353.3 abc	17.5 ab	804.6 a
12	Nortron	1	LB A/A	PRE	A	29357 b	88866 a	11108 ab	237.9 b	419.8 a	21.0 ab	657.7 a
13	Nortron	1.5	LB A/A	PRE	A	34912 ab	72997 abc	10315 ab	306.1 ab	320.1 abc	21.0 ab	626.2 a
LSD (P=.05)						24552.2	32408.0	9878.5	213.07	137.36	19.42	210.43
Standard Deviation						14568.9	19230.4	5861.8	126.43	81.51	11.52	124.87
CV						32.39	26.63	58.21	34.49	24.25	56.38	17.77

Means followed by same letter do not significantly differ (P=.05, LSD)

Post Emergence Weed Control with Nortron
Colorado State University - Weed Science

Project Code: ONIO079 Location: Rocky Ford-AVRC Cooperator: Colorado Onion Association

Site Description

Crop: Onion Variety: Bravo Planting Date: 3-21-99
Plot Width: 6.7 ft Plot Length: 30 ft Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	%Sand	%Silt	%Clay	pH	CEC
Silty Clay Loam	1.7				7.8	

Application Information

	A	B
Application Date	5-14	6-25
Time of Day	9:30 am	2:30
Application Method	Broadcast	Broadcast
Application Timing	POST-2 LEAF	2 LEAF + 3-4 WEEK
Air Temp (F)	73	94
Soil Temp (F)	60	
Relative Humidity (%)	22	20
Wind Velocity (mph/dir.)	0-5	0-5

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
A: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20/40	30/55
B: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20/40	30/55

Summary Comments

Nortron has selectivity of PRE and POST applications to onions and is currently in field residue studies to establish a residue tolerance for dry bulb onions. This study was initiated to evaluate weed control and crop tolerance for Nortron. Previous research has indicated that tank mixes of Nortron + Buctril provides good to excellent pigweed control. At this site the major weed species was kochia and not pigweed, so weed control was fair at best. Compared to the handweeded check, yields were not significantly different for any treatment. POST applications of Nortron at rates of 1.0 lb ai/ac did not significantly affect onion yields and tank mixes with Buctril or Goal had the highest yields.

Onion Tolerance
Colorado State University - Weed Science

Project Code: ONIO059 | Location: AVRC-Rocky Ford | Cooperator: BASF

Site Description

Crop: Onion | Variety: Bravo (Asgrow) | Planting Date: March 21, 1999
Plot Width: 6.7 ft | Plot Length: 30 ft | Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Silty Clay Loam	1.7	7.8

Application Information

	A
Application Date	5-13-99
Time of Day	8:30 am
Application Method	Broadcast
Application Timing	POST/LAYBY
Air Temp (F)	76
Soil Temp (F)	58
Relative Humidity (%)	28
Wind Velocity (mph/dir.)	0

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
A: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20	30

Summary Comments

This study was initiated to establish the level of crop safety for BAS 656, Frontier 6.0 and Dual Magnum on dry bulb onions. Rates are equivalent to 1X, maximum label rate, and 2X maximum label rate. This experiment was conducted under weed free conditions. Stand counts and onion yields were not significantly different for any treatment compared to untreated check.

Colorado State University

Onion Herbicide Tolerance to BAS 656 and Dual Magnum

Trial ID: ONIO059 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Onion Injury % 5-27-99	Onion Final Stand No./acre 9-28-99	Onion Jumbo Cwt/acre 9-28-99	Onion Medium Cwt/acre 9-28-99	Onion Small Cwt/acre 9-28-99	Onion Market Cwt/acre 9-28-99
1	Untreated					5.0 abc	66270 a	302.2 a	70.7 c	8.9 ab	372.9 a
2	BAS 656	0.64	LB A/A	2 LEAF	A	4.7 bc	70721 a	265.1 a	84.6 bc	13.8 ab	349.7 a
3	BAS 656	0.94	LB A/A	2 LEAF	A	3.7 c	66765 a	241.4 a	87.1 bc	10.4 ab	328.4 a
4	BAS 656	1.88	LB A/A	2 LEAF	A	8.3 ab	65281 a	326.9 a	62.8 c	6.9 ab	389.7 a
5	Frontier 6.0	1.17	LB A/A	2 LEAF	A	6.7 abc	61819 a	231.4 a	73.2 c	8.4 ab	304.6 a
6	Frontier 6.0	1.5	LB A/A	2 LEAF	A	6.0 abc	66765 a	277.4 a	62.8 c	12.4 ab	340.2 a
7	Frontier 6.0	3.0	LB A/A	2 LEAF	A	7.7 abc	70226 a	236.4 a	127.6 a	9.9 ab	364.0 a
8	Dual Magnum	1.0	LB A/A	2 LEAF	A	6.7 abc	72699 a	227.5 a	120.2 ab	13.8 ab	347.7 a
9	Dual Magnum	1.6	LB A/A	2 LEAF	A	4.3 bc	66270 a	236.4 a	92.5 abc	21.2 a	328.9 a
10	Dual Magnum	3.2	LB A/A	2 LEAF	A	9.3 a	71216 a	307.1 a	93.5 abc	5.0 b	400.6 a
LSD (P=.05)						4.51	14540.6	105.84	38.32	14.57	97.05
Standard Deviation						2.63	8476.2	61.70	22.34	8.49	56.57
CV						42.15	12.5	23.27	25.53	76.68	16.04

Means followed by same letter do not significantly differ (P=.05, LSD)

Onion Weed Control Using Fluroxypyr
Colorado State University - Weed Science

Project Code: ONIO069 | Location: Rocky Ford-AVRC | Cooperator: IR-4

Site Description

Crop: Onion | Variety: Bravo (Asgrow) | Planting Date: March 21, 1999
Plot Width: 6.7 ft | Plot Length: 30 ft | Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Silty Clay Loam	1.7	7.8

Application Information

	A	B
Application Date	5-14-99	6-25
Time of Day	9:30 am	1:30
Application Method	Broadcast	Broadcast
Application Timing	POST	POST
Air Temp (F)	73	93
Soil Temp (F)	60	
Relative Humidity (%)	22	20
Wind Velocity (mph/dir.)	0-5	0-5

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
A: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20/40	30/55
B: Backpack CO_2	3	Flat Fan	11002	20"	20"	6.7 ft	20/40	30/55

Summary Comments

This study as initiated to evaluate fluroxypyr (Starane, UAP) as a potential POST herbicide for kochia control in dry bulb onions. This project was funded through a competitive grant with IR-4 to develop a data-base on product performance and crop safety before significant resources are spent on field residue studies. Kochia control was good to excellent with all rates of fluroxypyr; however, onion injury was above acceptable levels for fluroxypyr rates of 0.5 lb ai/ac. Other tank mix combinations showed some crop response. Fluroxypyr applications at the 2-leaf stage were compared to 2-leaf followed by 6-leaf applications. There was very little crop response for 2-leaf applications. but applications at the 6-leaf stage resulted in leaf twisting that increased with increasing rate. This leaf malformation did not affect new growth or onion yield. Onion yields were not significantly different for any treatment. Plots were handweeded after weed control rating were taken on May 27th.

Colorado State University

Onion Weed Control Using Fluroxypyr

Trial ID: ONI0069 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Kochia Control % 5-27-99		Onion Injury % 5-27-99		Onion Final Stand No./acre 9-22-99	
1	Untreated					0.0	d	1.0	e	61720	abc
2	Hand weeded					100.0	a	0.7	e	52026	abc
3	Fluroxypyr	0.125	LB A/A	2 LEAF	A	93.3	a	4.3	de	66270	ab
4	Fluroxypyr	0.187	LB A/A	2 LEAF	A	91.7	a	2.7	e	53807	abc
5	Fluroxypyr	0.25	LB A/A	2 LEAF	A	93.3	a	8.3	a-e	56378	abc
6	Fluroxypyr	0.5	LB A/A	2 LEAF	A	100.0	a	17.3	a	51037	abc
7	Goal	0.15	LB A/A	2 LEAF	A	31.7	c	4.3	de	55389	abc
8	Buctril	0.2	LB A/A	2 LEAF	A	45.0	c	3.3	de	57368	abc
9	Goal	0.15	LB A/A	2 LEAF	A	61.7	b	5.0	cde	61325	abc
9	Buctril	0.2	LB A/A	2 LEAF	A						
10	Fluroxypyr	0.125	LB A/A	2 LEAF	A	91.7	a	5.0	cde	67655	ab
10	Goal	0.15	LB A/A	2 LEAF	A						
11	Fluroxypyr	0.25	LB A/A	2 LEAF	A	95.0	a	3.3	de	68446	a
11	Goal	0.15	LB A/A	2 LEAF	A						
12	Fluroxypyr	0.125	LB A/A	2 LEAF	A	88.3	a	6.7	b-e	62511	abc
12	Buctril	0.2	LB A/A	2 LEAF	A						
13	Fluroxypyr	0.25	LB A/A	2 LEAF	A	88.3	a	9.3	a-e	64489	abc
13	Buctril	0.2	LB A/A	2 LEAF	A						
14	Fluroxypyr	0.125	LB A/A	2 LEAF	A	90.0	a	14.3	abc	50247	bc
14	Goal	0.15	LB A/A	2 LEAF	A						
14	Buctril	0.2	LB A/A	2 LEAF	A						
15	Fluroxypyr	0.125	LB A/A	2 LEAF	A	86.7	a	12.7	a-d	47873	c
15	Dual Magnum	1.0	LB A/A	2 LEAF	A						
16	Fluroxypyr	0.25	LB A/A	2 LEAF	A	94.3	a	10.0	a-e	60533	abc
16	Dual Magnum	1.0	LB A/A	2 LEAF	A						
17	Fluroxypyr	0.125	LB A/A	2 LEAF	A	95.0	a	15.0	ab	56577	abc
17	Dual Magnum	1.0	LB A/A	2 LEAF	A						
17	Goal	0.15	LB A/A	2 LEAF	A						
17	Buctril	0.2	LB A/A	2 LEAF	A						
18	Fluroxypyr	0.125	LB A/A	2 LEAF	A					58357	abc
18	Fluroxypyr	0.125	LB A/A	6 LEAF	B						

Colorado State University

Onion Weed Control Using Fluroxypyr

Trial ID: ONIO069 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Kochia Control % 5-27-99	Onion Injury % 5-27-99	Onion Final Stand No./acre 9-22-99	
19	Fluroxypyr	0.187	LB A/A	2 LEAF	A			55390	abc
19	Fluroxypyr	0.187	LB A/A	6 LEAF	B				
20	Fluroxypyr	0.25	LB A/A	2 LEAF	A			51630	abc
20	Fluroxypyr	0.25	LB A/A	6 LEAF	B				
21	Fluroxypyr	0.5	LB A/A	2 LEAF	A			54005	abc
21	Fluroxypyr	0.5	LB A/A	6 LEAF	B				
LSD (P=.05)						14.12	9.70	17670.8	
Standard Deviation						8.47	5.82	10708.6	
CV						10.69	80.2	18.54	

Means followed by same letter do not significantly differ (P=.05, LSD)

Colorado State University

Onion Weed Control Using Fluroxypyr

Trial ID: ONI0069 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Onion Jumbo Cwt/acre 9-22-99		Onion Medium Cwt/acre 9-22-99		Onion Small Cwt/acre 9-22-99		Onion Market Cwt/acre 9-22-99	
	Weed Code												
	Crop Code												
	Part Rated												
	Rating Data Type												
	Rating Unit												
	Rating Date												
1	Untreated					171.8	a	171.8	bc	6.1	de	343.7	a
2	Hand weeded					131.7	a	147.4	c	6.5	de	279.1	a
3	Fluroxypyr	0.125	LB A/A	2 LEAF	A	188.9	a	168.3	bc	11.4	a-d	357.2	a
4	Fluroxypyr	0.187	LB A/A	2 LEAF	A	137.4	a	151.3	bc	7.4	cde	288.7	a
5	Fluroxypyr	0.25	LB A/A	2 LEAF	A	150.5	a	158.3	bc	4.8	de	308.8	a
6	Fluroxypyr	0.5	LB A/A	2 LEAF	A	174.5	a	131.7	c	3.0	e	306.2	a
7	Goal	0.15	LB A/A	2 LEAF	A	123.0	a	143.1	c	16.6	a	266.1	a
8	Buctril	0.2	LB A/A	2 LEAF	A	179.7	a	153.5	bc	6.1	de	333.2	a
9	Goal	0.15	LB A/A	2 LEAF	A	171.8	a	148.3	c	11.4	a-d	320.1	a
9	Buctril	0.2	LB A/A	2 LEAF	A								
10	Fluroxypyr	0.125	LB A/A	2 LEAF	A	115.1	a	244.2	a	9.6	a-e	359.4	a
10	Goal	0.15	LB A/A	2 LEAF	A								
11	Fluroxypyr	0.25	LB A/A	2 LEAF	A	153.5	a	219.8	ab	9.6	a-e	373.3	a
11	Goal	0.15	LB A/A	2 LEAF	A								
12	Fluroxypyr	0.125	LB A/A	2 LEAF	A	230.3	a	128.2	c	15.7	ab	358.5	a
12	Buctril	0.2	LB A/A	2 LEAF	A								
13	Fluroxypyr	0.25	LB A/A	2 LEAF	A	139.6	a	182.3	abc	14.0	abc	321.9	a
13	Buctril	0.2	LB A/A	2 LEAF	A								
14	Fluroxypyr	0.125	LB A/A	2 LEAF	A	153.5	a	133.5	c	7.0	cde	287.0	a
14	Goal	0.15	LB A/A	2 LEAF	A								
14	Buctril	0.2	LB A/A	2 LEAF	A								
15	Fluroxypyr	0.125	LB A/A	2 LEAF	A	149.2	a	116.0	c	5.2	de	265.2	a
15	Dual Magnum	1.0	LB A/A	2 LEAF	A								
16	Fluroxypyr	0.25	LB A/A	2 LEAF	A	203.2	a	157.9	bc	6.1	de	361.1	a
16	Dual Magnum	1.0	LB A/A	2 LEAF	A								
17	Fluroxypyr	0.125	LB A/A	2 LEAF	A	164.9	a	134.3	c	10.5	a-d	299.2	a
17	Dual Magnum	1.0	LB A/A	2 LEAF	A								
17	Goal	0.15	LB A/A	2 LEAF	A								
17	Buctril	0.2	LB A/A	2 LEAF	A								
18	Fluroxypyr	0.125	LB A/A	2 LEAF	A	160.9	a	158.8	bc	7.9	cde	319.7	a
18	Fluroxypyr	0.125	LB A/A	6 LEAF	B								

Colorado State University

Onion Weed Control Using Fluroxypyr

Trial ID: ONIO069 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Onion Jumbo Cwt/acre 9-22-99	Onion Medium Cwt/acre 9-22-99	Onion Small Cwt/acre 9-22-99	Onion Market Cwt/acre 9-22-99
	Weed Code								
	Crop Code					Onion	Onion	Onion	Onion
	Part Rated								
	Rating Data Type					Jumbo	Medium	Small	Market
	Rating Unit					Cwt/acre	Cwt/acre	Cwt/acre	Cwt/acre
	Rating Date					9-22-99	9-22-99	9-22-99	9-22-99
19	Fluroxypyr	0.187	LB A/A	2 LEAF	A	169.7 a	144.8 c	8.7 b-e	314.5 a
19	Fluroxypyr	0.187	LB A/A	6 LEAF	B				
20	Fluroxypyr	0.25	LB A/A	2 LEAF	A	126.5 a	150.9 bc	6.5 de	277.4 a
20	Fluroxypyr	0.25	LB A/A	6 LEAF	B				
21	Fluroxypyr	0.5	LB A/A	2 LEAF	A	132.6 a	159.6 bc	5.2 de	292.2 a
21	Fluroxypyr	0.5	LB A/A	6 LEAF	B				
LSD (P=.05)						137.11	70.00	7.22	147.54
Standard Deviation						83.09	42.42	4.37	89.41
CV						52.43	26.96	51.24	28.31

Means followed by same letter do not significantly differ (P=.05, LSD)

Colorado State University

Pre-emergence Weed Control in Onions

Trial ID: ONIO029 Investigator: Dr. Scott Nissen
Location: R. Ford/ARDEC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Pigweed Control % 6-18-99 ARDEC	Onion Injury % 6-18-99 ARDEC	Onion Stand No./acre 6-8-99 ARDEC	Kochia Control % 5-27-99 R. Ford	Pigweed Control % 5-27-99 R. Ford	Onion Injury % 5-27-99 R. Ford	Onion Stand No./Acre 6-11-99 R. Ford
1	Untreated					0.0 g	1.7 e	113256 b	0.0 e	0.0 g	6.0 a	68434.3 a
2	Hand weeded					100.0 a	2.3 de	105125 b	100.0 a	100.0 a	8.7 a	79344.0 a
3	Dacthal	10	LB A/A	PRE	A	78.3 cde	5.0 bcd	107448 b	93.3 a	87.3 a-d	6.0 a	85295.0 a
4	Prefar	5.5	LB A/A	PRE	A	46.7 f	2.3 de	139392 a	40.0 d	51.7 f	8.7 a	78352.7 a
5	Prefar	7	LB A/A	PRE	A	41.7 f	2.7 de	119645 ab	35.0 d	61.7 ef	7.3 a	77360.7 a
6	Prowl	0.8	LB A/A	PRE	A	70.0 de	2.3 de	123710 ab	91.7 a	83.3 bcd	7.0 a	81328.0 a
7	Prowl	1.2	LB A/A	PRE	A	83.3 b-e	6.0 bc	110352 b	98.3 a	92.3 abc	7.0 a	70418.0 a
8	Prowl	1.5	LB A/A	PRE	A	91.7 abc	4.3 b-e	115579 ab	98.3 a	98.3 a	7.7 a	81328.0 a
9	Prowl	2	LB A/A	PRE	A	96.0 ab	6.0 bc	130099 ab	100.0 a	97.7 ab	11.0 a	70418.0 a
10	Nortron	0.33	LB A/A	PRE	A	41.7 f	3.3 cde	126033 ab	45.0 cd	58.3 f	6.0 a	66450.7 a
11	Nortron	0.5	LB A/A	PRE	A	51.7 f	6.7 ab	127195 ab	60.0 bc	56.7 f	7.0 a	85295.0 a
12	Nortron	1	LB A/A	PRE	A	68.3 e	6.0 bc	126614 ab	61.7 b	78.3 cd	8.3 a	77360.7 a
13	Nortron	1.5	LB A/A	PRE	A	85.0 a-d	9.3 a	124872 ab	73.3 b	75.0 de	11.7 a	78352.7 a
LSD (P=.05)						16.10	3.04	26055.3	16.20	14.71	7.35	19255.20
Standard Deviation						9.56	1.80	15460.8	9.61	8.73	4.36	11425.73
CV						14.54	40.37	12.81	13.94	12.07	55.37	14.86

Means followed by same letter do not significantly differ (P=.05, LSD)

Colorado State University

Post-emergence Weed Control with Nortron

Trial ID: ONIO079 Investigator: Dr. Scott Nissen
Location: Rocky Ford-AVRC Study Dir.: Weed Science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Appl Code	Kochia Control % 5-27-99		Onion Injury % 5-27-99		Onion Total No./acre 9-22-99		Onion Jumbo Cwt/acre 9-22-99		Onion Medium Cwt/acre 9-22-99		Onion Small Cwt/acre 9-22-99		Onion Market Cwt/acre 9-22-99	
1	Untreated					0.0	d	6.7	a	51038	abc	171.0	ab	124.7	bc	7.9	abc	295.7	bc
2	Hand weeded					76.7	a	7.0	a	57764	ab	145.7	ab	162.2	ab	5.2	bc	307.9	abc
3	Nortron	0.25	LB A/A	2 LEAF	A	11.7	d	9.3	a	64094	ab	177.9	ab	148.3	ab	12.2	ab	326.2	abc
3	Nortron	0.25	LB A/A	+3-4WK	B														
4	Nortron	0.5	LB A/A	2 LEAF	A	41.7	c	15.0	a	46290	bc	78.5	b	137.8	bc	7.9	abc	216.3	c
4	Nortron	0.5	LB A/A	+3-4WK	B														
5	Nortron	1.0	LB A/A	2 LEAF	A	45.0	bc	11.0	a	60137	ab	113.4	b	175.3	ab	8.7	abc	288.7	bc
5	Nortron	1.0	LB A/A	+3-4WK	B														
6	Buctril	0.2	LB A/A	2 LEAF	A	73.3	ab	10.0	a	55785	abc	133.5	ab	148.3	ab	9.6	abc	281.7	bc
6	Goal	0.15	LB A/A	2 LEAF	A														
6	Buctril	0.2	LB A/A	+3-4WK	B														
6	Goal	0.15	LB A/A	+3-4WK	B														
7	Buctril	0.2	LB A/A	2 LEAF	A	83.3	a	15.6	a	33728	c	144.8	ab	63.5	c	4.2	bc	208.2	c
7	Nortron	0.25	LB A/A	2 LEAF	A														
7	Buctril	0.2	LB A/A	+3-4WK	B														
7	Nortron	0.25	LB A/A	+3-4WK	B														
8	Buctril	0.2	LB A/A	2 LEAF	A	68.3	abc	9.3	a	72402	a	187.5	ab	182.3	ab	14.0	a	369.9	ab
8	Nortron	0.5	LB A/A	2 LEAF	A														
8	Buctril	0.2	LB A/A	+3-4WK	B														
8	Nortron	0.5	LB A/A	+3-4WK	B														
9	Buctril	0.2	LB A/A	2 LEAF	A	76.7	a	8.3	a	72402	a	189.3	ab	219.8	a	2.6	c	409.1	ab
9	Nortron	1.0	LB A/A	2 LEAF	A														
9	Buctril	0.2	LB A/A	+3-4WK	B														
9	Nortron	1.0	LB A/A	+3-4WK	B														
10	Goal	0.15	LB A/A	2 LEAF	A	56.7	abc	6.7	a	73589	a	256.4	a	184.9	ab	4.4	bc	441.3	a
10	Nortron	0.5	LB A/A	2 LEAF	A														
10	Goal	0.15	LB A/A	+3-4WK	B														
10	Nortron	0.5	LB A/A	+3-4WK	B														
11	Buctril	0.2	LB A/A	2 LEAF	A	70.0	abc	16.7	a	51433	abc	157.0	ab	129.9	bc	7.8	abc	286.9	bc
11	Nortron	0.5	LB A/A	2 LEAF	A														
11	Dual Magnum	1.34	LB A/A	2 LEAF	A														
11	Buctril	0.2	LB A/A	+3-4WK	B														
11	Nortron	0.5	LB A/A	+3-4WK	B														
11	Dual Magnum	1.34	LB A/A	+3-4WK	B														
LSD (P=.05)						28.69		10.97		24026.7		127.66		78.86		8.50		141.81	
Standard Deviation						16.79		6.42		14059.5		74.70		46.15		4.98		82.98	
CV						30.61		61.1		24.22		46.82		30.27		64.73		26.6	

Means followed by same letter do not significantly differ (P=.05, LSD)

Control of Lepidopterous Larvae on Cabbage - 1999
Arkansas Valley Research Center
Rocky Ford, Colorado

This was again an above average year for precipitation with 6.75" of rain falling in July, the month prior to planting the cabbage and 2.79" in August. This is substantially above average. In addition, the first hard freeze occurred on September 25th at 25°F. prior to head formation. However, the plants continued to grow and small heads were forming by the last count on October 15th.

Methods and Materials-Supporting information relating to the test plots is given on page 2.

Plots were two rows wide, 43.56' long and treatments were replicated four times in randomized complete blocks.

Insecticides were applied with a compressed air sprayer mounted on bicycle wheels at 27 p.s.i. using TX12 nozzles at about 25 g.p.a. Treatments were applied September 10. Activator 90 (.125 v/v) was added to all insecticides.

Results and Discussion-The imported cabbage worm, *pieris rapae* L. was the only pest that occurred in significant numbers. They made up >95% of the pest population.

The percentage of infested heads was determined for each treatment and it was apparent the untreated plots had a high percentage of infested heads by the last count date. The first two weeks all treatments provided substantial control. Asana, Capture and Warrior T provided the best control throughout the test. Spintor and Proclaim also provided fairly good control. The treatments were not repeated in this test so we do not know the effect of multiple applications.

Frank C. Schweissing

Test Plot Information - 1999
Arkansas Valley Research Center

Purpose - To evaluate the effectiveness of selected insecticides for the control of lepidopterous larvae on cabbage.

Data - 1. Species
2. Infested plants

Plots - 43.56' long X 2 rows (5') wide = 217.8 sq. Ft. = 1/200th acre

Design - Randomized complete block (4 replications)

Variety - "Golden Acre" - *Brassica oleracea* - cabbage

Fertilizer - 50 lbs P_2O_5 + 10 lbs. N as 11-52-00 + 50 lbs. N as NH_3 chisel - preplant/acre

Herbicide - Treflan .75 lbs. AI/Acre - 8/11/99

Soil - Silty clay loam, 1 - 1.5% o.m., pH-ca. 7.8

Plant - August 11, 1999

Irrigate - 8/12, 8/17, 9/2, 9/21, 10/14

Treated - September 10, 1999. Compressed air bicycle sprayer - 27 p.s.i.
25 g.p.a. - TX12 cone nozzle

Table 1.-Control of lepidopterous larvae* on cabbage. Infested plants. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 1999.

Treatment[1]		AI[2]	Infested Plants (%)[3]				
			9/17	9/25	10/2	10/9	10/15
Asana	.66	.05	0	0	0	0	0
Capture	2	.04	5	0	0	0	0
Warrior T	1	.03	0	0	0	0	10
Spintor	2SC	.094	0	0	5	10	5
Proclaim	5SG	.015	0	0	10	0	15
Avaunt	30WG	.065	0	7	25	0	20
Alert	2SC	.10	0	7	20	0	30
Avaunt	30WG	.045	0	0	35	30	35
Confirm	2F	.12	0	13	30	30	35
Untreated			15	33	55	50	75

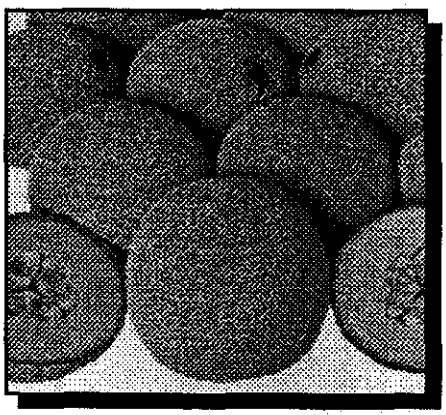
1 - Treated - September 10, 1999 - + Activator 90 .125 v/v

2 - Actual insecticide in pounds per acre

3 - Five plants examined per plot, 4 replications per treatment

* - The Imported Cabbage Worm, *Pieris rapae* L., constituted >95% of the population. A few Diamondback Moth, *Plutella xylostella* (L.) were found at the last count. Cabbage Looper, *Trichoplusia ni* (Hubner), were not detected.

Early Cantaloupe Trials



Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Fresh-market cantaloupe is a profitable commodity for local road-side stands and other direct-markets. Unfortunately, the marketing period is mainly limited to August and early September.

This study was conducted to determine how early cantaloupes can be produced in the Arkansas Valley using various combinations of plastic mulches and row covers.

The production window was greatly accelerated over the traditional marketing period by plasticulture techniques. A combination of clear plastic mulch, clear plastic row covers and a transplanted early variety provided the earliest harvest with the first fruit being picked on June 30.

Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 45 inches wide and 60 inches between centers, were shaped in early April. Drip lines were placed 1-2 inches from the center of the bed at a depth of 3 inches The test area was then sprayed with a combination of *Prefar* (Gowan Chemical) and *Alanap* (Uniroyal Chemical) for weed control. The beds were covered with clear embossed plastic mulch (Mechanical Transplanter) on April 20th using a one-bed mulch layer.

A fresh-market variety, *Earligold* (Hollar Seeds), and a western shipping type, *Impac* (Asgrow) were used in these trials. Cantaloupe seeds or four-week-old transplants were set through holes in the plastic mulch in a single row down the center of the bed at an in-row spacing of 18 inches. Each plot was one bed wide (5 feet) and 17 feet long and was replicated three times in the *"Earligold"* trial and four times in the *"Impac"* trial.

The following production methods were evaluated using the variety ***Earligold:***

1. Transplanted April 26 into clear mulch and covered with slitted plastic.
2. Seeded April 21 into clear mulch and covered with slitted plastic.
3. Transplanted April 26 into clear mulch and covered with perforated plastic.
4. Seeded April 21 into clear mulch and covered with perforated plastic.
5. Transplanted into clear mulch May 10.
6. Seeded into clear mulch April 21.
7. Seeded into clear mulch May 3.
8. Seeded into clear mulch May 10.

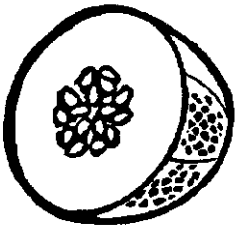
The following methods were evaluated using the variety ***Impac:***

1. Seeded April 21 into clear mulch.
2. Transplanted into clear mulch May 10.
3. Transplanted April 27 into clear mulch and covered with perforated plastic.

All row covers were suspended by wire hoops spaced 3-4 feet apart and were made of clear polyethylene plastic. One row cover was perforated (Mechanical Transplanter) and the other was slitted (Ken-Bar Inc.) for ventilation. Large slits were cut into the tops of the row covers for ventilation on May 21st and the row covers were completely removed off the transplanted and seeded treatments on May 24th and June 7th , respectively.

Beside the pre-plant of application herbicide, weeds were controlled via cultivation and hand weeding. A single application of *Sevin* (Rhone-Poulenc) was used to control cucumber beetles. The crop was irrigated via drip lines.

Cantaloupe were harvested at full slip every 1 to 2 days. Marketable melons were weighed and counted at each harvest. Melons were considered marketable if they weighed over 2 lbs. and were free of any physical defects.



Yield and earliness of *Earligold* (Hollar Seeds) cantaloupe grown with different plasticulture combinations.

Seeding or Transplanting Date	Row Cover	First Harvest	Ave. Fruit Size (lbs)	Fruit per acre	Market. Yield (lbs/acre)
Transplanted April 26	slitted	July 3	2.95	16,226	47,943
Seeded April 21	slitted	July 15	2.75	15,884	43,827
Transplanted April 26	perforated	June 30	2.78	15,030	41,931
Seeded April 21	perforated	July 15	2.69	15,542	41,794
Transplanted May 10	none	July 7	3.49	11,102	38,771
Seeded April 21	none	July 19	3.37	7,686	26,012
Seeded May 3	none	July 20	3.48	9,394	32,776
Seeded May 10	none	July 25	3.38	8,710	29,480
LSD (0.05)=			0.19	2,629	9,711

Yield and earliness of *Impac (Asgrow)* cantaloupe grown with different plasticulture combinations.

Seeding or Transplanting Date	Row Cover	First Harvest	Ave. Fruit Size (lbs)	Fruit per acre	Market. Yield (lbs/acre)
Seeded April 21	none	July 30	4.38	6,533	29,313
Transplanted May 10	none	July 22	4.88	9,736	47,570
Transplanted April 27	perforated	July 13	4.52	9,480	42,483
LSD (0.05)=			0.19	2,629	9,711

Budget Considerations:

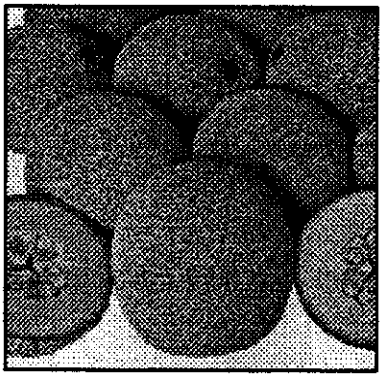
A. Annual

Item	Estimated Cost Per Acre
Plastic Mulch (based on 60" centers)	$ 150
Drip Tape (single year use)	$ 75
Plastic Row Cover (not including wire hoops)	$ 200
Cantaloupe Transplants (not including seed)	$ 200
Labor (transplanting, mulch removal, etc.)	$200 - 300

B. Re-useable

Item	Estimated Cost
Plastic Mulch Layer (one-bed) with drip-tape applicator	$ 2,000 - 3,000
Row cover attachment for mulch layer	$ 700 - 1,000
Wire hoop supports for row covers (can be used several years)	$300 - 400 per acre
Transplanter / Plastic Mulch Seeder	$ 2,000 - 3,000
Other items (pumps, filters, main lines)	varies according to size

Early Harvest PGR Trial



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This study was conducted to determine the effectiveness of *Early Harvest PGR* (Griffin L.L.C.) on the total yield, fruit size, and earliness of western-shipping type cantaloupe. The efficacy of applying three or multiple sprays of *Early Harvest PGR* was compared to an unsprayed control. In 1999, total marketable yield was not significantly (P=0.05) affected by any *Early Harvest* treatment. Although not significant at the 5% level, there was a strong trend showing that Early Harvest did enhance crop maturity. The yield of melons harvested before August 5th was higher in treatments receiving *Early Harvest* compared to the unsprayed control. The effect was most prominent in the treatment receiving multiple applications.

Materials and Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 45 inches wide and 60 inches between centers, were shaped in early April. Drip lines were placed 1-2 inches from the center of the bed at a depth of 3 inches. The beds were covered with black embossed plastic mulch (Mechanical Transplanter) on April 20th using a one-bed mulch layer.

A western-shipping type variety, *Gold Rush* (Harris Moran Seeds) was used in these trials. Cantaloupe seeds were set through holes in the plastic mulch in a single row down the center of the bed at an in-row spacing of 12 inches on May 5th . Two or three seeds were placed in each hole and seedlings were later thinned to one plant per hole. Each plot was one bed wide (5 feet) and 20 feet long and was replicated four times.

The melons were irrigated by drip lines as needed. Besides hand-weeding between the mulched beds, the plots required a single application of Sevin (carbaryl) to control cucumber beetles.

Cantaloupe were harvested at full slip every 1 to 2 days starting on July 27th. Marketable melons were individually weighed and counted at each harvest. Melons were considered marketable if they weighed over 2 lbs. and were free of any physical defects.

The following three foliar treatments were evaluated:

1. Unsprayed Control
2. Three applications: 3-leaf stage, first bloom, first bloom + 14 days.
3. Multiple applications, 3-leaf stage, first bloom, first bloom + 14 days, first bloom + 28 days.

Application times were on the following dates:

3-leaf stage: June 14th
first bloom: June 21st
first bloom + 14 days: July 5th
first bloom + 28 days: July 19th

All applications of *Early Harvest* were applied at a rate of 3.2 fl oz per acre in 30 gal per acre water. The solutions were applied with a 2-gallon hand-held garden sprayer. Careful attention was given to uniform and thorough wetting of leaf surfaces

Yield, melon size distribution, and earliness of *Gold Rush* cantaloupe treated with different applications of Early Harvest PGR.

Treatment	Cantaloupe Size[1] Marketable lbs acre			Marketable Early Yield[2] (lbs/acre)	Total Marketable Yield[3] (lbs/acre)
	15's	12's	9's		
Control	8,766	15,365	19,830	14,864	43,962
Three applications	12,262	14,690	14,124	17,609	41,077
Multiple applications	8,439	16,988	21,496	21,170	46,925
LSD (0.05)=	6,686	4,444	11,397	12,783	12,699

1. Cantaloupe Size is based on the number of melons that can be packed into a conventional shipping carton and is correlated to melon weight.

9's = 4.0 - 5.0 lbs
12's = 3.2 - 4.0 lbs
15's = 2.4 - 3.2 lbs
18's = 1.9 - 2.4 lbs

2. Marketable early yield is defined as those melons that were harvested from July 27th to August 5th.

3. Total marketable yields include all melons ranging in size from 18's to 9's.

Carrot Hail Damage Trial

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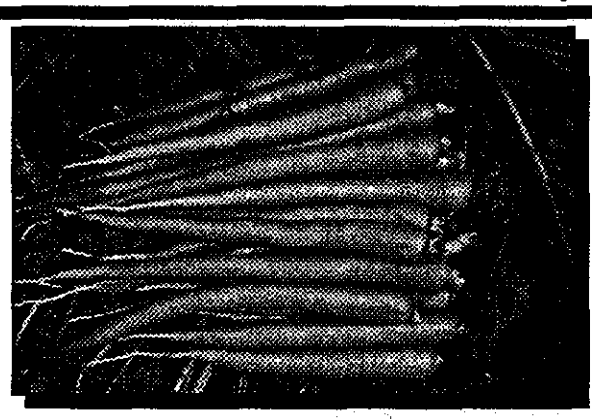


Severe storms with high winds, hail, and rain are common in Colorado. Crops like carrot (*Daucus carota* L.) leaf tissues are often injured by these weather conditions. Our study was conducted to determine the yield response of carrot to simulated storm damage during different periods of plant development. We removed 33% and 67% of the carrot foliage at four dates, spaced 10 days apart, during the middle of the growing season. In 1999, 67% defoliation reduced both total and marketable yields more than did 33% defoliation when the injury occurred at later stages of development. There was not a significant difference in yield between the levels when injury occurred early in the season. Yield components, length and diameter, were similarly affected. Carrot foliage continued to grow after all defoliation events, particularly when it occurred early in the season. Thus, given enough time, carrots may recover from the damaging effects of defoliation. Nonetheless, in this study, both moderate (33%) and severe (67%) foliage loss reduced marketable yield and yield components of carrots when they were harvested at normal times.

Methods

This study was conducted in a field trial in 1999 at the Arkansas Valley Research Center, Rocky Ford, Colorado. Experimental plots consisted of three beds 25 ft. long spaced 44 in. apart. Each bed had six lines of carrots with three lines on each shoulder of the bed. Plots were randomized within each of four blocks. The experimental site was prepared according to standard production practices for the area. Seeds of *Caropak* (Asgrow Seeds) were sown on March 23, 1999. Seeds were sown at a rate of 1 million live seed per acre. Weeds were controlled by pre-plant herbicides and cultivation; no other pest controls were needed. The crops were irrigated as needed via gravity-flow furrows spaced 44 in. apart.

The defoliation treatments were initiated on June 15, 1999. Carrot leaves were damaged using a gasoline-powered weed trimmer. Two levels of damage were inflicted, a 33% (moderate) and a 67% (severe) defoliation. The entire process was repeated on other plots 10 (June 25), 20 (July 5), and 30 (July 15) days later. The tops and roots of the carrots were harvested on August 23, respectively. Tops were

measured for total fresh weight. Any carrot roots that were severely forked, diseased, or had a diameter less than 0.5 in. were considered culls. In each plot, the length and diameter (at the shoulder) of . five randomly selected carrot roots were measured and recorded

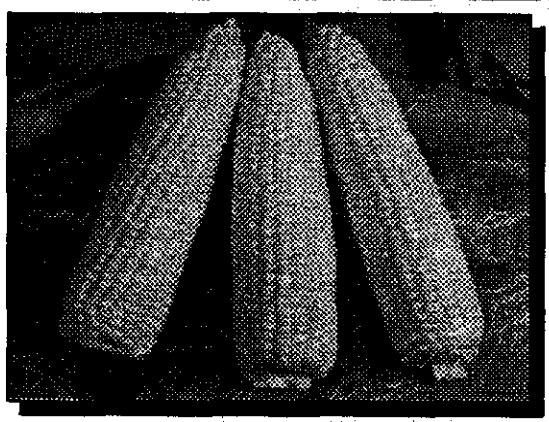
Stages of carrot development at different defoliation dates. Carrot (var. Caropak) were planted on March 23, 1999.

Date	Stage of Development
1. June 15	Carrot root length is 12-14 cm. Carrot foliage has 4 emerged leaves with the 5th leaf starting to emerge. Leaf area is approximately 116 cm^2.
2. June 25	Carrot root length is 16-20 cm. Largest carrot leaves have a length of 28-32 cm. Leaf area is approximately 281 cm^2.
3. July 5	Carrot root length is 17-22 cm. Root diameter is 70-100 mm. Largest carrot leaves have a length of 30-35 cm. Leaf area is approximately 322 cm^2.
4. July 15	Carrot root length is 19-24 cm. Root diameter is 150-180 mm. Largest carrot leaves have a length of 33-38 cm. Leaf area is approximately 516 cm^2

Effect of defoliation on carrot (var. Caropak) yield and yield components in 1999. Defoliation occurred at four different intervals during development.

Date of Defoliation	Defoliation (%)	Top Fresh Weight (lbs/acre)	Root Length (cm)	Root Diameter (cm)	Total Yield (lbs/acre)	Culls %	Marketable Yield (lbs/acre)
Control	0	19,936	20.75	2.49	62,370	5.0	59,251
1. June 12	33	15,481	19.90	2.22	47,223	9.2	42,990
	67	17,931	19.05	2.06	48,448	10.8	43,324
2. June 22	33	18,376	20.55	2.24	54,573	8.1	50,118
	67	18,265	18.35	1.94	44,438	17.0	37,087
3. July 2	33	19,267	19.45	2.24	60,253	7.4	55,798
	67	15,815	17.80	1.94	41,097	18.1	33,969
4. July 12	33	14,478	18.95	2.17	43,324	10.7	38,758
	67	13,030	18.45	1.98	41,542	12.4	36,753
LSD (0.05) =		4,650	2.05	0.22	11,258	6.1	11,658

Sweet Corn Variety Trials



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Five sugary enhanced/ sweet breed (se X $sush_2$) and seven supersweet sweet corn varieties were evaluated in field trials at the Arkansas Valley Research Center in Rocky Ford.

Methods

The sugary enhanced or sweet breed sweet corn varieties were sown on April 16th into conventional 30 inch rows. Plots were 25 feet long and four rows (10 feet) wide. The supersweet varieties were planted on May 24th .

Irrigation, via furrows, occurred as needed during the course of the trial . Post-emergence weeds were controlled by cultivation. No other pest controls were used including spraying for corn earworm.

Sweet corn was harvested when the kernel texture was firm. Maturity date, ear length, ear height, and plant height were recorded.

Growth characteristics and maturity of different sugary enhanced (se)or Sweet Breed (se X $sush_2$) corn varieties planted April 16th .

Variety	Source	Color	Type	Harvest Date	Plant Height	Ear Height	Ear Length
King Arthur	Stokes	Yellow	SE	July 14	61"	14"	7.1"
Sweet Chorus	Harris Moran	Bi-Color	Sweet Breed	July 10	63"	14"	7.5"
Daybreak	Seneca/Robson	Yellow	SE	July 12	48"	10"	6.7"
Sweet Rhythm	Harris Moran	Bi-Color	Sweet Breed	July 11	60"	16"	7.5"
Temptation	Asgrow	Bi-Color	SE	July 12	63"	16"	7.0"

Comments: The most outstanding variety in the trial was *Sweet Chorus*. *Sweet Chorus* had excellent ear quality and size and was the earliest corn in the trial. The spring of 1999 was slightly cooler than average. Under typical spring conditions, however, *Sweet Chorus* would likely mature by July 4th. Although there was not a lot of earworm pressure in 1999, *Sweet Chorus*, with its tight husk, was less predisposed to earworm infestation than the other varieties. *Temptation* and *Sweet Rhythm* were also very good varieties with similar attributes to *Sweet Chorus*.

Note: Ear Height was measured from the ground to the base of the ear shank

Growth characteristics and maturity of different supersweet corn varieties planted May 24th.

Variety	Source	Color	Type	Harvest Date	Plant Height	Ear Height	Ear Length
Bi-Time	Rogers	Bi-Color	Super Sweet	August 8	71"	23"	8.3"
Bandit	Harris Moran	Yellow	Super Sweet	August 7	79"	24"	7.8"
Attribute GSS 0966 *	Rogers	Yellow	Super Sweet	August 8	77"	23"	8.5"
Krispy King	Rogers	Yellow	Super Sweet	August 8	66"	19"	8.0"
Silver King	Harris Moran	White	Super Sweet	August 8	81"	22"	9.0"
Primetime	Rogers	Yellow	Super Sweet	August 9	71"	21"	8.0"
Ice Queen	Harris Moran	White	Super Sweet	August 8	67"	18"	8.5"

Note: Ear Height was measure from the ground to the base of the ear shank

* Attribute GSS 0966 is a genetically modified corn with resistance to corn earworm.

Comments: All varieties in the test were good performers with particularly nice ear quality. Primetime and Bi-time had notably good yield and quality. However, the most outstanding variety was clearly *Attribute* 0966. In addition to its earworm resistance, *Attribute* 0966 had an excellent shape, fill, color, and flavor. Overall, maturity was not that much different between varieties.

Pepper Variety Trials

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Colorado State University

Each year, several new pepper varieties are introduced into the market. Most new varieties are hybrids. These not only have excellent yield and quality traits but also are resistant to various diseases. Few new varieties, however, have been evaluated under Colorado growing conditions.

These studies were conducted to evaluate jalapeno, chile, bell, and speciality pepper varieties under local conditions. One trial was grown with black plastic mulch and drip irrigation and the second with conventional production techniques.

Methods

1. Plastic Mulch Trial: Forty-five pepper varieties were transplanted through black plastic mulch (Mechanical Transplanter) on May 16th. Mulched beds were on 60 inch centers and had a covered surface of 32 inches A double row of peppers, spaced 18 inches apart, was transplanted on each bed. The in-row distance between the peppers was 12 inches.

The crop was irrigated via drip lines placed three inches below the soil surface and down the center of the bed. Weeds between the mulched beds were controlled with cultivation and hand weeding. No other pest controls were needed.

Variety descriptions, sources, maturity information, and overall quality evaluations are found in **Table 1.**

2. Conventional Trial: In early April, beds were formed on a Rocky Ford silty clay loam soil. On May 7th and 8th, peppers were direct-seeded into 30 inch rows with a Stanhey precision planter or Earthway hand planter. The peppers were later thinned to a spacing of approximately 8 inches. Weeds were controlled by a cultivation, and hoeing. No other pest controls were needed. Irrigation was by gravity-flow furrows. Irrigation water was applied to every-other furrow (every 60 inches) to reduce the incidence of *Phytophthora* Wilt.

Overall quality assessments, sources, and variety descriptions are found in **Table 2.** Please contact the Arkansas Valley Research Center (719-254-6312) for more specific information.

Table 1: *Pepper varieties in the 1999 trial. Peppers were transplanted through black plastic mulch on May 16th and drip-irrigated.*

Variety	Source	Quality Score *	First Harvest	Description
Pretty in Purple	Johnny's	6	7-24	Ornamental bushy type with small round fruit
Super Chili	Total. Tomato	7	7-20	Ornamental with small yellow fruit
Numex Twilight	Johnny's	7	7-25	Ornamental, Multi-colored as plant matures
Prairie Fire	Hollar	8	7-20	Ornament with compact habit. Excellent
Red Habanero	Johnny's	5	8-31	Specialty, very hot and late maturing
Habanero	Burrell	6	8-31	Specialty, very hot and late maturing
Banana Supreme	Petoseeds	8	7-18	Hybrid sweet banana type. Excellent yield
Hot Spot	Petoseeds	8	7-18	Hybrid hot banana type. Excellent yield
Volcano	Harris Moran	8	7-18	Hybrid yellow banana type. Very good overall.
Mitla	Petoseeds	7	7-21	Hybrid jalapeno. Very productive. Medium size.
Picante	Harris Moran	6	7-23	Hybrid jalapeno. Good yield smaller size.
Hot Dog	Petoseeds	7	7-22	Hybrid jalapeno with very elongated shape,
Ole	Harris Moran	6	7-25	Hybrid jalapeno. Good yield and fruit size.
Grande	Petoseeds	8	7-20	Hybrid jalapeno. Very large fruit and productive.
Cherry Bomb	Petoseeds	8	7-20	Hybrid cherry pepper. Excellent yield and quality.
Mesilla	Petoseeds	7	7-23	Hybrid cayenne type. Elongated fruit & high yields
Rio Verde	Ferry Morse	6	8-15	Hybrid serrano type. Good yield, late maturing
CSU - 002	CSU	6	7-20	Short mira sol type. Low heat and compact habit.
Taurus	Rogers	7	7-24	Productive O.P. Bell pepper. Good yield and size.
P19-Y	Harris Moran	6	7-22	Hybrid green to yellow elongated bell.
Klondike Bell	Stokes	6	7-20	Hybrid green to yellow bell.
Enterprise	Asgrow	7	7-22	Hybrid green to red bell.
King Arthur	Petoseeds	9	7-19	Hybrid green to red bell. The best overall bell.
Canary	Stokes	6	7-22	Hybrid green to yellow bell.
Merlin	Petoseeds	9	7-23	Hybrid bell. Excellent yield and quality. Nice shape
Capistrano	Harris Moran	7	7-23	Open-pollinated blocky bell. Very good quality.
Sentry	Rogers	7	7-20	Hybrid green to red blocky bell. Good overall
Honeybelle	Harris Moran	6	7-24	Green to yellow hybrid bell. Elongated shape.
Camelot	Petoseeds	7	7-18	Hybrid green to red blocky bell. Excellent overall.
Figaro	Vilmorin	8	7-20	Semi-elongated hybrid bell. Very good yields.
Consul	Harris Moran	7	7-20	Hybrid green to red blocky bell. Good overall.
Bonita	Ferry-Morse	8	7-23	Hybrid green to red blocky bell. Excellent overall
Presidente	Harris Moran	7	7-22	Hybrid green to red elongated bell. Good overall.
Karma	Harris Moran	8	7-18	Hybrid green to red blocky bell. Very good overall
Aladdin XR3	Petoseeds	7	7-23	Green to yellow hybrid bell. Nice shape and yield.
FMX 1170	Harris Moran	7	7-20	Hybrid green to red blocky bell. Good overall
Viceroy	Harris Moran	7	7-22	Hybrid green to red elongated bell. Good overall
Commandant	Rogers	7	7-23	Hybrid green to red blocky bell. Good yield,

Camelot XR3	Petoseeds	7	7-21	Hybrid green to red. Not as good as reg. Camelot
Paladin	Rogers	7	7-21	Hybrid bell pepper. Phytophthora tolerant
Acapulco	Vilmorin	7	7-24	Semi-elongated hybrid bell. Very good yields.
Lilac	Stokes	6	7-24	Purplish colored fruit. Specialty bell.
Sofia	Stokes	6	7-16	Hybrid Italian type pepper. Elongated and mild.
Marconi	Total. Tomato	6	7-19	Productive Italian frying type. Good yields.
Mexican Imp	CSU	5	7-16	Original mira sol type stock seed.

* Quality Score: (2-3) poor, (4-5) average, (6-7) good, (8-9) excellent

Recommendations: Bells- *King Arthur, Paladin, Bonita, Merlin, Camelot*
Jalapenos: *Grande, Mitla, Hot Dog*
Speciality- *Praire Fire, Twilight, Banana Supreme, Hot Spot, Cherry Bomb*

Table 2: *Pepper varieties in the 1999 trial. Peppers were direct-seeded May 7th and 8th .*

JALAPENOS	ANAHEIM LONG CHILE	BELLS	MIRA SOLS	SPECIALITY
Ole*	Sonora	Emerald Giant	Mira Sol (Burrell)	Santa Fe Grande
Tula*	Joe Parker	Enterprise*	CSU -019	Cherry Bomb*
Sweet Jalapeno*	Big Jim	Karma*	CSU -020	Banana Supreme*
Delicias*	Curry Original	Taurus	CSU-024	Hot Spot*
Hot Dog*	XX Hot	Bonita*	CSU-025	Messilla*
Grande*	Alpha		CSU-026	
PS 2296*	Arizona 20		CSU-027	
Picante*	Navojoa*		CSU-028	
Early Jalapeno			CSU-029	

* HYBRIDS, All others are open-pollinated.

There were several outstanding jalapenos in the seeded trial. **Sweet Jalapeno, Tula,** and **Ole** were extremely productive anf fruit size was large. **Hot Dog** was an elongated jalapeno especially designed for processing with very high yields.

The best anaheim type was **Navojoa.** It is excellent direct-seeded but due to the high cost, impractical to seed. **Sonora** was the best open-pollinated variety. It sets many large pods but is very mild and a little thin walled.

Banana Supreme, Hot Spot, and **Cherry Bomb** were outstanding speciality peppers for processing.

The "CSU" numbered varieties are experimental lines of mira sols. Most are in the early stages of development. Please contact the Research Center for more specific information.

Chile Variety Trials

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Colorado State University

Many of the same chile varieties have been grown in the Arkansas Valley for years. Although these varieties have been historically productive, some are susceptible to disease and at times, produce fruit that lack uniformity. These trials, therefore, were conducted to examine the yield and crop characteristics of several common and new chile varieties.

In the first trial, different selections of the Mira Sol (Pueblo) chile pepper were compared. The new Mira Sol selections were originally derived from a single plant grown from stock obtained from a grower in Pueblo County. The plant was selected on the basis of its uniform fruit and productivity.

In terms of yield, the new selections were comparable if not slightly better than a standard Mira Sol type. In addition, the fruit were more uniform in shape. The newer selections had fruit that were slightly larger and more uniformly tapered than fruit from the conventional Mira Sol type.

In the second trial, eight commercially available anaheim-type peppers were examined. Yield, fruit size, and pungency were noted.

The hybrid variety *Navojoa* (Petoseeds) and open-pollinated variety *Sonora* (Petoseeds) were extremely productive and uniform. However, *Sonora* was the mildest chile in the test.

Methods

The trials were conducted at Colorado State University's Arkansas Valley Research Center in Rocky Ford, For both trials, experimental plots consisted of four rows 20 feet long spaced 30 inches apart. Plots were randomized within each of three blocks. In early April, 30 inch beds were formed on a silty clay loam soil. On May 8th 1999, the peppers were direct-seeded with an Earthway hand planter. The peppers were later thinned to a uniform spacing of approximately 9 inches. Weeds were controlled by mechanical cultivation, and hoeing. No other pest controls were needed. Irrigation was by gravity-flow furrows with water being applied to every-other furrow.

Marketable yield and fruit characteristics of Mira Sol peppers types. The peppers were harvested beginning September 2.

Variety	Source	Fruit Shape	Pungency *	Marketable Yield lbs/acre - (bu/acre)
019	CSU	Tapered to a point	6	19,573 (783)
020	CSU	Tapered to a point	6	17,758 (710)
Mira Sol	Burrell	Mixed pointed and rounded ends	6	17,090 (683)
LSD (0.05) =				2,437 (97)

Marketable yield and fruit characteristics of Anaheim-type pepper. The peppers were harvested beginning September 10.

Variety	Source	Pungency *	Plant Height (in)	Fruit Dimensions length X width (in)	Marketable Yield lbs/acre - (bu/acre)
Navojoa	Petoseeds	4	29	9.8 X 1.9	45,360 (1890)
Sonora	Petoseeds	3	34	9.8 X 2.1	35,515 (1479)
Curry Original	Rocky Mt	5	30	8.4 X 1.8	30,201 (1258)
Joe Parker	Burrell	5	32	8.2 X 2.1	27,588 (1149)
Arizona 20	Rocky Mt	5	34	8.2 X 2.0	26,426 (1101)
Alpha	Rocky Mt	5	32	8.4 X 1.9	25,874 (1078)
XX Hot	Rocky Mt	9	38	6.4 X 1.6	20,676 (861)
Big Jim	Burrell	5	34	7.7 X 2.0	17,307 (721)
LSD (0.05) =					5,916 (246)

* Pungency based of a relative scale of 1 (mild) to 10 (hot). A rating of "5" represent an estimated Scoville rating of 2,500 units.

Hybrid Chile Establishment Trial

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Colorado State University

Despite being very productive, hybrid chile varieties are rarely used in commercial operations. Most large-scale plantings of chile are direct-seeded and therefore, it is considered uneconomical to use costly hybrid varieties. Transplanting may be one way to reduce the seed cost associated with growing hybrid chile peppers.

This study was conducted to determine how different methods of crop establishment affect the yield and fruit characteristics of a hybrid anaheim-type chile (*Navojoa* - Petoseeds). Direct-seeding or transplanting different sized peppers into plastic mulch were compared.

Direct-seeding through plastic mulch did not result in a acceptable stand. Although seed germination was excellent, the young seedlings were prone to wind breakage and insect damage at the soil line. About 50% of the stand was lost with direct-seeding. Transplants grown in flats containing 75, 200, and 288 plants per tray all produced excellent stands and yields. There was not a significant difference in yield between the different size transplants. The larger 75 cell transplants, however, matured earlier than the smaller transplant sizes.

Fruit on transplanted peppers were shorter and more curved than fruit on direct-seeded peppers. Generally, the larger transplants (75 cell) gave rise to the highest percentage of curved fruit. In addition, transplanted pepper plants were consistently shorter than the direct-seeded plants and as a result, the fruit had a tendency to touch the ground.

Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 60 inches between centers, were shaped in early April. Drip lines were placed down the center of the bed at a depth of 3 inches. The beds were covered with black embossed plastic mulch (Mechanical Transplanter) on April 20th using a one-bed mulch layer. A double row of peppers, spaced 12 inches apart, was seeded or transplanted on each bed. The in-row spacing between peppers was also 12 inches. Experimental plots consisted of two rows (one bed) 10 feet long. Plots were randomized within each of four

blocks. Seeding and transplanting took place on May 12th . At seeding, two or three seeds were placed in each hole and covered with a peat/soil mixture. All transplants were set into the ground to the depth of their first true leaves.

Weeds between the mulched beds were controlled by mechanical cultivation, and hoeing. No other pest controls were needed.

The trial was harvested beginning July 25th. All marketable sized fruit were weighed and recorded. A fruit sub-sample was from each plot was taken to determine fruit length and degree of fruit curvature.

Transplant size of the hybrid anaheim-type pepper Navojoa (Petoseeds).

Treatment	Seeding date in greenhouse	Transplant height from base of plug (in)	Number of true leaves on transplant	Leaf area of transplant (cm^2)
75 cell	March 23	7.5	7	102.0
200 cell	March 30	5.0	4	28.5
288 cell	April 7	3.5	2	14.3

Marketable yield and fruit characteristics of the hybrid anaheim-type pepper Navojoa (Petoseeds).

Treatment	Fruit Length (in)	Plant Height (in)	% of curved fruit		Marketable Yield lbs/acre - (bu/acre)
			slight[1]	severe[2]	
Direct-Seeded	9.8	29	10	0	———
75 cell	7.8	24	35	5	31,581 - (1315)
200 cell	8.5	24	30	0	27,377 - (1140)
288 cell	7.9	24	15	5	29,359 - (1223)
lsd (0.05) =					7,538 - (314)

1. Slight curvature: "Banana shaped or less"

2. Severe curvature: Greater than banana shaped but less than "C" shaped (Anything more curved was considered a cull)

Bell Pepper Production Trials

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Bell peppers are a minor but nonetheless important crop for the local fresh market industry. Because of the relatively short growing season in Colorado, nearly all bell peppers are harvested at the green stage before mature color development. By using new hybrid varieties and intensive production methods, the growing season might be extended. A longer growing season would not only increase the marketing period for green bells but may allow enough time for the production of the more lucrative colored bells.

These studies were conducted to determine the yield and fruit quality of green, red, and yellow hybrid bell peppers grown at an 8 and 12 inch in-row spacing and using black plastic mulch and drip irrigation.

In the first trial, the variety *King Arthur* (Petoseeds) was harvested at the green stage starting on August 3rd. Total marketable yield was higher when peppers were grown at an 8 inch spacing rather than a 12 inch spacing. In addition, fruit quality was better at the 8 inch spacing because of the decreased incidence of sunscald. Fruit size was not significantly different between the different plant spacing treatments.

In the second trial, *King Arthur* was harvested at the red mature stage starting on August 17th. Total marketable yield was again higher when peppers were grown at an 8 inch spacing rather than a 12 inch spacing. There were fewer culls at the 8 inch spacing again due to less severe sunburning. Because of an early frost, some red peppers were not harvested and therefore yields were not as high as they could have been. Nonetheless all treatments were handled the same.

Finally, in the third trial, *Hybrid 860* (Stokes) was harvested at the yellow stage starting on August 20th. In this case, marketable yield, percent culls, and fruit weight were not significantly different between the two plant spacings. This variety, like many green to yellow types, was very prone to sunburn damage. Total yields were again lowered by the early frost.

Methods

All peppers were transplanted through black plastic mulch (Mechanical Transplanter) on May 16th. Mulched beds were on 60 inch centers and had a covered surface of 32 inches A double row of peppers (spaced 8 or 12 inches

apart in the row), was transplanted on each bed. The distance between the two rows of peppers was 18 inches.

The crop was irrigated via drip lines placed three inches below the soil surface and down the center of the bed. Weeds between the mulched beds were controlled with cultivation and hand weeding. No other pest controls were needed.

Yield and fruit quality of King Arthur (Petoseeds) hybrid bell pepper grown at an in-row spacing of 8 or 12 inches and harvested at the green stage.

In-row Spacing	Average Fruit Weight (Lbs)	% Culls	Marketable Yield lbs/acre - (bu/acre)
8 inches	0.454	11.6	54,943 - (2289)
12 inches	0.447	20.2	42,311 - (1763)
LSD (0.05) =	0.017	8.0	7,103 - (296)

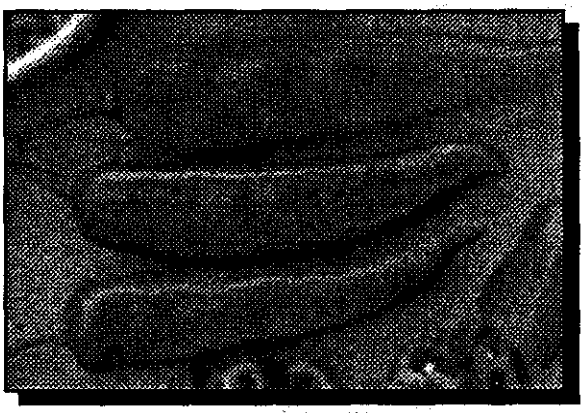
Yield and fruit quality of King Arthur (Petoseeds) hybrid bell pepper grown at an in-row spacing of 8 or 12 inches and harvested at the red stage.

In-row Spacing	Average Fruit Weight (Lbs)	% Culls	Marketable Yield lbs/acre - (bu/acre)
8 inches	0.49	18.1	21,402 - (892)
12 inches	0.47	29.3	15,884 - (662)
LSD (0.05) =	0. 05	17.3	11,756 - (490)

Yield and fruit quality of Hybrid 860 (Stokes Seeds) hybrid bell pepper grown at an in-row spacing of 8 or 12 inches and harvested at the yellow stage.

In-row Spacing	Average Fruit Weight (Lbs)	% Culls	Marketable Yield lbs/acre - (bu/acre)
8 inches	0.39	34.4	12,283 - (511)
12 inches	0.37	37.2	11,739 - (489)
LSD (0.05) =	0.10	9.8	4,817 - (200)

Pepper Disease Control



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The plant defense stimulator, *Actigard* (Norvartis Crop Protection, Inc.), was evaluated as a control for bacterial diseases of chile peppers. In addition, crop tolerance to the product was examined.

The season, as a whole, was good for pepper production. Despite, higher than normal precipitation in late July and early August, there was only a minute amount of bacterial leaf spot detected in the entire plot area. Disease pressure was so low that little inference could be made as to the efficacy of the different control measures.

In terms of crop tolerance, there were no visible signs of phytotoxicity on plots receiving multiple applications of *Actigard.* All peppers remained healthy and vigorous throughout the season. However, there was a slight yield reduction in the treatments receiving multiple applications of *Actigard* and multiple applications of *Actigard* plus one additional application of Kocide / Mancozeb compared to the unsprayed control. Notably, the treatment receiving a single application of Kocide/Mancozeb had yields comparable to the unsprayed control.

Methods

The trial was conducted at Colorado State University's Arkansas Valley Research Center in Rocky Ford, Colorado. Experimental plots consisted of four rows 20 ft. long spaced 2.5 ft. apart. Plots were randomized within each of six blocks. In early April, 2.5 ft. beds were formed on a Rocky Ford silty clay loam soil. On May 7th 1999, an anaheim- type pepper (Joe Parker - Burrell Seeds) was direct- seeded into the 2.5 ft. row with a Stanhey precision planter. The peppers were later thinned to a uniform spacing of approximately 9 inches. Weeds were controlled by mechanical cultivation, and hoeing. No other pest controls were needed. Irrigation was by gravity-flow furrows. Irrigation water was applied to every-other furrow (every 5 ft.).

The experimental treatments consisted of: 1. An unsprayed control. 2. Multiple applications (3X) of *Actigard.* 3. Multiple applications (3X) of *Actigard* plus one addtional application of *Kocide/Mancozeb.* 4. One application of *Kocide/Mancozeb.* The foliar applications of *Actigard* were

initiated on July 20th. *Actigard* was applied at a rate of 10.62 g AI/acre (26.25 g AI/hectare) in 30 gal. of water per acre. Foliar applications of all materials were made with a CO_2 backpack sprayer equipped with 8002 flat-tip nozzles (1 nozzle per row). Additional applications of *Actigard* were applied at 14-day intervals on August 3rd and August 17th. Another 14 days later, on August 31, the applications of *Kocide* (809 g AI/acre) and *Mancozeb* (404 g AI/acre) in 30 gal. of water per acre were made.

The plots were evaluated for incidence of disease and phtotoxicity on September 10th and were harvested on September 16th and 17th. All marketable fruit was harvested and weighed. Any misshapened, sunburned, or small fruit (less than 6 inches) were considered culls and not recorded.

Effect of foliar applications of Actigard on disease control, phytotoxicity, and yield of chile pepper (var. Joe Parker). Disease rating and phytotoxicity were made on a scale of 0 (none) to 10 (severe).

Treatment	Disease Rating (0 - 10)	Phytotoxicity (0 - 10)	Marketable Weight (Lbs. Per Acre)
Control	0	0	35,617 a
Actigard (3X)	0	0	28,575 b
Actigard (3X) plus Kocide/ Mancozeb	0	0	30,825 ab
Kocide/Mancozeb	0	0	35,544 a
CV%			16.48
Probability			0.0266
LSD (.05) =			5,253

Spinach Hail Damage Trial

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Colorado produces over 2,000 acres of spinach each year. In all production areas of the state, winds, hail, and rain are common. Leaf crops like spinach are often injured or rendered unsalable by these weather conditions. Our study was conducted to determine the yield response of spinach to simulated storm damage during different periods of plant development. We removed 33% and 67% of the carrot foliage at three dates, spaced 10 days apart, during the middle of the growing season. In 1999, 67% defoliation reduced marketable yield more than did 33% defoliation at all growth stages. Yield losses were most pronounced when the damage came latter in the season. Spinach leaves continued to grow after a defoliation event. However, given the constraints of the short growing season for spinach, total recover was not realized.

Methods

This study was conducted in a field trial in 1999 at the Arkansas Valley Research Center, Rocky Ford, Colorado. Experimental plots consisted of three beds 25 ft. long spaced 44 in. apart. Each bed had two lines of spinach planted on each shoulder of the bed. The lines were 18 in. apart on top of the bed. The in-row seed spacing was 1.5 in. Plots were randomized within each of four blocks. The experimental site was prepared according to standard production practices for the area. Seeds of *Indian Summer* (Burrell Seeds) were sown on March 5, 1999. Weeds were controlled by cultivation; no other pest controls were used. The crops were irrigated as needed via gravity-flow furrows spaced 44 in. apart.

The defoliation treatments were initiated on May 17th , 1999. Spinach leaves were damaged using a gasoline-powered weed trimmer. Two levels of damage were inflicted, a 33% (moderate) and a 67% (severe) defoliation. The entire process was repeated on other plots 10 (May 27), and 20 (May 7) days later. At each defoliation date, leaf number and leaf area were recorded. The spinach leaves were harvested on June 17th . Leaves were severed at ground level and all above-ground mass was measured for total fresh weight.

Stages of spinach development at different defoliation dates. Spinach (var. Indian Summer) was planted on March 5, 1999.

Date	Stage of Development
1. May 17	Spinach has 20-21 leaves per plant. Leaf area is approximately 334 cm^2.
2. May 27	Spinach has 21-22 leaves per plant. Leaf area is approximately 483 cm^2.
3. June 7	Spinach has 21-22 leaves per plant. Leaf area is approximately 673 cm^2.

Effect of defoliation on spinach (var. Indian Summer) yield in 1999. Defoliation occurred at three different intervals during development.

Date of Defoliation	Defoliation (%)	Total Marketable Leaf Weight (lbs/acre)
Control / No Damage	0	31,333
May 17	33	27,398
May 17	67	21,606
May 27	33	25,839
May 27	67	15,592
June 7	33	24,428
June 7	67	14,627
LSD (0.05) =		6,845

Tomato Production Trials

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Five tomato trials were conducted at the Arkansas Valley Research Center in Rocky Ford, Colorado. The objective of the trials were: **1.** To determine how early tomatoes can be produced using combinations of row covers and plastic mulches. **2.** To evaluate 25 fresh market varieties for earliness and adaptability to this area. **3.** To determine the marketable yield and size of three slicing-type varieties. **4.** To compare the effect of staking on fruit yield and size. **5.** To compare the effect of pruning on fruit yield and size.

Methods

1. Early Trial: Three tomatoes varieties (*Mt. Spring, Redrider, and Daybreak*) were transplanted through clear plastic mulch on April 27th. Mulched beds were on 60 inch centers and had a covered surface of 32 inch. A single row of tomatoes, spaced 18 inches apart, was transplanted down the center of each bed. The tomatoes were protected with solid or perforated row covers (clear plastic) immediately after transplanting. One-foot-long slits, spaced 3 feet apart, were cut in the solid row covers immediately after the covers were in place. Row covers were supported by wire hoops placed 4 feet apart. As the weather warmed up in early May, ventilating slits were enlarged in the solid row covers and cut into the perforated row covers. Row covers were completely removed from half the plots on May 18th and from the remaining plots on June 2nd.

The crop was irrigated via drip lines placed 3 inches below the soil surface and down the center of the bed. Weed control consisted of an pre-transplant application of *Treflan*, (trifluralin) beneath the clear mulch and seasonal hoeing. A single application of *Sevin* (carbaryl) was used to control tomato hornworm.

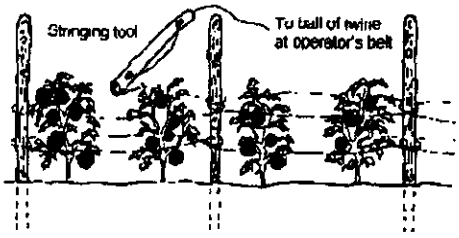
Maturity information, variety descriptions, and comments are found in **Section 1.**

2. Fresh-Market Variety Demonstration: Twenty-five tomato varieties were transplanted through black plastic mulch on May 11th and 12th. Tomatoes were pruned on June 1st and were later staked and trained. The crop was irrigated via drip lines. Weeds between the mulched beds were controlled by hoeing. One application of *Sevin* (carbaryl) was made to control tomato hornworm.

Descriptions, quality ratings, and maturity information are in **Section 2.**

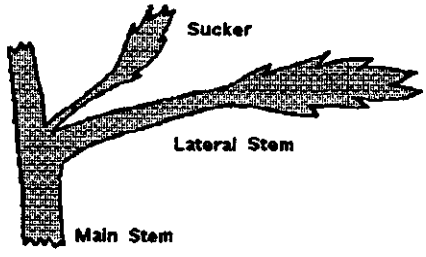
3. Fresh-Market Yield Trial: Three slicing tomato varieties (*Mountain Spring, Shady Lady, and Sunbrite*) were transplanted through black plastic mulch on May 11th and pruned, staked, and maintained as in the previous trials. Each variety plot was replicated three times, with each plot measuring 15 feet long and one bed (5 feet) wide. There were ten plants per plot. The plots were harvested seven times, beginning on July 27th and ending August 31st . At each harvest, the number and weight of marketable fruit were recorded. Fruit were considered marketable if they were showing color, free of major defects, and over 5 oz. in weight. Yield data and comments are listed in **Section 3.**

4. Staking Trial: The tomato variety *Shady Lady* was transplanted through black plastic mulch on May 11th and pruned and maintained as in the previous trials. Each treatment plot was replicated five times with each plot measuring 15 feet long and one bed (5 feet) wide. There were ten plants per plot. For one treatment, the tomatoes were staked and trained to grow in an upright position using 2 rows of jute twine. The first row of string was located 10-12 inches above the ground and the second row of string was located 12 inches above the first. For the other treatment, the tomatoes were allowed to grow prostrate on top of the plastic mulch. The plots were harvested seven times, beginning on July 27th and ending August 31st . At each harvest, the number and weight of marketable fruit were recorded. Fruit were considered marketable if they were showing color, free of major defects, and over 5 oz. in weight. Yield data and comments are listed in **Section 4.**



Stake and weave method of training tomatoes.

5. Pruning Trial: The tomato variety *Mountain Spring* was transplanted through black plastic mulch on May 11th and staked and maintained as in the previous trials. Each treatment plot was replicated five times with each plot measuring 15 feet long and one bed (5 feet) wide. There were ten plants per plot. For one treatment, the tomatoes were pruned. Specifically, all the suckers up to the one below the first flower cluster were removed. The tomatoes were pruned on June 3rd when all suckers were still small (less than 3 inches long). For the other treatment, the tomatoes were allowed to grow unpruned. The plots were harvested six times, beginning on July 27th and ending August 31st . At each harvest, the number and weight of marketable fruit were recorded. Fruit were considered marketable if they were showing color, free of major defects, and over 5 oz. Yield data and comments are listed in **Section 4.**



Section 1 : Early Trial

Early fresh market tomato trial. Tomatoes were transplanted on April 27th through clear plastic mulch and covered with a solid or perforated row cover to enhance earliness.

Variety	Row Cover	Date Cover Removed	% Stand Loss	First Harvest	Variety Description
Redrider	Solid	May 18	63	July 13	Large fruited variety and very early. Has an open canopy that predispose the fruit to sunburning. Works well under these intensive conditions as a "first early" tomato .
	Solid	June 2	53	July 14	
	Perforated	May 18	16	July 4	
	Perforated	June 2	13	July 4	
Mountain Spring	Solid	May 18	73	None	Large, firm fruited variety with one of the best and most consistent yields. Not a lot of canopy cover but more than Redrider.
	Solid	June 2	76	None	
	Perforated	May 18	10	July 12	
	Perforated	June 2	13	July 13	
Daybreak	Solid	May 18	43	None	Large, firm fruit but slightly later than other varieties. Vigorous vine growth with good fruit protection.
	Solid	June 2	56	None	
	Perforated	May 18	16	July 13	
	Perforated	June 2	13	July 13	

Comments:

Despite having ventilating slits, solid row covers caused severe stand loss due to excessive temperature build-up. Perforated row covers worked extremely well and provided a good growing environment for the tomatoes. Perforated row covers, however, provide little protection from sub-freezing temperatures.

Leaving row covers on as late as possible (May 18th vs. June 2nd) did not have an adverse effect on crop growth as long as there were large ventilating slits cut in the tops of the covers. In fact, despite having slits in the top, row covers provided excellent protection from wind and hail.

Using clear plastic mulch for the ground cover may have contributed to stand loss. Soil temperatures in excess of 90° F were noted at mid-day early in the season beneath the clear mulch. Clear mulch is more effective at warming the soil than colored mulches. Therefore, a colored soil mulch, in combination with a perforated row cover, may be the best method to enhance tomato earliness without causing excessive heat build-up.

Section 2: Fresh Market Variety Demonstration

Fresh market tomato varieties in the 1999 trial. Varieties were transplanted through black plastic mulch on May 11th and 12th and were staked and drip-irrigated. All varieties are determinate types except where noted.

Variety	Source	First Harvest	Quality Rating*	Type and Comments
Balboa	Harris Moran	7-24	7	Slicer. Excellent color and quality.
Show Girl	Sunseeds	7-30	7	A good slicer overall. Quality fruit.
Sunrise	Asgrow	7-27	8	Early slicer with very good size and yield.
Springfield	Harris Moran	8-1	6	A very good slicer but some cracking.
Sunbeam	Asgrow	7-30	8	One of the top slicers. Good quality.
Red Rider	Stokes	7-20	8	Slicer. Very early and firm. Small canopy.
HMX 2824	Harris Moran	7-31	7	A very good slicer overall. Good yield.
Flavormore 223	Harris Moran	8-1	8	Slicer with long shelf-life. Good yields
Fantom	Totally Tomatoes	7-30	8	Slicer with excellent fruit quality and
Carolina Gold	Totally Tomatoes	8-1	7	Hybrid Yellow slicer.
Mountain Gold	Totally Tomatoes	7-31	5	Yellow slicer. Prone to some cracking
Leading Lady	Sunseeds	8-1	7	A very good slicer overall.
Mountain Spring	Stokes	7-22	8	Large early slicer. Small canopy.
Mountain Fresh	Ferry-Morse	7-30	9	Excellent slicer with good yield and size.
Shady Lady	Sunseeds	7-24	9	The best overall slicer in the trial.
Sunbrite	Asgrow	7-26	9	Slicer. Very large size and great yields.
Stallion	Harris Moran	8-1	7	A very good slicer overall. Good yield.
Mt Supreme	Asgrow	7-31	8	Slicer with excellent yield and fruit color.
Goliath	Totally Tomatoes	7-31	6	More suited for back yard gardens.
Viva Italia	Totally Tomatoes	7-30	8	Roma type. Good yield
Tirano	Harris Moran	7-20	8	Roma type. Good yield and quality.
Puebla	Petoseeds	7-30	8	Roma type. Excellent yield and quality
Mountain Belle	Totally Tomatoes	7-21	8	Excellent cherry
Cherry Grande	Totally Tomatoes	7-22	8	Excellent cherry
Cherrytime	Harris Moran	7-22	6	Indeterminent cherry. Vigorous growth

* Quality Rating: (2-3) Poor, (4-5) Average, (6-7) Good, (8-9) Excellent

Comments:

There were several varieties that excelled in the 1999 trial. Overall, *Shady Lady and Sunbrite* were the best slicers. *Shady Lady* had better canopy cover than *Mountain Spring* and as a result, seemed to have less sunburning. Sunbrite was very large-fruited and productive. *Sunbeam* and *Mountain Fresh* were also excellent varieties. *Puebla* and *Tirano* were good roma types and *Mountain Belle* and *Cherry Grande* were excellent cherry types.

Section 3: Fresh Market Variety Trial

The marketable yield and average fruit weight of three fresh market tomato varieties. The tomatoes were harvested seven times and marketable yield and fruit number were recorded at each harvest. Tomatoes were considered marketable if they were free of defects and were over 5 oz. in weight. Varieties were transplanted through black plastic mulch on May 12th and were staked and drip-irrigated.

Variety	Harvest Date Marketable Yield (lbs/acre) and Average Fruit Weight (oz)														Total Marketable Yield (lbs/acre)	Ave. Fruit Wt (oz.)	Total Marketable Yield (boxes/acre)
	7-27		8-2		8-6		8-12		8-17		8-26		8-31				
Mt. Spring	2,962	7.63	7,511	8.24	2,323	8.97	8,286	8.07	5,091	7.90	8,402	7.16	8,576	6.37	43,153	7.51	1726
Shady Lady	2,729	7.18	9,215	8.80	3,736	8.18	10,009	8.22	3,349	7.07	10,609	6.46	8,015	5.86	47,664	7.22	1906
Sunbrite	1,219	10.04	5,575	9.35	4,046	9.07	7,898	8.84	4,491	7.71	11,732	7.10	9,873	6.37	44,837	7.66	1793
LSD (0.05) =															15,913	0.83	636

There was not a significant difference in overall yield between the three varieties although *Shady Lady* seemed to slightly outperform the other two. *Mountain Spring* and *Shady Lady* were slightly earlier than *Sunbrite*. In terms of fruit size, *Sunbrite* was the best. *Sunbrite* had extremely large fruit (10 oz. +) especially early in the season. For all varieties, fruit size gradually diminished in later harvests. In terms of fruit appearance and taste, *Shady Lady* and *Sunbrite* were better than *Mountain Spring*. *Mountain Spring* had a smaller canopy than the other varieties and was more predisposed to sunburning. Nonetheless, all three varieties were good slicers that would perform well in the Arkansas Valley.

Section 4: Staking Trial

The marketable yield and average fruit weight of Staked and Non-Staked (Control) tomatoes. The variety Shady Lady was used in this experiment. The tomatoes were harvested seven times and marketable yield and fruit number were recorded at each harvest. Tomatoes were considered marketable if they were free of defects and were over 5 oz in weight. Tomatoes were transplanted through black plastic mulch on May 11th and were staked and drip-irrigated.

Treatment	Harvest Date Marketable Yield (lbs/acre) and Average Fruit Weight (oz)														Total Marketable Yield (lbs/acre)	Ave. Fruit Wt (oz.)	Total Marketable Yield (boxes/acre)
	7-26		7-30		8-3		8-10		8-17		8-25		8-31				
Staked	4,321	7.60	5,680	7.97	7,329	8.34	12,138	8.77	11,790	7.82	10,802	6.60	8,131	6.39	59,892	7.53	2395
Control	4,809	7.52	5,343	7.70	6,621	7.59	11,639	7.98	9,223	7.33	10,500	6.55	5,552	6.20	53,991	7.24	2159
LSD (0.05) =															6,425	0.79	257

Comments:

There was not a significant difference (at the 5% confidence level) in yield between tomatoes that were staked and those that were allowed to grow flat on the ground. There was a general trend, however, that staking did improve total yield and yields at each individual harvest. Staking also helped to improve fruit size a tendency that was evident at all seven harvests. Overall, staked tomatoes were much easier to pick, requiring less time and effort to harvest. In addition, fruit quality was improved when tomatoes were staked, a characteristic that was very evident in wet weather. Specifically, tomatoes had less disease (spotting and rots) and were cleaner when held off the ground by staking and stringing.

The cost of staking and stringing is approximately $250 -$300 per acre considering materials (stakes and twine) and labor. Based on this estimate, staked tomatoes would have to yield 38 more boxes per acre than unstaked tomatoes to justify the added expense.

Section 5: Pruning Trial

The marketable yield and average fruit weight of Pruned and Non-pruned (Control) tomatoes. The variety Mountain Spring was used in this experiment. The tomatoes were harvested six times and marketable yield and fruit number were recorded at each harvest. Tomatoes were considered marketable if they were free of defects and were over 5 oz in weight. Tomatoes were transplanted through black plastic mulch on May 11th and were staked and drip-irrigated.

Treatment	Harvest Date Marketable Yield (lbs/acre) and Average Fruit Weight (oz.)												Total Marketable Yield lbs/acre	Fruit # per acre	Ave. Fruit Wt oz.	Total Marketable Yield boxes/acre
	7-26		7-30		8-3		8-11		8-17		8-25					
Pruned	2,172	7.78	2,474	8.40	5,715	7.81	8,084	9.25	10,872	7.90	6,075	7.60	35,393	70,741	7.99	1415
Control	2,776	7.27	1,393	8.20	5,436	8.04	8,247	8.46	14,241	7.70	9,978	7.13	42,073	87,468	7.67	1682
LSD (0.05) =													15,069	27,071	0.59	625

Comments:

There was not a significant difference (at the 5% confidence level) in yield between tomatoes that were pruned and those that were not. However, there was a prominent trend that non-pruned tomatoes had a higher total yield and more total fruit than pruned tomatoes. On the other hand, pruned tomatoes produced fruit that were consistently larger in size. These findings are consistent with other reports that illustrate that pruning will increase fruit size but may reduce total yield.

An important point to consider when pruning is variety selection. *Mountain Spring* does not have a lot of canopy cover anyway. Therefore, pruning *Mountain Spring* may be less beneficial than pruning more leafy varieties like *Shady Lady, Mountain Fresh*, or *Sunbrite*. Pruning varieties with heavy foliage has been shown to increase fruit size and decrease disease problems by providing better light interception and air movement in the canopy.

Another consideration is cost. Pruning can be done fairly cheaply (~$30 per acre) if done at the right time; that is, when the first flower cluster appears and the plant stands about 12 inches tall. At this stage, the suckers are still small and easy to remove. At later stages, pruning is more tedious and less efficient since the tomato plant has already "invested" a lot of energy into growing suckers.

Watermelon Variety Trial

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Eighteen watermelon varieties were grown in a replicated trial in 1999. Melons were transplanted and grown using black plastic mulch and drip irrigation. Six of the varieties were seedless (triploid) varieties. An additional 25 experimental varieties were grown in a non-replicated trial. Those varieties are listed at the end of this report and information concerning them is available upon request.

Environmental conditions were favorable for most of the growing season. Melon flavor was exceptionally good. Total yield and average melon weight was lower than expected and may be a result of poor pollination and too close of an in-row spacing respectively. Overall, crop maturity was enhanced by intensive production methods compared to a traditionally-grown crop.

Although there was not a statistical difference in yield (at the %5 level) between most varieties, several were notably more productive. *Stars N' Stripes* (Asgrow) and *Arriba* (Hollar Seeds) were two of the better seeded varieties and *Millionaire* (Harris Moran) and *Premiere* (Colorado Seeds) were some of the higher yielding seedless types.

Methods

This trial was conducted at the Arkansas Valley Research Center, on a Rocky Ford silty clay loam. Beds, 60 inches between centers, were shaped in early April. Drip lines were placed 1-2 inches from the center of the bed at a depth of 2-3 inches. The beds were then covered with black embossed plastic mulch (non-degradable) on April 20th.

Eighteen varieties were used in this test. On May 14th, four-week-old transplants were set through holes in the plastic in a single row down the center of the bed at an in-row spacing of 30 inches. Each plot was one bed wide and 17.5 feet long and was replicated three times.

The melons were irrigated by the drip lines as needed using canal (Rocky Ford Ditch) water. Besides hand-weeding between the mulched beds, the plot required no other pest control.

Each plot was harvested over a 5-7 day period (denoted as "Harvest Period"). Only fully ripe melons were selected. Each marketable melon was individually weighed. Watermelons were considered marketable if they weighed over 8 lbs. (seeded) or 6 lbs. (seedless) and were free of any physical defects.

Yield and earliness of watermelon varieties grown using intensive production practices.

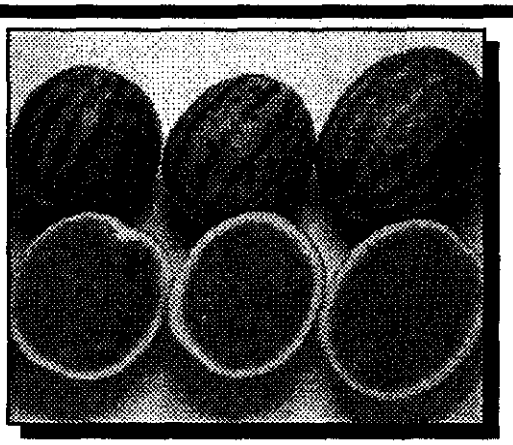
Variety	Source	Harvest Period	Ave Fruit Size (lbs)	Marketable Yield (lbs/acre)
Millionaire *	Harris Moran	July 21 - 25	10.25	51,041
Stars N' Stripes	Asgrow	July 24 - 30	11.24	44,868
Premiere *	Colorado Seeds	July 21 - 25	10.26	42,412
Arriba	Hollar Seeds	July 21 -26	12.82	42,064
CS 4830 *	Colorado Seeds	July 22 - 29	9.69	41,715
Crimson Sweet	Burrell Seeds	July 26- Aug. 1	12.39	41,566
Tri-X Palomar	American Sunmelon	July 23 -28	10.20	40,603
Tri-X 313	American Sunmelon	July 23 -28	10.86	40,305
Carnival	Rogers	July 24 - Aug 1	13.14	38,844
Starbrite	Asgrow	July 24 - 30	10.70	33,734
Bravo	Hollar Seeds	July 23 -29	14.36	33,253
Vista	Hollar Seeds	July 24 - 29	15.92	33,053
Tri-X Carousel	American Sunmelon	July 20 - 25	9.93	32,970
Stargazer	Asgrow	July 23 -30	12.09	32,771
Royal Majesty	Petoseeds	July 25 - 30	10.81	28,806
HSR 2261	Hollar Seeds	July 23 - 30	12.64	27,096
XP-1492	Asgrow	July 22 - 28	12.20	26,350
Crimson Delight	Hollar Seeds	July 24 - 30	12.99	25,869
LSD (0.05) =			2.35	16,575

* Triploid (seedless)

Experimental Varieties

Hollar Seeds			Colorado Seeds	Burrell Seeds
1. W9200	7. HSR 2716	13. HSR 2733	17. CX-4835 *	21. BWX 139
2. HSR 2757	8. HSR 2730 *	14. HSR 2695	18. CX-4834 *	22. BWX 122
3. HSR 2734 *	9. HSR 2692	15. HSR 2731 *	19. CS-4831 *	23. BWX 119
4. HSR 2737	10. HSR 2732 *	16. HSR 2584	20. CX-4838 *	24. BWX 141
5. HSR 2745 *	11. HSR 2671			25. BWX 127
6. HSR 2682	12. HSR 2689			

Early Seedless Watermelon



Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Seedless watermelons are an increasingly popular produce item with consumers. Despite the excellent growing conditions in the Arkansas Valley and potentially high returns, few seedless watermelons are produced in the area. The relatively high cost of seed and high level of management are two reasons that seedless watermelons are a less attractive crop than seeded watermelon.

This study was conducted to determine how different plasticulture methods can be used to produce seedless watermelon in the Arkansas Valley. Various combinations of varieties, plastic mulches and row covers were examined.

Seedless watermelons produced high yields and matured as early as July 14th when grown with placticulture methods. Several varieties, including *Millionaire* (Asgrow), *Tri-X Carousel* (American Sunmelon), and *Sapphire* (Hollar Seeds) performed well under intensive conditions.

Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 60 inches between centers, were shaped in early April. Drip lines were placed 1-2 inches from the center of the bed at a depth of 3 inches. The test area was then sprayed with a combination of *Prefar* (Gowan Chemical) and *Alanap* (Uniroyal Chemical) for weed control. The beds were covered with clear embossed plastic mulch (Mechanical Transplanter) on April 20th using a one-bed mulch layer.

Four seedless watermelon varieties were used in this study; *Diamond* and *Sapphire* (Hollar Seeds), *Millionaire* (Asgrow) and *Tri-X Carousel* (American Sunmelon). All melons were started in the greenhouse and then transplanted at four-weeks of age. The melons were set through holes in the plastic mulch in a single row down the center of the bed at an in-row spacing of 30 inches. Each plot was one bed wide (5 feet) and 17 feet long and contained six seedless watermelon plants and one seeded pollinator (*Arriba* - Hollar Seeds). The treatments transplanted April 28th (before the last frost date) were covered with a perforated row cover (Mechanical Transplanter). Later transplanted treatments (May 17th) were not covered. Large slits were cut into the top of the row covers as the temperature warmed up and as the first fruiting flowers appeared. The row covers were completely removed on June 7th .

The following eight production combinations were evaluated:

1. *Diamond* - transplanted on April 28th and covered with a perforated row cover.
2. *Tri-X Carousel* - transplanted on April 28th and covered with a perforated row cover.
3. *Diamond* - transplanted on May 17th.
4. *Tri-X Carousel* - transplanted on May 17th.
5. *Sapphire* - transplanted on May 17th.
6. Millionaire - transplanted on May 17th
7. Sapphire - transplanted on April 28th and covered with a perforated row cover.
8. *Millionaire* - transplanted on April 28th and covered with a perforated row cover

Each plot was harvested over a 5-7 day period. Only fully ripe melons were selected. Each marketable melon was individually weighed. Watermelons were considered marketable if they weighed over 6 lbs. and were free of any physical defects. Seeded melons from the same plot were not included in the yield evaluation.

Plots were replicated only two times and therefore, a statistical analysis was not conducted.

Yield and earliness of *seedless watermelons* grown with different plasticulture combinations.

Variety	Transplanting Date	Row Cover	First Harvest	Ave. Fruit Size (lbs)	Market. Yield (lbs/acre)
Diamond	April 28	perforated	July 14	9.80	57,810
Tri-X Carousel	April 28	perforated	July 14	9.66	56,938
Diamond	May 17	none	July 21	8.78	33,748
Tri-X Carousel	May 17	none	July 22	9.34	43,101
Sapphire	May 17	none	July 22	11.02	50,840
Millionaire	May 17	none	July 22	12.60	64,578
Sapphire	April 28	perforated	July 20	9.55	53,863
Millionaire	April 28	perforated	July 20	9.10	55,965

2000 Research Plots
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado

Field Crops

ALFALFA *- 20.8 acres*
Variety Trials - 28 entries, 3rd year, new trial established- 24 entries
Alfalfa Weevil - Varietal Resistance - 6 entries - 5th year
Insecticide Trial - 11 treatments

BEANS *(Pinto)*
Variety Trial - 25 entries

CORN *- 28.2 acres*
Variety Trial - 24 grain entries, 20 forage entries
Acaricide Trial - Banks Grass Mite
Corn Borer Resistant (Bt) corn - 18 entries
SW Corn Borer Pheromone Traps - Arkansas Valley - 10
Weed Management - 12 treatments

FERTILITY *- N Fertility Response - Long Term - 12 treatments*

SMALL GRAINS

Winter Wheat	*Harvest*	*Plant*
Variety Trial	*30 entries*	*entries*

SORGHUM *- 4.0 acres*
Variety Trial - 14 forage entries
Greenbug
Resistant Variety Trial - 22 entries, 2 treatments
Insecticide Trial - treatments

SOYBEANS *- 8.5 acres*
Variety Trial - 18 entries

ALTERNATIVE CROPS
Canola Trial - National Canola Trial - 30 entries
Great Plains - 32 entries
AgroEvo - 40 entries

Vegetable Crops

ONIONS *- 5.3 acres*

Variety Trial - 40 entries
Drip vs furrow - 2 treatments
Salinity Trial - 5 varieties - 3 levels of salinity
Fertility - N trial - 17 treatments
Overwintering - 24 varieties harvested, varieties planted
Disease Management - Fungicide Trial - 18 treatments;
Bactericide Trial - 12 treatments
Thrips Management - Tolerance Trial - 20 entries,
2 treatments
Insecticide Trial - 10 treatments
Weed Management - Post emergence - 16 treatments
Dual Tolerance - 7 treatments

CABBAGE *- Insect Management - treatments*

CARROTS *- Disease Management - 3 treatments*

CANTALOUPE

Plastic Mulch Study-Fresh Market - 2 varieties, 12 treatments
Shipping Melons - 24 varieties, demonstration
Irrigation - drip, 2 treatments

PEPPERS

Variety Demonstration - 30 seeded entries
Plastic Mulch Demonstration - drip irrigation, black plastic,
80 varieties
Bell Pepper Spacing Trial - 1 variety, 3 treatments
Hybrid Anaheim Plant Establishment - 1 variety, 3 treatments
Jalapeno Establishment Trial - 1 variety, 3 treatments
Variety Screening - 2 varieties

SPINACH *- Hail Simulation - 9 treatments*

TOMATOES *- Drip Irrigation and Plastic*

Staked and Mulch Variety Demonstration - 33 entries
Yield Trial - 3 entries
Early Tomato Production - 4 varieties, 2 row cover
Pruning Trial - 2 treatments
Staked Trial - 2 treatments

WATERMELONS *- 3.0 acres*

Early Watermelon Study - 2 varieties,
8 treatments-plastic mulch
Variety Demonstration - 24 varieties
Spacing Trial - 1 variety, 3 treatments
Establishment - seeded vs transplant - 2 treatments

OTHER

Sweet corn Variety Demonstration - 12 entries
Cucumber, squash, eggplant

ZINNIAS *- 1.0 acre*

Stand Reduction - 13 treatments