Technical Report TR01-9

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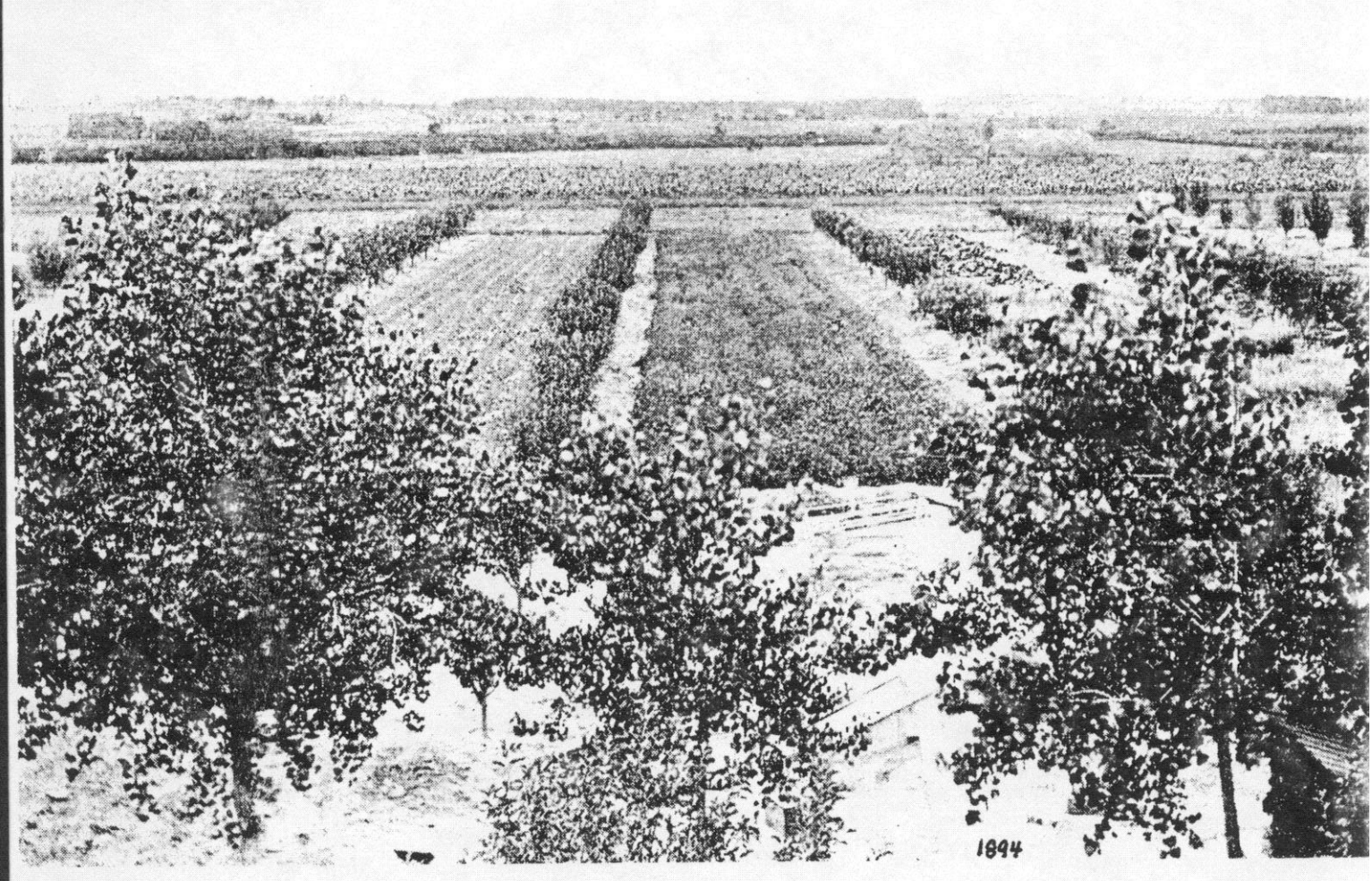
Colorado State University

2000 RESEARCH REPORTS



ARKANSAS VALLEY RESEARCH CENTER

Established in 1888

Rocky Ford, Colorado

COLORADO AGRICULTURAL EXPERIMENT STATION

Vol. CXIII

Arkansas Valley Research Center
Rocky Ford, Colorado

Staff

(719) 254-6312

Frank C. Schweissing	Superintendent-Entomologist
Michael E. Bartolo	Vegetable Crops Scientist
Marvin A. Wallace	Farm Technician
Kevin J. Tanabe	Research Associate

Cooperators

Whitney Cranshaw, Entomologist, C.S.U., Department of Bioagricultural Sciences and Pest Management

Jessica Davis, C.S.U., Ext. Soil Specialist, Department of Soil and Crop Sciences

Orren Doss, Graduate Research Assistant, C.S.U., Department of Soil and Crop Sciences

Tii Damato, Res. Associate, C.S.U., Department of Bioagricultural Sciences and Pest Management

Jim Hain, Res. Associate, C.S.U., Department of Soil and Crop Sciences

Ardell Halvorson, Soil Scientist, USDA-ARS

Jerry Johnson, Crop Scientist, C.S.U., Department of Soil and Crop Sciences

Kevin Larson, Crop Scientist, C.S.U., Plainsman Research Center and Dept. of Soil & Crop Sciences

Scott Nissen, Weed Scientist, C.S.U., Department of Bioagricukural Sciences and Pest Management

Curtis Reule, Soil Scientist, USDA-ARS

Howard Schwartz, Plant Pathologist, C.S.U., Dept. of Bioagricultural Sciences and Pest Management

Jim Valliant, Irrigation Specialist, Rocky Ford, Cooperative Extension

Philip Westra, Weed Scientist, C.S.U., Department of Bioagricukural Sciences and Pest Management

Colorado State University
Fort Collins, Colorado
Agricultural Experiment Station
Administration

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491-5371

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491-6325

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Department of Animal Sciences
491-6672

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491-5261

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491-7019

James S. Quick, Head
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491-6517

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ARKANSAS VALLEY RESEARCH CENTER
ROCKY FORD, COLORADO

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	2003	Chairman	Matt Heimerich, 5325 Ln. 9 1/2, Olney Spa., CO 81062
El Paso	2001		*Toby Wells, 11120 Old Pueblo Road, Fountain, co 80817
	2002		Jay Frost, 18350 Hanover Rd., Pueblo, co 81008
	2003		Glen Ermel, 10465 REA Road, Fountain, co 80817
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	2002		'John Kimbrel, P.O. Box 452, Walsenburg, CO 81089
	2003		Bob Freese, P.O. Box 226, Gardner, CO 81040
Las Animas	2001		*Paul E. Philpott, Box 3, Hoehne, co 81046
	2002		Art Winter, 20110 CR 75.0, Trinidad, CO 81082
	2003		Allen Nicol, Box 63, Hoehne, co 81046
Otero	2001		*Dennis Caldwell, 25026 Road 19, Rocky Ford, CO 81067
	2002	Vice Chrm.	Robert Gerler, 25320 Road BB, La Junta, CO 81050
	2003		Hans Hansen, 36606 Road JJ, La Junta, CO 81050
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	2002		*Robert Jensen, 23485 Co. Rd. GG.5, Granada, CO 81041
	2003		Leonard Rink, 21971 Hwy. 196, Bristol, co 81028
Pueblo	2001		Dan Genova, 33200 South Rd, Pueblo, co 81006
	2002		*Robert Wiley, 52699 Olson Rd., Boone, co 81025
	2003		Clay Fitzsimmons, 36038 So. Rd., Pueblo, co 81006

*Research Committee Member

Extension Agents

Bent	John Ming, Fair Grounds, Las Animas, CO 81054
Crowley	, Courthouse Annex, Ordway, CO 81063
El Paso	Jonathan Vrabec, 305 S. Union, co. Sps., Co 80910
Huerfano	, 401 Main, Suite 101, Walsenburg, co 81089
Las Animas	Robert Goebel, 200 E. lst, Rm. 101, Trinidad, CO 81082
Otero	Bill Hancock, Box 190, Rocky Ford, CO 81067
Prowers	,1001 S. Main, Lamar, co 81052
Pueblo	Frank Sobolik, Courthouse, Pueblo, co 81003
NRCS	John Knapp, 29563 Road 18, Rocky Ford, CO 81067
	Lorenz Sutherland, 318 Lacy, La Junta, co 81050

2000 Climatic Conditions
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado
Frank C. Schweissing, Superintendent

This year, for the first time since 1994, the annual precipitation of 9.60" was lower then the long term average (100 yrs.) of 11.86". Only March and October had significantly increased precipitation amounts, while all the other months were about normal or below. Crop production was good, leaf disease problems were greatly reduced and fall harvest and field work was carried on without interruption.

The frost free period of 153 days between April 25 and September 25 was 5 days shorter than average. Based on a nominal growing season of May 1 to September 30, there were 3099 corn growing degree days which is above normal.

2000 Frost Dates		2000 Frost Free Period (days)	Average Frost Dates*		Average* Frost Free Period (days)
Last Spring Frost	First Fall Frost		Last Spring Frost	First Fall Frost	
April 25 - 31°F	Sept. 25 - 28°F	153	May 1	October 6	158

Month	Temperature(F°)			Precipitation		Snowfall	10 Year Precip.	
	High	Low	Avg.	2000 inches	Normal* inches	Total inches		Inches
Jan.	69	2	35.6	0.33	0.26	4.5	1991	11.62
Feb	76	10	42.7	0.19	0.30	T	1992	12.33
March	80	17	46.7	2.09	0.69	7.8	1993	11.36
April	89	22	56.2	0.81	1.32	2.0	1994	11.42
May	102	32	65.5	0.79	1.83		1995	12.64
June	99	50	72.9	0.60	1.39		1996	13.38
July	104	53	78.2	1.25	2.00		1997	18.58
Aug.	103	53	77.8	1.36	1.58		1998	14.62
Sept.	101	28	68.2	0.77	0.91		1999	19.96
Oct.	93	29	55.3	1.13	0.79		2000	9.60
Nov.	67	-1	34.3	0.11	0.47	2.5		
Dec.	66	2	29.7	0.17	0.32	3.0	Average	13.55
		Total		**9.60**	**11.66**	**19.8**		

*Average - 100 years

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

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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.

2000 Alfalfa Variety Performance Trial Report

Location: Arkansas Valley Research Center
Rocky Ford, Colorado 8 1067

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 3 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 was managed to reduce factors which limit production. The plot area was fertilized with 150 lbs. of P_2 0, per acre prior to planting and again on November 30, 1998. Sencor 75DF .50 lbs. + Gramoxone .3 1 lbs. were applied on February 16, 1999 and again on February 22, 2000 for weed control. Furadan 4E at .75 lbs. AI/Acre was applied on April 21, 1999 and at 1.0 AI/Acre on April 25, 2000 for alfalfa weevil control.

Harvest dates in 2000 were May 30, July 5, August 10 and Sept. 28. Rainfall from April through September was 5.6 inches compared to a long term average of 9 inches. Growing degree days were above normal. The trial was irrigated prior to the first cutting and after each of the four cuttings. All four cuttings were harvested without rain damage. The average trial yield was 5.84 tons, compared to 6.35 tons in 1999 and 5.36 tons in 1998. 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 usually sell your hay. Example: (Yield/1.00-.10) = yield with 10% moisture or 5.34/.90 = 6.49 tons.

Decisions as to variety selection in addition to being based on highest yields should include consideration of those varieties which are maintaining or increasing their average yields compared to the first two years,

Forage yields of 28 alfalfa varieties at the Arkansas Valley Research Center, Rocky Ford, Colorado from 1998-00.

Variety	Brand or Source	1st cut 5/30	2nd cut 7/5	3rd cut 8/10	4th cut 9/28	2000 Total	1999 Total	1998 Total	3 Yr. Total
		tons/acre[1]							
WL 334RK	W-L Research	1.87	1.82	1.57	1.39	6.65	7.03	5.86	19.54
3L104*	Novartis	1.95	1.74	1.40	1.34	6.43	6.59	5.57	18.59
DK 143	DeKalb Genetics Corp.	1.88	1.68	1.36	1.42	6.34	6.52	5.67	18.53
Millennia	Union seed co.	2.02	1.70	1.37	1.27	6.36	6.64	5.48	18.48
Leaf Master	Union Seed Co.	1.99	1.72	1.43	1.30	6.44	6.73	5.24	18.41
Cimarron 3i	Great Plains Research	1.90	1.61	1.39	1.34	6.24	6.62	5.54	18.40
Pinnacle	Arkansas Valley Seed	1.98	1.66	1.49	1.23	6.36	6.48	5.35	18.19
Depend + EV	Agripro seeds Inc.	1.56	1.58	1.35	1.25	5.74	6.63	5.60	17.97
TMF Multiplier II	Mycogen Seeds	1.77	1.62	1.28	1.33	6.00	6.40	5.44	17.84
Big Horn	Cargill Hybrid Seeds	1.76	1.56	1.38	1.24	5.94	6.48	5.41	17.83
ZX 9352*	ABI Alfalfa	1.50	1.53	1.38	1.40	5.81	6.55	5.46	17.82
WL 324	Germain's	1.50	1.49	1.34	1.21	5.54	6.52	5.74	17.80
5454	Pioneer Hi-Bred Int'l.	1.57	1.62	1.35	1.32	5.86	6.49	5.43	17.78
DK 142	DeKalb Genetics Corp.	1.79	1.57	1.29	1.30	5.95	6.47	5.34	17.76
631	Garst Seed co.	1.61	1.58	1.24	1.26	5.69	6.60	5.38	17.67
ZC 9651*	ABI Alfalfa	1.46	1.57	1.34	1.29	5.66	6.39	5.56	17.61
Archer	America's Alfalfas	1.54	1.64	1.35	1.34	5.87	6.29	5.24	17.40
WL 325HQ	Germain's	1.86	1.62	1.38	1.26	6.12	6.01	5.25	17.38
Innovator + Z	America's Alfalfas	1.62	1.54	1.32	1.20	5.68	6.27	5.43	17.38
Affinity + Z	America's Alfalfas	1.46	1.46	1.25	1.27	5.44	6.44	5.44	17.32
DK127	DeKalb Genetics Corp	1.67	1.61	1.30	1.16	5.74	6.29	5.24	17.27
Lahontan	USDA NV-AES	1.77	1.68	1.38	1.25	6.08	6.06	5.13	17.27
630	Garst Seed co.	1.57	1.60	1.28	1.19	5.64	6.19	5.34	17.17
Haygrazer	Great Plains Research	1.61	1.42	1.29	1.14	5.46	6.24	5.29	16.99
6L271*	Arkansas Valley Seed	1.40	1.58	1.32	1.44	5.74	6.11	5.07	16.92
ZC 9650'	ABI Alfalfa	1.42	1.55	1.28	1.21	5.46	6.01	5.30	16.77
Ranger	USDA NE-AES	1.28	1.28	1.17	1.10	4.83	5.25	4.71	14.79
Vernal	USDA WI-AES	1.29	1.25	1.01	0.94	4.49	5.39	4.51	14.39
Column Mean		1.67	1.58	1.33	1.26	5.84	6.35	5.36	17.55
LSD (0.05)		0.24	0.12	0.13	0.13	0.48	0.42	0.31	0.94
cv (%)		10.28	5.32	6.82	7.25	5.90	4.72	4.12	3.79

'Yields calculated on oven-dry basis.

*Indicates experimental entry

Planted August 29, 1997 at 10.2 lbs. seed/acre

Chemical Control of the Alfalfa Weevil - 2000
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado

September 1999 through February 2000 was substantially drier than usual followed by March with three times the average (0.67") precipitation, then a very dry April and May, with less than half the long time average precipitation. Weevil populations were low and present for only a limited period of time. Economically important damage did not occur and at first cutting was not visible. Pea aphid populations were low.

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

All insecticide treatments were applied May 4, 2000, at the time the plants were about 20" 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. Visible damage was not apparent at harvest time. Pea aphids were not a factor.

Test Plot Information - 2000

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. = 100th acre

Design - Randomized complete block (3 replications)

Variety - AV-177 - 4th year

Herbicide - Sencor 75 DF .50 lbs. + Gramoxone 2.5E .47 lbs. AI/Acre - 2/22/00

Plant - March 12, 1997

Treat - May 4, 2000

Frank C. Schweissing

Table l.-Chemical control of the alfalfa weevil on alfalfa. Sweep Counts. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Treatment[1]		AI[2]	Alfalfa Weevil[3]				Pea Aphid	
			Larvae		Adults			
			5/12	5/20	5/12	5/20	5/12	5/20
Mustang	1.5EW	.038	0.00	0.00	3.50	14.17	2.67	2.33
Furadan	4F	.50	0.00	0.17	0.67	4.67	0.33	1.33
Warrior T	1CS	.03	0.17	0.00	3.17	6.67	0.17	0.00
Steward	1.25SC	.11	0.17	0.17	0.00	1.00	9.17	3.67
Mustang	1.5EW	.05	0.17	0.17	4.17	12.33	0.33	0.67
Baythroid	2E	.035	0.33	1.00	1.67	8.50	0.50	2.00
Steward	1.25SC	.065	0.83	0.50	0.33	1.33	5.00	5.67
Lorsban	4E	.50	0.83	1.00	1.00	6.67	0.33	1.67
Pounce	3.2E	.20	4.33	1.17	4.17	7.17	0.00	0.33
Lannate LV	2.4WS	.90	3.83	2.33	2.33	1.50	2.50	2.17
Untreated			13.67	3.17	1.00	2.00	7.17	3.17

1 - Treated - May 4, 2000 + Dyne-Amic .005 VN

2 - Active ingredient per acre

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

2000 Pinto Bean Trials
Arkansas Valley Research Center

This is the eleventh year a variety trial has been carried out at this Center in recent years. Yields were much above average and the overall trial average was the second highest in the eleven years. This years trial average was 3664 lbs./acre compared to 2749 lbs./acre in 1999, 2134 lbs./acre in 1998, 2461 lbs./acre in 1997, 3419 lbs./acre in 1996, 1599 lbs./acre in 1995, 3 129 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 a below average year for precipitation at 9.60". Rust was not a problem

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
2. Test Weight
3. Seeds/lb.

Plot - 32' X 10'(4 rows)

Design - Randomized complete blocks (3 replications)

Varieties - 30 entries

Fertilizer - 50 lbs. P_2O_5/Acre + 10 lbs. N/acre - 10/20/99

Herbicide - Treflan 4E .75 lbs.AI/Acre + Eptam 7E 3.0 lbs.AI/Acre - 6/3/00

Insecticide - none Fungicide - none

Plant - June 5.2000

Irrigate - 6/6, 6/13, 7/8, 7/27, 8/7

Harvest - Cut - 9/12; Lift-9/14; Thresh - 9/14 - 4 rows, 32' long

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

Yields of pinto bean varieties in the 2000 trial at the Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado.

Variety	Origin	Yield	Test Average	Moisture	Seeds
		lbs./A	%	%	#/lb.
Bill Z	Colo. State Univ.	4240	116	11.3	1079
GTS Cob 502-04	Genetic	4024	110	10.9	970
CO83778	Colo. State Univ.	4023	110	11.4	944
Cisco	Novartis Seeds, Inc.	4015	110	15.0	982
co74905	Colo. State Univ.	3994	109	13.2	1029
CO64342	Colo. State Univ.	3986	109	11.6	1037
97: 197P	Univ. of Idaho	3971	108	13.9	1049
CO64155	Colo. State Univ.	3942	108	13.4	1030
CO74630	Colo. State Univ.	3929	107	11.3	1062
97:395P	Univ. of Idaho	3925	107	14.5	1000
co64599	Colo. State Univ.	3846	105	12.8	1075
Chase	Univ. of Nebraska	3838	105	12.0	1090
Elizabeth	Fox Bean Co.	3762	103	12.1	1035
Montrose	Colo. State Univ.	3747	102	11.9	1020
Poncho	Novartis Seeds, Inc.	3739	102	11.5	1058
co75714	Colo. State Univ.	3733	102	11.4	1186
Othello	USDA	3730	102	12.6	1047
USPT-73	USDA	3678	100	11.5	962
Buster	Asgrow Seed Co.	3659	100	13.4	1015
93:219P	Univ. of Idaho	3578	98	11.5	1062
Burke	Wash. State Univ.	3558	97	11.0	**1000**
co75944	Colo. State Univ.	3546	97	12.6	**980**
CO64589	Colo. State Univ.	3508	96	11.1	1150
co7551 1	Colo. State Univ.	3402	93	10.6	1191
CO74518	Colo. State Univ.	3305	so	11.5	1130
94:1023P	Univ. of Idaho	3303	so	18.8	1123
Buckskin	Novartis Seeds, Inc.	3258	89	14.1	1143
CO74527	Colo. State Univ.	3246	89	10.5	1171
Kodiak	Mich. State Univ.	3162	86	12.5	1005
CO74526	Colo. State Univ.	2836	77	11.0	1073
Average		3664		12.4	1057
CV%		10.0			
LSD(.30)		314.8			

Plant - **June 5, 2000** Harvest - September 14, 2000

Fertilizer - 50 lbs. P_2O_5 + 10 lbs. N/Acre

Rust was not a factor in this years test.

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)
c o	Colorado State University experimental lines with resistance to rust
Eliiabeth	A variety from Fox Bean Co. with rust resistance.
GTS Cob 502-94	An experimental line from Genetic in Twin Falls, Idaho.
Kodiak	A variety from Michigan (P94207) with rust resistance.
Montrose	A variety released from Colorado State University in 1999 (CO5 1715) 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.
97:, 94; 93:	Experimental limes from the University of Idaho.

2000 Corn Grain and Silage Variety Trial
Arkansas Valley Research Center

The average grain yield in this trial was 233 bushels per acre, greater than any in the previous 10 years. In 1999 trial average was 206 bu., 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 39 tons per acrecomparedto 1999-33T., 1998-40T., 1997-32T., 1996-36T., 1995-35T., 1994-33T., 1993-27T., 1992-41T., 1991-37T., and 1990-31T. The average silking date for this trial was 2 days earlier than 1999. 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.

Teat Plot Information

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

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

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

Design - Randomized complete blocks (3 replications)

Varieties - Gram-24 entries Silage-20 entries

Fertilizer - 50 lbs. P_2O_5/A + 10 Ibs. N/Acre - 10/20/99
175 lbs. N/A as NH_3 - 1 1/16/99

Herbicide - Bladex 1.5 lbs. + Dual II 1.15 lbs. + Gramoxone .3 1 AI/Acre - 4/27/00

Insecticide - Comite II 1.5 lbs. AI/Acre - 7/15/00
Capture .08 lbs. AI/Acre - 7/23/00

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

Plant - May 4, 2000

Irrigate - 5/8, 6/1 1, 6/24, 7/7, 7/28, 8/8, 8/18, 9/21

Harvest - Silage - September 14, 2000 - Forage harvester
Gram - October 26, 2000 - Self-propelled two row plot combine

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

Irrigated corn performance at Rocky Ford' in 2000.

Hybrid	Yield	Grain Moisture	Test Weight	Plant Height	Density	Lodging	Silking[2]
	bu/ac	%	lb/bu	in	plants/ac	%	date
Pioneer brand 33P67 (BT)	268	20.2	61.5	94	33214	1	198
Novartis N67-T4 (BT)	266	18.8	57.9	92	33487	0	196
Grand Valley GVX5458	250	17.7	58.2	95	31762	0	198
Garst 8546	248	21.8	57.7	93	33124	0	197
Grand Valley SX1600	247	19.2	59.4	109	31490	3	202
Mycogen2725	246	21.2	57.6	89	32035	0	197
DEKALB DK611	246	15.4	59.6	92	33396	1	198
Pioneer brand 33B51 (BT)	246	21.2	59.7	90	30855	0	196
AgriPro 9570 (BT)	243	21.4	58.7	95	32942	1	196
Pioneer brand 3 1A13 (BT)	242	19.2	59.8	96	31490	1	200
Grand Valley SX1300	241	19.2	57.6	92	31036	1	196
Pioneer brand 32R42	237	18.9	60.2	92	30220	2	199
Novartis N7070 (BT)	237	16.8	57.6	94	31672	0	197
Kaystar KX-920	236	25.4	56.4	96	32942	0	198
Triumph 15 14A (BT) (IMI)	234	20.3	57.4	94	31218	3	199
Mycogen 2784 (BT)	234	16.8	57.9	99	33578	1	196
Grand Valley GVX4478	233	19.7	57.4	93	30310	1	197
DEKALB DK655	217	20.5	60.2	92	30129	1	198
DEKALB DK647 (BTY)	211	20.3	56.7	103	31036	0	199
Asgrow RX799 (BT)	209	23.4	59.7	98	30764	0	199
Pioneer brand 31698	204	22.3	59.9	99	32126	1	203
Asgrow RX889	203	27.3	58.8	91	31309	5	200
Grand Valley GVX0145	195	25.7	57.1	103	29584	2	203
Grand Valley GVX5345	193	26.0	56.9	107	30764	1	203
Average	233	20.8	58.5	96	31687	1	198
CV%	6.8						
$LSD_{(0.30)}$	13.5						

'Trial conducted on the Arkansas Valley Research Center; seeded 5/4 and harvested 10126. No ear drop.
'Julian date.

Corn silage performance at Rocky Ford' in 2000.

Hybrid	Yield	Moisture	Density	Plant Height	Silking[2]
	t/ac	%	plants/ac	in	date
MBS38 11 x Lfy 497L	45.3	52.2	31853	109	203
AgriPro HY9646	43.8	54.3	29403	104	203
Wilson E7004	43.1	55.6	29222	97	205
Asgrow RX891	41.3	53.9	30583	97	203
Grand Valley SX1602	40.7	53.9	31309	105	203
Wilson EDX5 1	40.1	58.4	31309	96	203
Garst 8315	39.8	55.5	30310	95	205
DEKALB DK679	39.4	51.5	31762	107	202
Pioneer brand 31B13 (BT)	39.3	57.6	31581	99	203
Pioneer brand 3 1G98	38.6	56.4	32398	101	204
Grand Valley GVX4601	38.6	55.6	30220	99	201
Pioneer brand 3 1R88	37.9	55.6	32398	105	204
Grand Valley GVX4681	37.8	55.3	31672	95	198
DEKALB DK647 (STY)	37.6	54.7	30583	101	200
Grand Valley GVX2416	36.6	57.8	26862	98	202
FR1064 x Lfy 419L	36.3	54.3	3 1944	116	202
Wilson E7005	35.7	58.5	28496	94	206
MBS3811 x Lfy 554L	34.9	60.3	28223	112	206
Grand Valley GVX4478	34.1	56.4	30492	93	198
Asgrow RX799 (BT)	32.7	56.5	31127	100	202
Average	38.7	56.0	30587	**101**	203
CV%	10.0				
$LSD_{,,30)}$	3.3				

'Trial conducted on the Arkansas Valley Research Canter; seeded 5/4 and harvested 9/14.
[2]Julian date.

2-Yr average irrigated corn performance at Rocky Ford, 1999-00.

Hybrid	Yield	Grain Moisture	Test Weight
	bu/ac	%	lb/bu
Garst 8546	238	17.8	57.9
Grand Valley SX1300	231	16.8	57.9
Mycogen 2725	230	17.5	58.0
DEKALB DK611	223	14.8	59.7
Novartis N7070 (BT)	220	15.3	57.8
DEKALB DK647 (BTY)	213	17.5	57.5
Asgrow RX799 (BT)	206	21.0	59.9
DEKALB DK655	206	19.6	60.1
Asgrow RX889	202	24.6	59.3
Average	219	18.3	58.7

2-Yr average corn silage performance at Rocky Ford, 1999-00.

Hybrid	Yield	Moisture
	t/ac	%
AgriPro HY 9646	40.6	57.7
Wilson E7004	38.9	59.6
Asgrow RX897	38.2	58.9
Garst Seed 8315	37.7	59.9
Pioneer brand 31B13 (BT)	36.9	60.1
DEKALB DK647 (BTY)	34.2	57.1
Asgrow RX799 (BT)	32.4	56.9
Average	37.0	58.6

Nitrogen Management Projects on Corn and Onion at AVRC

Dr. Ardell Halvorson and Mr. Curtis Reule, USDA-ARS, Fort Collins, CO
Dr. Frank Schweissing and Dr. Mike Bartolo, AVRC, Rocky Ford, CO

Problem: High nitrate-N (NO_3-N) levels have been reported in groundwater in the Arkansas River valley in Colorado, which is a major producer of melons and vegetable crops grown in rotation with alfalfa, corn, sorghum, winter wheat, and soybeans. Relatively high rates of N fertilizer are used to optimize crop yields and quality, generally without regard to soil testing. Vegetable crops generally have shallow rooting depths and require frequent irrigation to maintain market quality. High residual soil N levels, high N fertilization rates to shallow rooted crops, shallow water tables, and excess water application to control soil salinity all contribute to a high NO_3-N leaching potential. Application of slow release fertilizers to crop rotations that include vegetables/melons could potentially increase nitrogen use efficiency (NUE) and reduce nitrate-N leaching potential. Nitrogen management research is needed to develop improved NUE and N management practices for these furrow irrigated crop rotations. Improved N management practices for melon, vegetable and field crop rotations in the Arkansas River Valley should optimize crop yields while minimizing N fertilizer impacts on ground water quality.

Nitrogen fertilizer rate studies under conventional tillage, furrow irrigation are being conducted on a Rocky Ford silty clay soil at the CSU Arkansas Valley Research Center (AVRC) at Rocky Ford to evaluate the N fertilizer needs for optimum onion and corn yields. Soil N levels are being monitored before N fertilization to evaluate the NUE by each crop. Slow release N fertilizers are being tested to determine the potential to increase NUE and reduce NO_3-N leaching potential in comparison to regular N sources such as urea.

Research Objectives of N Work at AVRC:

1. Determine nitrogen (N) uptake patterns and N fertilizer use efficiency of onions.
2. Determine N fertilizer needs for optimizing onion and corn yields.
3. Determine if slow release N fertilizer will improve N fertilizer use efficiency by onion and corn and reduce the potential for NO,-N leaching and groundwater contamination.
4. Develop improved N management practices for crops grown in Colorado Arkansas Valley area.

Research Approach in 2000:

Six broadcast N rates were established for the grain corn study (0, 50, 100, 150, 200, and 250 lb N/a) in 2000. Corn total biomass, grain yield, N uptake, and soil NO,-N were measured. The onion study in 2000 included five banded N rates for onion study (0, 50, 100, 150,200) that included urea, Meister, and Polyon N fertilizers. Onions were sampled during the growing season from the 0,100, and 200 lb N/a N rates to determine N uptake patterns. Plant and soil N analyses are in progress on the 2000 samples. Randomized block, split-plot designs were used. Statistical analyses of the data were performed using SAS.

Results:

Previous Nitrogen Projects On Onion. In March 1998, USDA-ARS and AVRC scientists initiated a N fertilizer study on onions. The study was located on a plot area that was fallowed for the latter part of 1997. Soil NO_3-N was high (see Figure 1) in March 1998, with a total of 701 lb N/a in the 6 ft profile. Soil NO_3-N level in the 0 - 2 ft depth was 317 lb N/a. Fertilizer labeled with ^{15}N was band applied at a rate of 100 lb N/a on May 20 and on June 13, 1998 for a total N application of 200 lb N/a to determine the N fertilizer use efficiency of onions. A plot receiving no N fertilizer was also included in the study. In 1998, the fresh bulb yield for the 200 lb N/a treatment yielded significantly more than the plots receiving no N fertilizer (Figure 2). The results show that 11% of the fertilizer N applied on May 20th and 19% of the N applied on June 13th was taken up by the onions. The average amount of fertilizer N taken up by the onions in 1998 was 15%. The data also showed that the N fertilizer applied in May and June was leached below the onion root zone and was detected at the 6 ft soil depth in September 1998.

In 1999, corn was grown on the onion fertilizer plots with no additional N fertilizer applied to determine if corn could recover more of the fertilizer N not used by onion. In April 1999, the soil profile of the onion plots receiving 200 lb N/a was still high (Figure 1) and still fairly high in the plots receiving no fertilizer N. Both treatments still had enough residual soil NO_3-N in the 6 ft profile to produce a 300 bu/a corn crop. The 1999 corn yields were 239 bu/a for the no fertilizer N plots and 234 bu/a for the plots receiving 200 lb fertilizer N/a in 1998. The corn recovered an additional 12% of the 200 lb/a of fertilizer N applied to onion in 1998. Thus the onion and corn crops combined recovered 27% of the fertilizer N applied in 1998. Residual soil NO_3-N was still high in November 1999

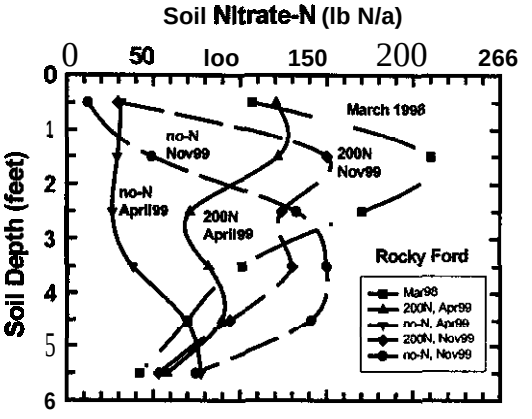


Fig. 1. Soil nitrate-N during ^{15}N study on onion in 1998 and corn in 1999.

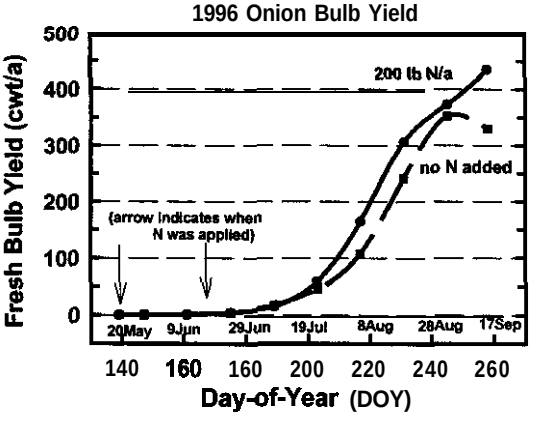


Fig. 2. Onion yield as function of N rate and date.

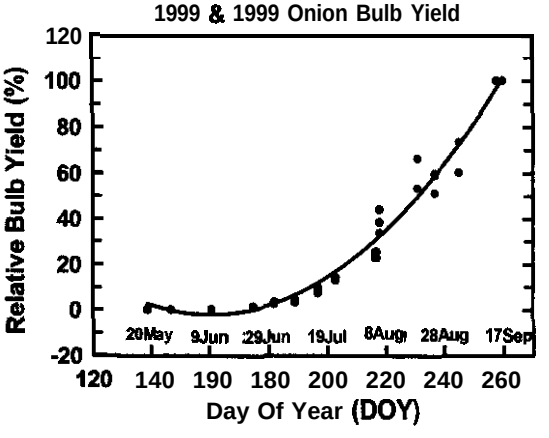


Fig. 3. Relative onion bulb yield as function of date

following corn harvest.

This research suggests that obtaining a soil test before making N fertilizer application would be helpful'm preventing application of unneeded N fertilizer. The data suggests that delaying N application to onions until mid-June to early-July would improve N fertilizer use efficiency. The relative yield (Figure 3) and N uptake (Figure 4) curves determined in 1999 and 1998 for onion show that the N requirements of onion is very low up until early July. Frequent irrigation is needed in the early growth stage for onion survival and establishment. Delaying N application until mid-June to early-July would reduce the potential for leaching the fertilizer N out of the root zone. The ^{15}N data showed that a large portion of the fertilizer N was moved toward the center of the 44 inch onion beds with the irrigation water, with much of the fertilizer N remaining in the upper portion of the root zone. If corn could be grown on these onion beds, fertilizer N recovery and use could possibly be improved.

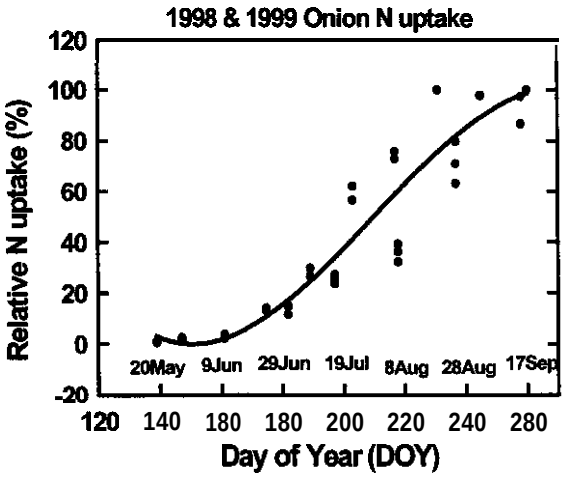


Fig. 4. Relative N uptake as a function of harvest date in 1998 and 1999.

The additional N uptake data collected in the 2000 N study on onion will be combined with that from previous years to develop improved N uptake curves for onion. The N rate and source (including slow release N fertilizers) study details and data will be reported by Dr. Mike Bartolo.

Nitrogen Rate and Source Study on Corn. AN rate and fertilizer source study on corn was initiated in 2000 on a plot area that had previously been in alfalfa for 5 years, before being plowed up on 20 October 98. Fertilizer application to the alfalfa was two applications of 150 lb P_2O_5/a as 11-52-o which added 64 lb N/a during the five years of alfalfa. Watermelon was produced on the plot area in 1999 with 100 lb P_2O_5/a applied as 11-52-o which contained 21 lb N/a. Corn was produced in 2000 with 50 lb P_2O_5/a applied as 11-52-o which contained 11 lb N/a. Six N fertilizer rates of urea and polyon (slow release N fertilizer) were applied. The slow release N fertilizer was applied to determine if the slow release fertilizer would improve fertilizer N use efficiency and corn yields and reduce NO_3-N leaching potential. Total corn biomass production, grain yield, plant N uptake, and residual soil NO,-N are being determined.

Analysis of soil samples collected in April 1999 from the plot area shows that the soil NO,-N in the profile was concentrated in the O-2 ft soil depth, with low levels of NO_3-N at deeper depths (Fig. 5). The total amount of NO,-N in the 6 ft profile was 114 lb N/a. Following the watermelon crop, soil Nitrate levels in November 1999 had decreased in the top 2 ft but increased in the deeper soil depths. The total amount of NO,-N in the 6 ft profile was 157 lb N/a in November of 1999. In April 2000, soil NO_3-N levels in upper part of the soil profile had increased, with a total level of 180 lb N/a in the 6 ft profile. Thus soil NO_3-N levels just prior to

N fertilization and corn planting was relatively high, despite the fact that little N fertilizer had been applied during the previous 6 years. The question is, what is the source of this high level of residual soil N?

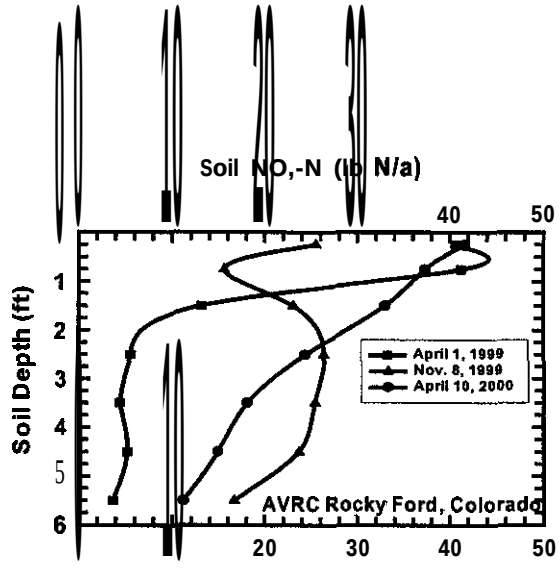


Fig. 5. Soil profile nitrate-N for 1999 watermelon crop and 2000 corn crop.

Watermelon was planted May 18, 1999 on the plot area and harvested in late August and early September. By August 25, 1999, the total oven dry biomass produced (tops + melons) was 12,094 lb/a with the tops contributing 4,098 lb/a of this total. About 124 lb N/a was returned to the soil in the tops, which had a C/N ratio of 13. At this C/N ratio, the tops would decompose rather rapidly when combined with the soil, with a release of N for following crop. At harvest on August 25th, the rind made up 29.5% of the oven dry melon weight. Assuming that 50% of the melons were of harvestable size (>18 lbs), the rind on the unharvested melons left in the field could have contributed 35 lb N/a back to the soil. With a C/N ratio of 14, the rind would decompose rather rapidly. Assuming that the fruit or meat part of the unharvested melons contained about 1% N, an additional 30 lb N/a could possibly have been returned to the soil. When the unharvested melons and tops were destroyed by disking, microbial decomposition of the melon biomass was initiated. This could explain the increase in soil NO_3-N measured in the profile from November 1999 to April 2000. The amount of N in the watermelon tops and unharvested melons could potentially contribute up to 184 lb N/a to the next crop. This might explain the unexpected high level of soil N at corn planting in 2000.

The corn was planted on April 27, 2000 at a seeding rate of 28,336 seeds per acre. The fertilizer N was broadcast applied and incorporated just prior to planting. Corn grain yields were not significantly increased by N fertilization in this study in 2000. Nitrogen fertilizer source had no significant effect on grain yield. The overall average grain yield was 254 bu/a for the study. The lack of response to N fertilization should probably be expected, given the high level of soil NO,-N in the 6 ft profile (181 lb N/a) in early April 2000.

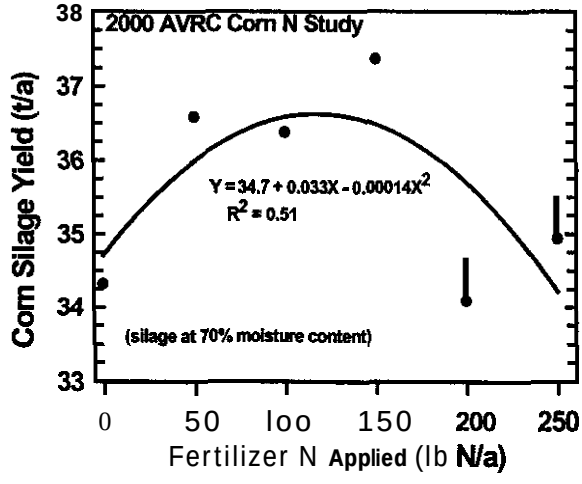


Fig. 6. Corn silage yield as function of N rate in 2000

Corn silage yields (70% moisture) on 9 September 2000 increased

significantly with increasing N rate up to 150 lb N/a then declined with increasing N rate (Fig. 6). The slow release Polyon N source resulted in higher silage yields (36.1 t/a) than with urea (35.2 t/a) (P=0.106 significance level).

Corn plant stands were affected by fertilizer N source and N rate. Plant populations decreased as N rate increased for urea (Fig. 7). Plant populations were greater with Polyon than with urea. The N rate x N source interaction was significant (P = 0.077). The data show that as the rate of urea-N increased above 150 lb N/a, the plant population was reduced. These data would suggest that if high rates of urea are to be applied at planting, a split application may be desirable to avoid a negative effect on plant population. The decrease in plant population at the 200 and 250 lb/a N rates, especially with urea, explains the decrease observed in corn silage yields at these N rates. In contrast, corn grain yields were maintained at these high N rates despite the lower population. Thus the corn plants at the high N rates compensated with larger ears, and on some plants two ears were produced.

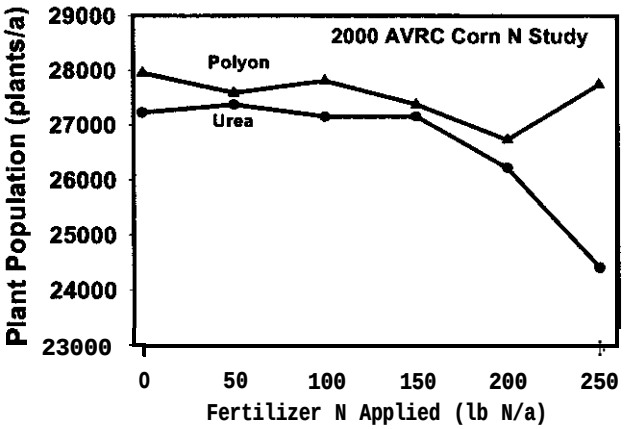


Fig. 7. Corn plant population at harvest as a function of N rate and source in 2000.

The N level in the irrigation water is monitored by AVRC throughout the growing season. We used this information along with number of irrigations and amount of irrigation water applied to calculate an estimate of N added to the cropping system by irrigation. The N contribution from the irrigation water to the plot area would have amounted to about 6 lb N/a in 1999 while irrigating the watermelon and about 15 lb N/a in 2000 while irrigating the corn. Although the irrigation water contributes some N to the cropping system, it does not appear to be the major contributor to the high levels of NO_3-N found in the soils at AVRC.

The corn N study will be continued on the same plots in 2001. Nitrogen fertilization effects on residual soil nitrate-N levels will be monitored.

Acknowledgment

The authors wish to thank Patti Norris, Marcella Causton, Kevin Tanabe, and Marvin Wallace for their field assistance and analytical support in processing the soil and plant samples and collecting the data reported herein.

Evaluation of Corn Borer Resistant (Bt) Hybrids
to the Southwestern Corn Borer - 2000
Arkansas Valley Research Center

Eighteen corn hybrids, including 16Bt and 1 non-Bt hybrids, were evaluated for resistance to the southwestern corn borer(SWCB), *Diatraea grandiosella* Dyar. All of the Bt hybrids had substantially reduced SWCB infestations when compared to the non-Bt hybrid and significantly increased yields. The corn earworm, (CEW) *Helicoverpa zia* (Boddie) was not a factors in this year's test.

We did not consider the small CEW infestation this year because in trials during 1997 and 1998, the presence of CEW infestations without the SWCB did not result in any yield reduction in the non-Bt hybrids as compared to the Bt hybrids and a number of the Bt hybrids had CEW infestations as great or greater than the non-Bt hybrids.

The infestation (SWCB) rate for the non-Bt variety Mycogen 2725 was 77%. The overwintering (2000-2001) survival rate in the non-Bt variety was an average 36% as measured on March 27, 2001.

Test Plot Information

Date - 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 - 50 lbs. P_2O_5 + 10 lbs. N/Acre - 1 l/l 1/99
150 lbs. N as NH, - 11/16/99

Herbicide - Bladex 1 .0 lbs. + Dual II 1.15 lbs. + Gramoxone .3 1 lbs. AI/Acre - 5/18/00

Acaricide - none

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

Plant - May 10, 2000

Irrigate - 5/1 1, 6/26, 7/6, 7/22, 8/5, 9/12

Harvest - October 27, 2000 - self-propelled two row plot combine

Frank C. Schweissing

Table L-Grain yields of corn borer resistant (Bt) and non-resistant corn hybrids. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

		Grain Yield'			%[3]
Hybrid[1]	Brand	Bu/Acre	Moisture %	Bu.Wt.	Broken/Lodged
DK647 Bty	DeKalb	212.30	16.2	55.6	<1
H9230 Bt	Golden Harvest	206.66	15.5	56.7	<1
8559 Bt RR	Garst	204.62	14.9	56.1	1
714 Bt	Producers	203.00	14.5	56.3	0
AP9570 Bt	Agripro	201.29	15.4	56.8	<1
RX 686 RR YG	Asgrow	200.36	14.5	55.3	0
H9533 Bt	Golden Harvest	199.57	19.9	55.4	<1
N67T4	NK Brand	198.94	15.7	56.6	<1
7922 Bt	Cargill	197.45	18.6	58.4	0
RX799 Bt	Asgrow	197.07	20.2	58.3	<1
6920 Bt	Cargill	196.48	15.9	57.2	<1
1141 Bt	Triumph	196.18	15.8	57.0	<1
8530 Bt	Garst	192.30	16.2	56.9	<1
717 Bt	Producers	191.63	16.2	57.0	<1
DKC63-22	DeKalb	190.47	18.2	56.6	<1
N65A1	NK Brand	188.94	14.3	57.5	<1
1514 A Bt	Triumph	187.34	17.4	55.7	<1
2725*	Mycogen	113.56	17.7	55.0	77
Column Mean		193.23			
LSD(0.10)		20.46			
CV%		8.94			

1 -Plant -May 10, 2000 'Not Bt

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

3 - Percent of all stalks broken or lodged for each treatment.

Harvest - October 27.2000

Chemical Control of the Southwestern Corn Borer - 2000
Arkansas Valley Research Center
Rocky Ford, Colorado
Frank C. Sehweissing

This was a good corn production year due to warm temperatures, above average corn growing degree days (3099) and plentiful irrigation water. Precipitation was just over 2 inches below normal but not an important limiting factor,

While this pest is an important limiting factor to corn production in Baca County on a more or less regular basis, it had only in the last two or three years moved into Prowers and Bent Counties due to very mild winters, which allowed the larvae to survive overwinter in the corn stalks. However, this was the first year in memory that this borer had reached high enough numbers to cause significant damage to corn throughout Otero County. Prior to this year it had occurred in Otero County in only small limited areas where they caused very little damage.

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

The two row plots were separated by four rows of corn which served as a buffer between plots to reduce the effect of chemical drift and maintain population pressure on the various treatments.

The treatments were applied July 27 and a second time on August 11 on half of each plot. Silwet at 10 oz./acre and Bond at 4 oz./acre were added to each treatment. The insecticides were applied with a compressed air sprayer, mounted on a Hahn Hi-Boy sprayer at 38 p.s.i. at the rate of 25 g.p.a.

Broken or lodged plants for each plot were counted on October 3, 2000. Corn was harvested for grain on October 26, 2000.

Results and Discussion - The various treatments resulted in significantly diierent yields and wide range of broken/lodged corn stalks. Untreated plots produced significantly lower yields than all of the other treatments. Warrior and Capture treatments resulted in the best yields at either 1 or 2 applications. Yields were not significantly different between the two treatments nor was 2 applications significantly better than 1 application. Furadan produced significantly less yield than Warrior and there was also a non-significant difference between 1 and 2 applications. Asana XL, Pounce and Lorsban had significantly lower yields than the previous three with 1 application and the 2 application rates were significantly better than the 1 application rate. There seemed to be a particular benefit for 2 applications of Pounce.

However, it appears considering the present low price of corn and the cost of insecticide applications that the use of 1 application of an effective insecticide would be of particular benefit to growers. Proper timing through the use of pheromone traps and field inspections would be important tools to use with single applications.

Test Plot Information - 2000
Arkansas Valley Research Center

Purpose - To evaluate the effectiveness of selected insecticides for the control of the southwestern corn borer *Diatraea grandiosella* Dyar, in corn.

Data - 1. Broken stalks, lodging
2. Grain Yields

Plots - Treated 87.12' long X 2 rows (5') wide = 435.6 sq. Ft. = 100th acre

Design - Split plot, randomized block (4 replications)

Variety - DK580RR

Fertiliir - 50 Ibs. P_2O_5 + 10 lbs. N/A - disc, 150 lbs. N as NH_3, chisel - preplant

Herbicide - Bladex 1.5 Ibs. + Dual II 1.15 lbs. + Gramoxone .3 1 lbs. AI/Acre - 4/28
Roundup 1 lb. AI/Acre - 6/6

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

Plant - May 2, 2000 Half Silk - July 12, 2000

Irrigate - 5/10, 6/9, 6/25, 7/8, 7/29, 8/15, 9/17

Treated - July 27, 1000 and August 11 - Hahn Hi-Boy, compressed air sprayer - 38 p.s.i. - 25 g.p.a. - TW12 cone nozzle

Harvest - October 26, 2000 - self-propelled two row combine

Frank C. Schweissing

Table 1.-Chemical control of the southwestern corn borer in corn. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Treatment[1]		AI[2]	1 Application[1]				Sig.[5]	Rank[6]	2 Applications[1]			
			Yield[3] Bu/A	Moist %	Test Wt. lbs/bu.	B/L[4] %			Yield[3] Bu/A	Moist %	Test Wt. lbs/bu	B/L[4] %
Warrior T	1	.03	184.43	14.5	58.1	2.3	N.S.	1	189.07	14.4	57.1	1.1
Capture	2EC	.08	179.15	14.8	59.0	4.6	N.S.	2	186.37	14.1	57.7	3.0
Furadan	4F	1.00	169.62	14.0	58.4	7.9	N.S.	4	174.19	14.3	59.6	3.0
Asana XL	.66EC	.05	158.37	14.3	58.7	12.7	*	5	172.89	14.2	59.2	8.7
Pounce	3.2EC	.20	157.13	15.0	56.2	10.0	*	3	182.95	14.6	58.1	1.9
Lorsban	4E	1.00	154.00	13.9	56.7	11.2	*	6	167.77	14.1	56.6	5.8
Untreated			136.75	14.7	55.3	22.9	N.S.	7	138.75	14.2	56.3	24.4
Average			162.78						173.14			
LSD(0.10)			9.27						12.37			
CV%			4.65						5.83			

1 - Treated - 1X - July 27, 2000; 2X - July 27 & Aug. 11, 2000

2 - Active insecticide per acre.

3 - Average yield per acre, 4 replications per treatment.

4 - Percent of all plants broken or lodged for each treatment. Four replications for each treatment.

5 - N.S. - not a significant difference between yields. * - significant difference t-test (0.10)

6 - Rank by yield for treatments with two applications.

BROAD SPECTRUM WEED CONTROL IN CORN
Colorado State University - Weed Science

Project Code: CORN1300

Location: ARKANSAS VALLEY RESEARCH CENTER
Site Description

Crop: CORN
Variety: NORTHRUP KING 73-Q3
Planting Date: 4/27/00

Plot Width: 10 FT
Plot Length: 30 FT
Reps: 3

Irrigation Type: FURROW

Soil Description

Texture	%OM	%Sand	%Silt	%Clay	pH	CEC
CLAY LOAM	1.6	44	23	33	7.8	

Application Information

	A	B	C	D
Application Date	5/5/00	5/19/00		
Time of Day	9:00 AM	1:00 PM		
Application Method	BROADCAST	BROADCAST		
Application Timing	PRE	POST		
Air Temp (F)	72	74		
Soil Temp (F)	65	74		
Relative Humidity (%)	60	32		
Wind Velocity (mph/dir.)	0	0		

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	CPA	PSI	I
BACKPACK CO2	3	FLAT FAN	11002LP	12 IN	20 IN	10 FT	22	24	

Summary Comments

The preemergence treatments were applied 8 days after planting, some weed emergence had occurred. The soil surface was dry, sub-surface moisture was good at time of applications. The post emergence treatments were rpplied over 4 inch tall corn at the 3 leaf stage, venice mallow (HIBTR) was cotyledon to 4 leaves, redroot pigweed (AMARE) was 4 leaves, and kochia was l-6 inches tall. All treatments provided excellent weed control with the exception of treatment 5 – ICIA5676/ZA1296, a premix of acetachlor and mesotrione applied preemergence. The ineffectiveness of treatment 5 may have been due to emergence of some weeds at time of application.

Tim Damato
Phil Westra
Frank Schweissing

Colorado State University
BROAD SPECTRUM WEED CONTROL IN CORN

Trial ID: CORN1300 Investigator: CSU
Location: ROCKY FORD Study Dir.: Wed Science

Trt NO.	Treatment Name	Form Amt	Frm Ds	Rate	Rate Unit	crow Stg	Appl Code	HIBTR CONTROL PERCENT 6-6-00	KCHSC CONTROL PERCENT 6-6-00	AMARE CONTROL PERCENT 6-6-00
1	CHECK							0.0 e	0.0 c	0.0 c
2	BICEP LITE II MAGNUM	6	L	1.5	QT/A	PRE	A	78.3 c	53.3 a	100.0 a
3	BICEP LITE II MAGNUM	6	L	1	QT/A	PRE	A	95.0 ab	100.0 a	94.7 a
3	BALANCE	75	DF	1.25	OZ/A	PRE	A			
4	BALANCE	75	DF	1.25	OZ/A	PRE	A	85.0 bc	53.3 a	96.7 a
4	AE F130360	70	DF	1.25	02./A	POST	3			
4	COC		L	1.5	PT/A	POST	3			
4	28% UAN		L	2	QT/A	POST	3			
5	ICIA5676/ZA1296	3.5	L	4.5	PT/A	PRE	A	20.3 d	35.0 b	51.7 b
6	TOPNOTCH	3.2	L	4 5	PT/A	PRE	A	91.7 ab	'6.7 a	100.0 a
6	ZA 1296	4	L	.168	PT/A	POST	3			
6	COC		L	1	% V/V	POST	B			
6	28% UAN		L	2.5	% V/V	POST	B			
7	OUTLOOK	6	L	16	OZ/A	PRE	A	96.3 ab	100.0 a	90.0 2
7	STARANE	1.5	L	a	OZ/A	POST	B			
7	AIM	40	DF	.33	OZ/A	POST	3			
7	NIS			.25	% V/V	'OST	B			
8	DUAL II MAGNUM	7.64	L	1.67	PT/A	PRE	A	90.0 ab	96.7 a	96.7 a
8	NORTHSTAR	51.4	DF	5	OZ/A	POST	3			
8	NIS		L	.25	% V/V	POST	3			
9	CELEBRITY PLUS	j j	DF	1.7	OZ/A	POST	3	95.0 ab	100.0 2	59.7 a
9	COC		L	1	% V/V	POST	3			
9	28% UAN		L	2.5	% V/V	POST	3			
10	BASIS GOLD	so	DF	14	OZ/A	POST	3	91.7 ab	96.7 a	100.0 a
10	COC		L	1	% V/V	POST	a			
10	28% UAN		L	2.5	% v/v	POST	B			
11	DISTINCT	70	DF	6	OZ/A	POST	B	100.0 a	100.0 a	100.0 a
11	COC		L	1	% V/V	POST	B			
11	28% UAN		L	2.5	% V/V	"CST	3			
12	ACCENT	75	DF	.66	OZ/A	POST	3	94.7 ab	100.0 a	36.7 a
12	AIM	40	D?	.33	OZ/A	POST	B			
12	COC		L	1	% V/V	POST	B			
12	28% UAN		L	2.5	% V/V	POST	3			
LSD (P=.05)								10.82	3.28	14.29
Standard Deviation								6.33	5.48	8.44
CV								8.09	6.5	3.87
Replicate F								0.300	1.202	0.289
Replicate Prob(F)								0.7436	0.3197	0.7538
Treatment F								12.323	103.384	38.1%
Treatment Prob(F)								0.0001	0.0001	0.0001

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

Winter Wheat Variety Trial - 1999-2000
Arkansas Valley Research Center

The average yield of 84.1 bushels per acre was about the same as the previous year. Range in yields was 94.3 bu. to a low of 70.1 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 - 15 varieties + 15 experimental lines or varieties no longer available

Fertilizer - 81 lbs. NO,-N in soil test
50 tbs. P_2O_5 - 10/20/99
57 lbs. N/acre as urea in irrigation water - 4/17/00

Herbicide - Bronate 1 lb. AI/Acre - 2/28/00

Insecticide - DiSyston 8E .75 lbs. AI/Acre - 4/13/00

Plant - September 29, 1999 900,000 seeds/acre

Irrigate - 9/30, 10/28, 4/17, 5/8, 5/24

Harvest - June 26, 2000 - small plot combine

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

Table 1.-Irrigated winter wheat performance trial. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Variety[1]	Yield[2]	Moisture	Test Wt.	Plant Ht
	Bu/Acre	%	lbs./bu.	inches
Venango	94.3	10.6	56.3	34
TAM 107	91.3	10.1	54.5	33
Nuplains	89.3	12.0	55.2	33
Trego	88.4	10.8	56.1	33
Enhancer	87.2	9.6	52.0	34
Jagger	86.8	10.1	54.3	33
Yuma	83.7	10.6	53.7	34
Prairie Red	82.0	10.0	54.2	32
Kalvesta	81.5	11.0	56.6	32
2137	80.9	9.5	51.6	32
Cossack	77.3	9.8	53.2	36
Wesley	75.2	10.1	53.5	31
Yumar	75.0	9.2	49.8	34
Akron	74.4	9.9	53.9	33
Custer	70.1	10.3	54.7	32
Average	84.1	10.5	54.5	
CV%	12.3			
LSD(0.30)	8.8			

1 - Plant - September 29, 1999 900,000 seeds/acre Harvest - June 26, 2000
Varieties headed out week of May 8, 2000

2 - Grain yields are adjusted to 13% moisture, 60 lb. bushel

Fertilizer - 50 lbs. P_2O_5 + 10 lbs. N as 1 l-52-00 - October 20, 1999
81 lbs. N available - soil test
57 lbs. N in water as urea - April 17, 2000

Herbicide - Bronate 1 lb. AI/Acre - February 28, 2000

Insecticide - DiSyston .75 lbs. Al/Acre - April 13, 2000

Description of winter wheat varieties.

NAME AND PEDIGREE	ORIGIN	RWA	HD	HT	SS	COL	WH	LR	WSMV	TW	PC	MILL	BAKE	COMMENTS
2137 W2440/W9488A//2163	KSU-1995	S	5	5	2	3	3	7	4	4	6	4	4	Public release from Pioneer winter wheat donation to Kansas State University. Semidwarf, medium-early maturity. Good winterhardiness, good straw strength. Good barley yellow dwarf virus tolerance, very susceptible to stem rust. Good performance record in both dryland and irrigated CSU Variety Trials.
Akron TAM 107/Hail	CSU-1994	S	5	5	4	4	3	8	9	4	6	6	5	Semidwarf, medium-early maturity, vigorous fall and spring growth characteristics, closes canopy early in spring. Lax spike may contribute to enhanced hail tolerance. Excellent yield performance record in Colorado.
Alliance Arkan/Colt//Chisholm sib	NEB-1993	S	3	5	5	4	2	8	9	6	7	6	6	Medium-early maturing semidwarrf, short coleoptile, above average tolerance to root rot and crown rot. Excellent yield performance record in Colorado.
Cossack BCD1828/83	Goertzen-1998	S	7	7	5	6	NA	7	9	3	3	1	1	A private entry from Cargill-Goertzen. Medium-tall, medium-late maturity with marginal straw strength. Very good fall growth characteristics and milling and baking quality characteristics.
Custer F-29-76/TAM-105//Chisholm	OK-1994	S	4	5	3		5	6	9	4	5	4	7	Medium-maturity, short, with very good straw strength. Good performance record under irrigated conditions in Colorado. Very marginal baking quality characteristics.
Enhancer 1992 Nebraska Bulk Selection	Goertzen-1998	S	5	5	8	3	NA	7	6	7	5	6	6	A private entry from Cargill-Goertzen. Medium height and medium maturity. Poor straw strength (just slightly better than Scout 66) and very low test weight patterns. Very good fall growth characteristics.
Golden Spike Arbon/Hansel/4/Hansel/3/Cl14 106/Columbia/2/McCall	Utah St.-1999	S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Hard white winter wheat (HWW) developed by Utah State University. Bronze-chaffed, very good noodle quality characteristics, resistant to dwarf bunt and common bunt. Marketed by General Mills, first entered in Colorado Trials in 2001.
Halt Sumner/CO820026,F1// PI372129, F1/3/TAM 107	CSU-1994	R	2		3	4	3	9	7	6	2	4	1	Developed from a complex cross with 50% TAM 107 parentage. RWA resistant, semidwarf, early maturity, very good milling and baking quality characteristics.
Intrada Rio Blanco/TAM 200	OK-2000	S	4	3	NA	NA	NA	5	7	2	4	1	1	Hard white winter wheat (HWW) developed by Oklahoma State. Medium maturity, semidwarf, very good millling and baking quality. First entered in Colorado Trials in 2001.
Jagger KS82W418/Stephens	KSU-1994	S	1	4	6	4	8	8	4	6	2	6	1	Developed from cross between a Karl sister selection and a soft white wheat from Oregon. Bronze-chaffed, early maturing semidwarf, good tolerance to WSMV. Breaks dormancy very early, marginal winterhardiness. Very good baking quality characteristics.
Kalvesta Oelson/Hamra//Australia 215/3/Karl92	Goertzen-1999	S	4	2	3	4	NA	9	8	3	2	3	3	A private entry from Cargill-Goertzen, developed from a cross with 50% Karl 92 parentage. Medium-early, semidwarf. Good milling and baking quality characteristics.
Lakin Arlin/KS89H130	KS-Hays-2000	S	5	5	4	3	NA	9	5	4	6	4	3	Hard white winter wheat (HWW) developed by KSU program in western Kansas (Hays). Medium height, medium maturity. Suitable for both domestic (bread) and export (Asian noodles) uses. First entered in Colorado Trials in 2000.
Nuplains Abilene/KS831862	NEB-1999	S	8	1	2	3	NA	6	8	1	5	1	2	Hard white winter wheat (HWW). Medium-late maturity, semidwarf, excellent straw strength, very high test weight. Very good milling and baking quality characteristics. First entered in Colorado Trials in 2000.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), Coleoptile length (COL), winterhardiness (WH), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), Protein Content (PC), milling quality (MILL), and baking quality (BAKE).

* Ratings range from 0 = very early or very short to 9 = very poor, very late, or very tall.

NAME AND PEDIGREE	ORIGIN	RWA	HD	HT	SS	COL	WH	LR	WSMV	TW	PC	MILL	BAKE	COMMENTS
Prairie Red CO850034/PI372129//5* TAM 107	CSU-1998	R	1	2	4	5	3	9	5	4	4	4	6	Developed via "backcross transfer" of RWA resistance directly into TAM 107. Bronze-chaffed, semidwarf, early maturity. Very similar to TAM 107 except for its RWA resistance. Poor end-use quality reputation.
Prowers CO850060/PI372129//5* Lamar	CSU-1997	MR	7	7	7	8	2	6	7	2	2	4	2	Developed from the hackcross transfer of RWA resistance into Lamar. Moderately resistant to RWA, tall, medium-late maturity, very good milling and baking quality characteristics. Similar to Lamar, except oderately resistant to RWA.
Prowers 99 CO850060/PI372129//5* Lamar	CSU-1999	R	7	7	7	8	2	6	7	2	2	4	2	Developed from reselection within Prowers for improved RWA resistance. Tall, long coleoptile, medium-late maturity, high test weight and very good milling and baking quality characteristics. Very similar o Lamar and Prowers, except for improved RWA resistance.
Stanton PI220350/KS87H57//TAM-200/KS87H66/3/KS87H325	KS-2000	R	5	5	5	2	NA	2	5	3	6	1	4	RWA-resistant (different gene from CSU varieties), medium height and medium maturity. Good test weight. First entered in Colorado Variety Trials in 2000.
TAM 107 TAM 105*4/Amigo	TX-1984	S	1	2	4	5	3	9	5	4	5	4	7	Developed via "hackcross transfer" of Greenbug resistance directly into TAM 105. Bronze-chaffed, early maturing semidwarf, medium long coleoptile, good heat and drought tolerance. poor end-use quality reputation. Very susceptible to leaf rust.
TAM 110 (TX71A562-6*4/Amigo)*4/ Largo	TX- 1995	S	1	4	4	3	3	9	5	4	6	5	7	Developed via "backcross transfer" of an additional Greenbug resistance gene directly into TAM 107. Very similar to TAM 107. Marginal end-use quality. Good yield performance record in Colorado.
Trego KS87H325/Rio Blanco	KSU-1999	S	6	4	3	3	4	2	5	2	7	3	3	Hard white winter wheat (HWW) developed by KSU program in western Kansas (Hays). Medium maturity, semidwarf with, good straw strength, high test weight, and good end-use quality characteristics. Good dryland performance record in Colorado Variety Trials.
Venango Random Mating Population	Cargill-Goertzen-2000	S	6	4	3	3	NA	5	5	3	5	NA	NA	A private entry from Cargill-Goertzen. Medium-late semidwarf, very good straw strength, good test weights. Very good yield performance under irrigated conditions in CSU Variety Trials. Observed to shatter uite severely in 1999 (Lamar, CO dryland testing site).
Wesley KS831936-3//Colt/Cody	NEB-1998	S	4	3	2	4	3	7	7	8	3	4	2	(Medium-early, short, excellent straw strength. Good winterhardiness and baking quality characteristics. May be best adapted for high-input, irrigated production systems.
Wichita Early Blackhull/Tenmarq	KSU-1944	S	4	9	8	8	5	NA	NA	3	NA	4	7	all, early, very long coleoptile, very poor straw strength, strong tendency to shatter prior to harvest. (Long-term check variety)
Yuma NS14/NS25/2/2*Vona	CSU-1991	S	5	4	3	3	5	8	6	5	5	5	2	Developed from a complex cross with 75% Vona parentage. Medium maturity. semidwarf. very good straw strength. short coleoptile, good aking quality characteristics.
Yumar Yuma/PI372129//CO850034 /3/4*Yuma	csu-1997	R	5	4	3	3	5	8	6	4	7	5	2	Developed via "backcross transfer" of RWA resistance directly into Yuma. 'Medium-maturing semidwarf. Very good straw strength, slighly better than Yuma despite taller Stature. Good baking quality characteristics.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), Coleoptile length (COL), winterhardiness (WH), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), Protein Content (PC), milling quality (MILL), and baking quality (BAKE).

* Rating scale: 0 - very good, very early, or very short to 9 - very poor, very late, or very tall.

Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 2000.

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 19. HARVESTED: September 13.

EMERGENCE DATE: 7 days after planting. SOIL TEMP: 60^0 F.

IRRIGATION: Four furrow irrigations: May 22, July 1, August 1, August 17, total applied 18 acre-in/A.

PEST CONTROL: Preplant Herbicide: Roundup 1 lb. AI/A. Preemergence Herbicide: biinox 2 lbs. AI/A. Insecticide: None.

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

Month	Rainfall	GDD/2	>90F	>100F	DAPP
	in.		no. of days		
May	0.22	101	7	2	12
June	0.60	618	20	0	42
					73
August	1.86	793	29	16	104
September	0.22	278	13	1	117
Total	3.65	2541	96	20	117

/1 Growing season from May 19 (planting) to September 13 (harvest).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

CULTURAL PRACTICES: Previous crop: watermelons. Field Preparation: disc 2X, roller pack 2X, field cultivator, float. Cultivation: 2 X.

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

COMMENTS: Cloddy soil conditions resulting in not as good a stand as we expected. Hot, dry summer. Adequate supply of irrigation water. No lodging. Greenbugs were not a problem. Forage yields very good.

Table 1.-Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 2000'

Brand	Hybrid	Forage Type[2]	Days to 50% Bloom (No.)	Stand Plts/A[3] (1000 X)	Plant Ht. (Ins.)	Stage At Harvest[4]	Stem Sugar (%)	Dry Matter (%)	Forage Yield' (T/A)	Yield % of Test Avg.
BUFFALO BRAND	Buffalo Brand	ss	76	53.5	122	HD	9	42	42.19	123
BUFFALO BRAND	Grazex BMR 727	SS	82	55.5	104	SD	10	36	38.45	112
GARRISON & TOWNSEND	SG-BMR-201	SS	82	56.0	102	ED	9	33	37.00	108
BUFFALO BRAND	Grazex IIW	SS	71	54.0	111	HD	10	45	36.59	107
GARRISON & TOWNSEND	SG-BMR-301	SS	Veg	53.0	113	Veg	7	23	36.43	106
BUFFALO BRAND	Grazex II	SS	14	54.0	106	HD	10	37	34.86	102
BUFFALO BRAND	Canex II	FS	84	54.0	104	ED	12	34	34.61	101
BUFFALO BRAND	Canex	FS	I9	52.5	96	SD	12	33	34.14	100
BUFFALO BRAND	Grazex BMR 737	SS	76	55.5	102	HD	8	36	33.50	98
GARRISON & TOWNSEND	SG-BMR-100	FS	83	50.0	101	SD	5	31	32.62	95
BUFFALO BRAND	Grazex BMR 116	SS	83	49.5	104	SD	I	33	32.59	95
MYCOGEN	2725	corn	69	30.0	81	HD	7	41	31.09	91
(Check)	NB 305F	FS	87	57.0	108	SD	12	29	29.37	86
BUFFALO BRAND	Canex BMR 208	FS	80	52.0	91	HD	3	34	26.00	76
Average			I3	51.9	103		9	35	34.25	
LSD (0.20)									3.08	

1 - Planted May 19, 2000; Harvest September 13, 2000

2 -Forage Type: FS, Forage Sorghum; SS, Sorghum Sudan grass

3 -Plant Population per acre June 20, 2000

4 - seed Maturation: Veg, vegitative; 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, 1998-2000.

Brand	Hybrid	Forage Yields					Yield as % of Test Average		
		1998	1999	2000	2 Year Avg.	3 Year Avg.	1998	1999	2000
		(T/A)	(T/A)	(T/A)	(T/A)	(T/A)	(%)	(%)	(%)
BUFFALO BRAND	Buffalo Brand	38.04	33.51	42.19	37.85	37.91	120	110	123
BUFFALO BRAND	Canex	29.90	29.92	34.14	32.03	31.32	95	99	100
BUFFALO BRAND	Canex II	24.69	29.06	34.61	31.84	29.45	I8	96	101
BUFFALO BRAND	Canex BMR 208	23.95	29.69	26.00	27.85	26.55	76	98	76
BUFFALO BRAND	Grazex II	32.94	29.27	34.86	32.07	32.36	104	97	102
BUFFALO BRAND	Grazex IIW	35.02	29.73	36.59	33.16	33.78	111	98	107
BUFFALO BRAND	Grazex BMR 737	28.60	26.10	33.50	29.80	29.40	90	86	98
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	34.02	34.38	----	34.20	----	108	113	----
ASGROW	XP BMR I	30.43	27.75	----	29.09	----	96	91	----
(Check)	NB 305F	28.66	24.74	29.37	27.06	27.59	91	82	86
Average		32.05	31.38	33.91	32.85	31.05			

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

Performance of Greenbug Resistant Sorghum Hybrids in the Arkansas Valley, 2000

F. C. Schweissing[1]

This is a report of a gram sorghum trial with greenbug resistant hybrids conducted at the Arkansas Valley Research Center. The weather conditions were drier than normal through the growing season while temperatures were very warm. The annual precipitation of 9.60" was below the long term average (99 yr. = 11.88") for the first time since 1994. Predator populations were significant but not evenly distributed in the field. Greenbug populations between plots within an untreated variety could be highly variable.

TESTING PROCEDURE

Individual plots of each hybrid consisted of four rows 72 feet long and spaced 30 inches apart. Each plot was split by four foot alleys with one-half sprayed, at random, with insecticides. Each hybrid was replicated four times,

The trial area was fertilized with 150 lbs. Of nitrogen and 50 lbs. of P_2O_5 per acre. Plots were planted May 19, 2000 at 79,805 seeds per acre. Soil conditions were cloddy and dry and a pre-emergence irrigation was needed. A preplant application of glyphosate at 1 lb. ai/acre and a pre-emergence application of bifenox at 2 lbs. ai/acre provided weed control.

The trial area was irrigated four times: May 22, July 1, August 4 and September 19. Carbofuran (.5 lbs. ai/a) + chlorpyrifos (.5 lbs. ai/a) and PBO (.1 lbs. ai/a) were applied to the sprayed plots for greenbug control on August 3, 2000.

All plots were harvested October 27, 2000 with a self-propelled two row combine.

'Superintendent and Entomologist, Arkansas Valley Research Center, Rocky Ford, CO.

Table l.-Agronomic data for sorghum hybrids tested in the greenbug-resistant trial at Rocky Ford, 2000.

		Sprayed			Unsprayed		
Brand	Hybrid	Days to Bloom	Height	Test wt.	Days to Bloom	Height	Test wt.
		(No)	(In)	(Lbs)	(No)	(In)	(Lbs)
CARGILL	576	68	41	54.4	68	40	53.9
CARGILL	627	69	48	56.0	69	47	54.8
CARGILL	647	70	51	58.1	70	51	58.1
CARGILL	697	75	49	55.4	75	50	53.6
CARGILL	770Y	76	49	53.3	76	48	51.4
NC+	7Y57-K	82	54	53.7	82	52	52.7
TRIUMPH	TRX93390	69	47	56.1	69	49	55.4
TRIUMPH	TRX94090	73	52	56.3	73	51	56.7
TRIUMPH	TRx94891	74	51	56.7	74	51	56.9
DEKALB	x-914c	76	52	58.0	76	52	57.7
DEKALB	X-918c	79	57	55.2	79	54	54.5
DEKALB	x-944c	71	45	56.1	71	49	55.9
DEKALB	DK-44c	71	48	56.2	71	49	55.6
DEKALB	DK-53c	76	52	58.8	76	51	57.6
DEKALB	DK-54c	81	5.5	55.0	81	54	53.6
MYCOGEN	3636	72	43	53.0	72	41	52.3
MYCOGEN	3696	83	48	53.1	83	48	52.8
NOVARTIS	1486	72	43	52.6	72	42	51.6
NOVARTIS	1606	82	52	54.4	82	52	53.3
PIONEER	8500	68	47	57.7	69	48	56.7
PIONEER	8505	69	48	57.9	69	49	57.6
(Check)	399X2536	78	46	51.5	78	46	49.9
Average		74	49	55.4	74	49	54.7

RESULTS

Agronomic data for the hybrids in this trial is presented in Table 1. Greenbug activity did not influence the three factors to any great degree although the test weights for the unsprayed plots were somewhat lower than those in the sprayed plots. This was a relatively dry, warm year and the average days to bloom were less than recent years while degree-days during the growing season were above normal for our area (ca. 3099DD). Tbis was a good production year for grain sorghum in the trial, better than the 1997 overall treated trial average of 7503 lbs. per acre but not as good as the 1994 overall treated trial average of 9013 lbs. per acre.

Greenbug counts, obtained on August 9 and 17 in both sprayed and unsprayed plots, are presented in Table 2 as the average number of greenbugs per plant. The population was determined by counting the number of greenbugs on two plants in each plot. Greenbug counts in the untreated plots are an indication of relative levels of non-preference (antixenosis) and/or antibiosis factors in the plant. Overall populations were moderate in the untreated plots but the counts for several hybrids were as high or higher as those for the long time check variety (399X2536).

Four samples of greenbugs, collected from the trial area were sent to Dr. Gerald Wilde at Kansas State University for identification as to biotype and level of insecticide resistance. Fifteen subsamples were tested and twelve were found to be biotype I and three biotype K. Insecticide resistance varied from 11 to 18 percent in the samples. The convergent lady beetle, *Hippodamia convergens*, and the green lacewing, *Chrysopa spp.* were numerous in various areas of the plots and undoubtedly contributed to the variability in greenbug populations between plots within an untreated hybrid.

Yield loss indicates a combiition of damage to the plants by the greenbug populations present and level of tolerance to the infestation. Differences in yield between sprayed and unsprayed plots were highly variable for each hybrid. Some hybrids showed very little resistance/tolerance to the populations present in the untreated plots as indicated by the large yield differences. In other hybrids, populations were low in the untreated plots combined with low yield differences, Incremental differences occurred with other hybrids between the two extremes.

Growers interested in the yields that can be obtained from these hybrids should note the rankings in Tables 2 and 3. Significant differences occurred between hybrids in both the sprayed and unsprayed plots. Table 2 ranks the hybrids according to their yield performance in the unsprayed plots. Table 3 ranks the hybrids according to their performance in the sprayed plots. One of the hybrids produced higher yields in the unsprayed plots than their sprayed counterparts (Table 3).

This year is the first year since 1997 that greenbug populations developed to sufficient numbers to cause differences in yield between the sprayed and unsprayed plots of at least some of the hybrids. Two hybrids actually had greater yield differences between the sprayed and unsprayed plots than our longtime standard open pedigree hybrid (399X2536) although yields were substantially lower in the check.

It appears that predators and the parasite, *Lysiphlebus testaceipes*, have been very effective in reducing greenbugpopulations. The availabii of a number of greenbug resistant/tolerant varieties enhanced the predator/parasite effect along witb greater than usual rainfall, during the growing season, for most of the past ten years. Although biotype I and now K have been present in our fields since 1991 neither have caused major damage to commercial production, as yet.

Soybean Variety Trial - 2000
Arkansas Valley Research Center

This is the second soybean trial at the Center. Trials were initiated in 1999 due to a renewed interest in oil crops, in part, because of a new processing plant which has been established at Lamar. Precipitation was below normal through the growing season as was total precipitation for the year at 9.60". Irrigation water supplies were very good. Yields were substantially better than last year and **averaged** 66 bushels per acre for the trial compared to 53.7 bu. Per acre in 1999. Yields ranged from 57.5 bu. to 74.2 bu. per acre.

Test Plot Information

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

Data - 1. 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 - 10/20/99
Equivalent of 15 oz. of soybean innoculant/300 tbs. of seed

Herbicide - Pursuit .0626 lbs. AI/Acre - 6/6/00
Poast .28 lbs. AI/A + pt. Dash/A. - 6/20/00
Basagran 1 lb. + Blazer .25 lbs. AI/Acre - 6/23/00

Insecticide - none

Soil - Silty, clay loam, l-l.5 o.m., pH - ca. 7.8

Plant - May 31, 2000 174,240 seeds/Acre 30" rows

Irrigate - 6/1, 6/12, 7/8, 7/25, 8/10, 8/25, 9/15

Harvest - October 13, 2000 Self propelled two row plot combine

Frank C. Schweissing
James P. Hain

Table I.-Performance of soybean varieties at the Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Variety	Brand	Yield	Test Average	Test Weight	Moisture
		Bu./A	%	lbs./bu.	%
DKB 38-51	DeKalb	74.2	112	56.0	8.3
346 RR	Producers	72.4	110	56.2	8.5
5404	Mycogen	71.3	108	55.8	8.4
93851	Pioneer	71.2	108	56.1	8.4
5383	Mycogen	70.8	107	56.0	8.3
5370 RR	Mycogen	67.8	103	56.2	8.3
TR3750 RR	Triumph	67.6	102	56.4	8.4
93834	Pioneer	66.7	101	56.8	8.4
TR3939 RR	Triumph	65.7	99	56.6	8.7
CX391 RR	DeKalb	65.7	99	56.4	9.0
AG 3701	Asgrow	65.4	99	57.0	8.3
5316 RR	Mycogen	63.6	96	55.7	8.5
AG4101	Asgrow	63.4	96	55.7	11.8
TR4319 RR	Triumph	61.3	93	55.6	14.4
429 RR	Producers	60.9	92	56.9	8.9
94801	Pioneer	58.8	89	56.5	8.9
9396	Pioneer	57.5	87	56.6	8.3
Average		66.0			
CV%		7.2			
LSD(.10)		5.7			

Plant - May 31, 2000

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

Herbicide - Pursuit .0626 lbs. AI/Acre - 6/6
Poast .28 lbs. AI/Acre + Dash - 6/20
Basagran 1 lb. + Blazer .25 lbs. AI/Acre - 6/23

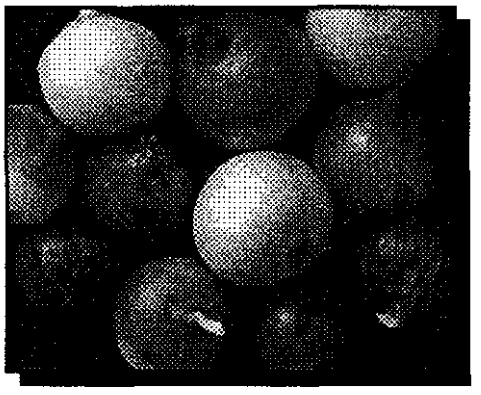
Fungicide - 0 Insecticide - 0

Harvest - October 13, 2000

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

Onion Varietv 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 timer in the trial.

Planted - March 9" and 10th, 2000

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

Insect Control - Lannate (0.9 lbs AI/A) +Warrior (0.03 lbs AI/A) -June 21'

Weed Control - Prefar (5 lbs. AI/A)-preplant, -Goal 1.6E - .2 lbs. AI/A - May 2nd . Dual Magnum - .95 lbs AI/A + Goal 1.6E - .18 lbs. AI/A Goal - May 22nd, Goal 1.6E - .18 lbs. AI/A June 19th
-Hoe - 2 times

Disease Control --Dithane F-45 (2.4 lbs AI/A) + Kocide (0.6 lbs AI/A) - July 11th (Aerial)
-Dithane F-45 (2.4 lbs AI/A) + Kocide (0.6 lbs AI/A) - July 29th (Aerial)
-Pencozeb 15DF (2.25 lbs AI/A) + Kocide DF(1.23 lbs AI/A)- August 8" (ground)
-Dithane F-45 (2.4 lbs AI/A) + Kocide (0.6 lbs AI/A) - July 11th (Aerial)

Irrigation - 14 times (approximately 2" each irrigation)

Harvest - September 13th

Grade - November 1st - 2nd

COMMENTS

Growing conditions were generally hot and dry during the 2000 growing season. The plots escaped storm injury and there was little incidence of any disease. Overall. the onions had excellent quality. The yields, however. were lower than expected. most likely a result of temperature and water stress during the bulbing period.

In general, the longer season varieties (i.e. Colorado 6) performed well under the 2000 conditions. In addition, two experimental white varieties by Petoseeds (PX901694 and PX901464) were some of the best whites that have been trialed to date.

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, 2000

Variety	Source	Maturity (% tops down) 8-28	Colossals ≥ 4" %	Jumbos 3"-4" %	Medium 2¼"-3" %	C J M CWT/A	Pre-Pack 1¾"-2¼" %	Total Market. CWT/A	Culls %	Total Weight CWT/A
Colorado 6	Burrell	10	15.4	54.6	18.1	485.9	0.4	488.1	11.4	552.0
Tequilla	D. Palmer	17	16.6	56.4	17.7	428.0	0.5	430.6	8.7	470.4
SXO-1430	Sunseeds	65	6.5	68.5	23.4	426.5	0.4	428.4	1.2	433.2
XPH97H33	Asgrow	42	3.6	66.3	18.7	424.7	0.5	427.6	10.3	483.7
Mesquite	D. Palmer	15	11.1	57.0	23.5	419.5	0.7	422.4	7.6	458.8
X-202	Waldow	15	12.9	46.3	32.3	414.3	1.3	420.2	7.0	450.3
T-434	Takii	12	4.9	58.9	31.9	409.1	1.1	4139	3.1	427.3
X-201	Waldow	15	7.9	54.8	26.8	406.1	0.7	409.4	9.8	454.8
T-433	Takii	17	6.1	54.8	36.5	399.4	0.9	403.1	1.6	409.5
Torero	Sunseeds	25	147	69.4	11.7	394.3	0.3	395.3	3.8	411.7
XP15234	Asgrow	52	22.9	54.8	7.4	388.3	0.3	389.8	14.6	457.0
Vision	Petoseeds	72	8.2	67.6	14.3	373.5	0.0	373.4	9.8	416.5
Quest	Petoseeds	90	19.8	55.5	14.2	369.0	0.3	370.1	10.2	409.5
PX901694 (W)	Petoseeds	47	6.7	64.9	15.9	366.4	0.3	367.9	12.1	413.2
Harvest Moon	Dorsing	27	6.0	44.8	39.6	357.9	0.4	359.7	9.1	396.1
SRO-1429	Sunseeds	12	1.4	64.7	32.3	356.0	0.7	358.6	0.9	361.9
XPH97H36	Asgrow	67	6.2	59.5	22.1	347.5	0.9	351.5	11.3	394.6
Vaquero	Sunseeds	87	1.1	60.4	31.0	348.9	0.8	351.5	6.6	374.6
XP15225	Asgrow	80	8.5	51.9	29.7	337.1	0.0	337.1	9.9	372.7
PX901464 (W)	Petoseeds	37	16.5	58.4	12.2	326.7	0.7	329.2	12.0	372.7
BGS 153	Bego	55	0.0	33.9	51.1	323.7	1.0	327.0	2.0	333.7

Variety	Source	Maturity (% tops down) 8-24	Colossals ≥ 4" %	Jumbos 3"-4" %	Medium 2¼"-3" %	C J M CWT/A	Pre-Pack 1¾"-2¼" %	Total Market. CWT/A	Culls %	Total Weight CWT/A
X-333	Waldow	92	1.4	44.9	51.8	309.6	0.9	312.5	0.9	314.8
PS663395	Petoseeds	80	0.0	70.1	26.3	307.4	0.7	309.9	2.8	318.9
XP15113	Asgrow	57	0.0	62.3	33.1	308.1	0.5	309.6	4.1	322.9
Mira	Asgrow	82	8.4	69.2	20.9	303.6	0.2	304.4	1.3	307.7
XP15129	Asgrow	65	0.0	71.0	26.6	302.6	0.6	304.0	1.8	309.2
SXO-1428	Sunseeds	72	2.7	69.8	24.7	287.3	1.9	294.0	0.8	297.7
Legend	Bejo	27	0.0	36.8	51.2	279.6	6.6	294.0	5.3	311.5
Kodiak	D. Palmer	77	0.0	54.3	37.4	282.1	1.5	286.6	2.7	294.4
Daytona	Bejo	22	3.9	39.3	51.6	273.2	3.0	282.8	6.1	301.1
Outrigger	Asgrow	87	0.0	50.4	47.0	261.7	1.1	264.7	1.4	268.8
Spinnaker	Asgrow	85	0.0	43.1	53.6	245.4	1.8	248.7	1.5	253.9
Redwing (R)	Bejo	15	0.0	29.5	53.0	220.1	3.3	227.9	14.2	266.2
Gladstone (W)	Bejo	27	0.0	33.8	49.4	207.9	5.3	221.6	11.3	251.7
Tradewind	Asgrow	85	0.0	46.0	52.0	213.8	0.2	214.2	1.8	217.5
Red October (R)	Dorsing	85	0.0	20.6	64.1	150.7	6.8	162.2	8.5	177.1
lsd (0.05) =						96.5		96.3		

High-value Crops Have Low Salinity Tolerance

Study evaluates onion varieties for salinity tolerance.

Crops differ in their ability to tolerate salinity. For example, barley and sugarbeet are known for their strong tolerance of salinity. Wheat, sorghum, alfalfa, and corn have moderate salinity tolerance. Peppers, onion, dry bean, and carrot have very low salinity tolerance. Hence, these high-value crops suffer the most under saline conditions. As salinity increases, growers may be forced to grow lower-value crops that have greater salinity tolerance. This shift may have severe consequences for agricultural profitability.

We started an experiment this year at the CSU Arkansas Valley Research Center which compares the response of different onion varieties to soil salinity. The variety evaluation included three yellow onion varieties (Colorado 6, Vision, and Daytona), one red onion variety (Redwing). and

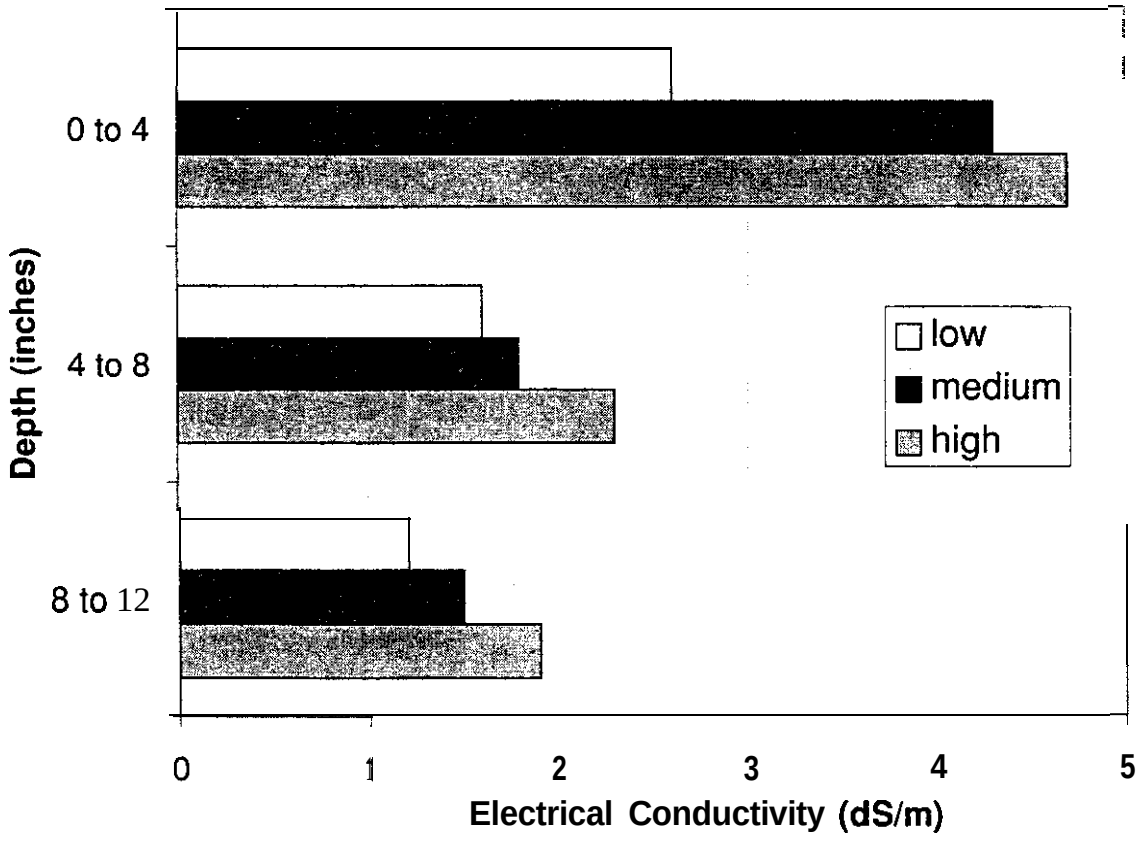


Figure 1. Soil-salinity levels in onion variety plots.

Tolerance

one white variety (Blanco Duro). We are testing these onion varieties at three different salinity levels. The three salinity treatments are low, medium, and high as shown in Figure 1 (page 18). The low level is the natural salinity level in the field area, and epsom salt ($MgSO_4$) was applied to achieve the medium and high salinity levels.

Yields were measured from each plot and graded by size, and data were analyzed in a split-block design. Salinity levels had no effect on total market yield or grade, but varieties were significantly different as shown in the table below. Colorado 6 had the highest colossal and jumbo yields. Colorado 6 and Vision had the highest total market weight, but Colorado 6 also had the greatest cull weight, while Vision had the lowest cull weight. Blanco Duro had the lowest total market weight, while Daytona and Redwing market yields were moderate.

The interaction between variety and salinity levels was not statistically significant. In other words, the trends described above were true at all salinity levels. Next year we will increase salt application rates so that we get soil salinity levels which are high enough to have a significant impact on onion yields.

Mike Bartolo
Extension vegetable crop specialist
Orren Doss
Graduate research assistant
Jessica Davis
Extension soil specialist

Table 1. Total market yield and grade of onion varieties averaged across salinity levels.

Variety	Colossal Weight (cwt/acre)	Jumbo Weight (cwt/acre)	Medium Weight (cwt/acre)	Pre-Pack Weight (cwt/acre)	Total Market Weight (cwt/acre)	Cull Weight (cwt/acre)
Colorado 6	7 A	296 A	131 c	8 BC	442A	62 A
Vision	OB	146B	273 A	12 AB	431 A	10 C
Daytona	OB	66 C	247 AB	13 AB	326 B	30 B
Redwing	OB	60C	236 B	16 A	311 B	10 C
Blanco Duro	2B	138 B	95 D	6C	241 c	13 c

Varieties with a common letter are not significantly different at $p<0.05$.

2000

FOLIAR DISEASE STUDIES

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

Objective: 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.

Experimental Design: Fungicide/bactericide treatments were applied in 25 gallons of water per acre with a CO_2 backpack sprayer. 8001 flat-tip nozzle (3 pet bed of 2 onion lines). Plots were 3.5' wide by 25' in length with a 3.5' border (1 bed - 2 lines) of untreated/inoculated onions between each plot, replicated 4 times in a randomized complete block design. The experiments were furrow irrigated at Rocky Ford. A companion experiment at ARDEC -Fort Collins was abandoned after poor stand establishment due to dry windy conditions post-planting and insufficient irrigation water early in the season.

FUNGICIDE SCREENING:

Treatments:		Product/Acre (unless otherwise stated):
1.	Control	--
2.	Pcnncozeb 75DF + Dynamic	2.25 lb ai + 0.25% v/v
3.	Penncozeb 75DF + TD-23X9-01 + Dynamic	2.25 lb ai + 0.40 lb + 0.25% v/v
4.	Penncozeb 75DF + Bravo 6F	1.13 lb ai + 0.75 lb ai
5.	Pcnncozeb 75DF + Bravo 6F + TD-2389-01	1.13 lb ai + 0.75 lb ai + 0.40 lb ai
6.	Quadris + Latron (Sprays 1,3,5)	0.15-0.20 lb ai + 0.06%
	Bravo Weather Stick Zn + Latron (# 2,4,6)	2.00 pt + 0.06%
7.	Auxigro + Kinetic. 1.5" and 30 dph	4.00 oz + 0.05%
8.	Auxigro + Kinetic, 1.5" end 30 dph	4.00 oz + 0.05%
	+ Manex + Kocide 2000 (all sprays)	2.00 pt + 1.50 lb
9.	Bravo 720 (Sprays 1,3,5)	841 g ai / Ha
	Switch 62.5 WG (Sprays 2,4,6)	615 g ai/Ha
10.	Rint 50WG (Sprays 1,4)	70 g ai/Ha
	Switch 62.5 WG (Sprays 2,5)	615 g/Ha
	Bravo 720 (Sprays 3.6)	841 g/Ha
11.	Scala 4osc	0.63 pt
12.	Scala 4osc	1.70 pt
13.	Walabi	1.70 pt
14.	Reason 4.17EC + Scala 40SC	0.35 pt + 0.63 pt
15.	Inferno (pre-crop)	3.00 gal
	Manex + Kocide 2000 (all sprays)	2.00 pt + 1.50 lb
16.	Inferno (pre-crop)	4.00 gal
	Manex + Kocidc 2000 (all sprays)	2.00 pt + 1.50 lb
17.	Inferno (post-crop)	3.00 gal
	Manex + Kocide 2000 (all sprays)	2.00 pt + 1 SO lb
18.	Inferno (post-crop)	4.00 gal
	Manex + Kocide 2000 (all sprays)	2.00 pt + 1.50 lb

Variety: Yellow Onion variety 'X 202' planted 08-13-00

Spray Dates:

07/11/00	no apparent fungal disease problems
07/18/00	ditto
07/25/00	ditto
08/01/00	ditto
08/08/00	ditto, 5 - 15% tip death from Xanthomonas/Pantoea
08/15/00	ditto, Inferno pre-crop
08/22/00	Inferno, post-crop (50% plants cropped over)
	trace Purple Blotch, no Blast observed

Inoculation Dates: 07/24/00 & 07/31/00 on spreader rows with *Botrytis allii* (10' conidia/ml); 08/15/00 on treated plots with *a* mixture of Botrytis, Blue Mold (*Penicillium* species) & Black Mold (*Aspergillus niger*) @ 10^7 conidia/ml

Disease Evaluation = % of foliage infected/killed by Xanthomonas/Pantoea Blight; 08/24/00.

Plots were not harvested since there was no foliar fungal disease pressure from Purple Blotch or Botrytis Blast to separate the effects of fungicide protection. On 9-15-00, a random sample of 20 large bulbs was topped, bagged and transported to ARDEC - Fort Collins for curing and a storage rot evaluation later in the fall.

000 Onion - Storage Rot Fungi Complex

	Foliar Disease (%) 8/24/00		Storage Rot (%) 11/11/00	
			% Botrytis	% Bacterial
1. Control A	26.25	Ab	18.75	35.00
2. Penncozeb + Dyneamic	23.75	abcd	25.00	17.50
3. Penncozeb + TD-2389-01 + Dyneamic	21.25	bcde	22.50	18.75
4. Penncozeb + Bravo 6F	25.00	abc	23.75	13.75
5. Penncozeb + Bravo 6F + TD-2389-01	25.00	abc	21.25	15.00
6a. Quadris + Latron 6b. Bravo Weather Stick Zn + Latron	23.75	abcd	18.75	30.00
7. Auxigro + Kinetic	18.75	de	8.75	31.25
8a. Auxigro + Kinetic 8b. Manex + Kocide 2000	18.75	de	18.75	11.2s
9a. Bravo 720 9b. Switch 62.5 WG	21.25	bcde	13.75	8.75
10a. Flint 50WG 10b. Switch 62.5 WG 10c. Bravo 720	23.75	abcd	13.75	20.00
11. Scala 40SC	18.75	de	17.50	16.25
12. Scala 40SC	16.25	e	18.75	13.75
13. Walabi	21.25	bcde	11.25	18.75
14. Reason 4.17EC + Scala 40SC	20.00	cde	17.50	21.25
15a. Inferno, pre crop 15b. Manex + Kocide 2000	26.25	ab	16.25	20.00
16a. Inferno, pre crop 16b. Manex + Kocide 2000	28.75	a	17.50	12.50
17a. Inferno, post crop 17b. Manex + Kocide 2000	20.00	cde	11.25	20.00
18a. Inferno, post crop 18b. Manex + Kocide 2000	21.25	bcde	17.50	20.00
Probability:	0.0843		1.0000	1.0000
% C.V.:	23.01		57.06	79.09
LSD:	6.052	0.10	n.s.	n.s.

Fungicide Results & Discussion:

The prolonged hot, dry conditions throughout the 2000 season did not favor natural outbreaks of Purple Blotch or other foliar fungal pathogens, or even favor development of Botrytis blast from the inoculated spreader rows.. The untreated control only expressed 18% infection by Botrytis after 8 weeks storage. and did not differ significantly from any of the fungicide treatments.

The secondary spread of bacterial pathogens from an adjacent nursery generated some background infection throughout the fungal nursery. In spite of this, the overall canopy vigor was visibly greater late in the season for treatments 8.9 and 1 1 - 14. The untreated control expressed 35 % rot from bacteria (mixture of Pantoea blight, sour skin. slippery skin) after 8 weeks storage. and many of these bulbs were firm but apparently infected at harvest. A few treatments such as those with a copper bactericide did show less infection, but none of the differences were significant.

Future research should continue to evaluate timely applications of these products under uniform disease pressure, hopefully with less extreme environmental conditions. Controlled inoculation with a pathogen such as Botrytis was successful, and a higher incidence with less variation can be achieved by direct inoculation of test plots upon completion of the pesticide protocol and prior to harvest. Inoculation of spreader rows with a pathogen like Botrytis with minimal secondary sporulation makes it difficult to promote uniform spread throughout a nursery, especially with hot dry conditions prior to and during harvest.

BACTERICIDE SCREENING:

Bactericide Screening Treatments:	Produce/Acre (unless otherwise stated):
1. Control	–
2. Manex + Kocide 2000	2.00 pt + 1.50 lb
3. ManKocide	2.25 lb
4. Champ DP + Dithane DF, start pre-bulb	1.00 lb + 1.00 lb
5. Champ DP + Dithane DF, start pre-bulb	1.00 lb + 1.50 lb
6. Champ DP + Dithane DF, start at bulbing	1.00 lb + l.OOlb
7. Champ DP + Dithane DF, start at bulbing	1.00 lb + 1.50 lb
8. Actigard	26.25 8 ai /Ha
9. Actigard + Manex + Kocide 2000	26.25 g ai/Ha + 2.00 pt + 1.50 lb/A
10. Auxigro + Kinetic, 1.5" bulb & 30 DPH	4.00 oz + 0.05%
11. Auxigro + Kinetic. 1.5"/30DPH + Manex/Koc	4.00 oz + 0.05% + 2.00 pt + 1.50 lb
12. Exp. 1 (Biological Agent)	3.00 lb

Variety: Yellow Onion variety 'X 202' planted 03-13-00

Spray Dates:

06-27	no apparent disease, applied Trts 2 - 5, 8 - 12
07-05	ditto
07-l 1	Auxigro applied at 1.5" bulb
07-18	
07-25	Auxigro at 30 DPH, Trt 6 & 7 started; watersoaking & necrosis on spreaders
08-01	
08-08	30 - 40% disease in spreaders
08-15	

Inoculation Dates: 07/11/00, 07/18/00 & 08/01/00 on spreader rows with *Xanthomonas campestris* & *Pantoea ananitas* (1 0^{7-8} cells/ml)

Disease Evaluation = % of foliage infected/killed by Xanthomonas/Pantoea; Evaluation 1 on 08-07, Evaluation 2 on OS-24. and Evaluation 3 on 08-30. On 09/15/00, a random sample of 10 large bulbs was evaluated for bacterial bulb rot incidence in reps I - III.

A field harvest of 10' - 2 links per treatment was taken on 9-15, topped, sorted (medium, small, total unsorted) and weighed as pounds/plot before convening to cwt/A. There were no jumbos harvested from this nursery.

Bactericide **Results &** Discussion:

Disease pressure was significantly **reduced** by all copper treatments and tank mixes throughout the season **(Trt.** 2 **- 7, 9,** 11): as well as by the Actigard itself **(Trt.** 8). Actigard is a plant activator (Systemic Acquired Resistance) which **turns** on the plant's immune system to help combat **fungal** and **bacterial** pathogens if applied before disease development. **Although** not significant statistically, **there** was 17 to 59 **%** less bulb rot at harvest with Treatments 2 **-** 9 and 11.

Treatments 10 **(Auxigro** by itself) and **12** (biological agent) did not provide any foliar or bulb disease **control.** The **Auxigro** (as a metabolic primer) did increase yield (17 **-** 19% over the control), but provided no protection against foliar infection or bulb rot unless if combined with the standard **copper/EBDC** program **(Trt.** 11). The primer may have kept **the** foliage and bulb tissues too succulent **late** in the **season,** thereby extending **infection** periods; this type of treatment should **probably** he **suspended** shortly after **bulb** initiation to reduce the potential for foliar and storage disease development: similar to industry recommendations regarding late-season fertilizer applications.

Although not significant statistically, there was a 10 **-** 16% yield improvement with **copper/EBDC** Treatments 2 **-** 3.5 **-** 7 and the Actigard **Treatments/combinations** 8 **-** 9.

The 2000 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.** The addition of new products such as Actigard could significantly improve disease management.

ACKNOWLEDGEMENTS:
We **gratefully acknowledge** the assistance of Miie **Bartolo** and Frank Schweissing at Rocky Ford; 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, AgroEvo, AgraQuest, Auxein** Corp.. and **Agtrol Intl.**

2000 Onion Bacterial Complex - Yield Measurements

		Medium (CWT/A)	Small (CWT/A)	Total (CWT/A)
1	Control A	365.93	49.78	434.98
2	Manex + Kocide 2000	415.70	56.00	487.25 (12 %)*
3	ManKocide	440.28	73.45	500.33 (15 %)
4	Champ DP + Dithane DF	359.08	57.25	426.90 (- 2 %)
5	Champ DP + Dithane DF	412.58	54.15	477.90 (10 %)
6	Champ DP + Dithane DF	406.35	59.10	502.78 (16 %)
7	Champ DP + Dithane DF	438.10	46.68	487.88 (12 %)
8	Actigard	395.15	88.38	500.93 (15 %)
9	Actigard + Manex + Kocide 2000	392.65	66.60	489.73 (13 %)
10	Auxigro + Kinetic	421.30	70.33	507.78 (17 %)
11	Auxigro + Kinetic Manex + Kocide 2000	433.73	62.23	516.50 (19 %)
12	EXP1 (Biological Agent)	355.33	77.78	451.18 (4 %)
	Probability:	1.0000	1.0000	1.0000
	% C. V.:	28.13	42.03	22.95

(* % yield increase over thd untreated control)

Chemical Control of Thrips in Onions - 2000
Arkansas Valley Research Center

This was a below average year for precipitation at 9.6". Foliage disease problems were greatly reduced compared to the previous few years. Thrips populations built up the latter part of June and remained moderately high for about three weeks following which they decreased rapidly.

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

Plots were six rows wide, 26.4' long and treatments were replicated three times in randomized complete blocks.

Insecticides were applied with a compressed air sprayer mounted on bicycle wheels at 27 p.s.i. using TX 12 nozzles at about 20 g.p.a. Treatments were applied June 30 and July 14. Selwet L-77 and PAS-800 were added to the treatments.

Onions were harvested September 13, 2000.

Results and Discussion - Thrips populations were barely at the level (20/plant) which has caused a reduction in yields in past years. However, measured yields were not significantly different between the treated and untreated plots.

The count data would indicate that Warrior T and treatments including Warrior T provided the best control. The Mustang treatments also reduced thrips populations substantially below the untreated plots. Metasystox-R by itselfwas not satisfactory.

Frank C. Schweissing

Test Plot Information - 2000

Purpose - To evaluate the effectiveness of selected insecticides for control of the onion thrips, *Thrips tobaci* Lindeman in onions.

Data - 1. Thrips Counts
2. Yield

Plots - Treated - 6 rows (11') X 26.4' = 1/150th acre

Design - Randomized complete block (3 replications)

Variety - Colo 6 (Sweet Spanish - yellow)

Fertilizer - 100 lbs. P_2O_5 + 11 lbs. N/Acre - preplant, plow.

Herbicide - Prefar 5 lbs. Al/Acre - 316
Prowl .825 lbs. AI/Acre - 4/12
Goal .2 lbs. AI/Acre - 5/2
Dual Magnum .95 lbs. + Goal .18 lbs.AI/Acre - 5/12
Goal .18 lbs. AI/Acre - 6/19
Hoe - 2X

Fungicide - Dithane F 45 2.4 lbs. + Kocide .6 lbs. AI/Acre - 7/18, 7/29, 8/20
Penncozeb 2.25 lbs. + Kocide 1.23 lbs. AI/Acre - 8/7

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

Plant - March 8, 2000

Irrigation- 11X - 12hr. Runs

Treat Plots - 6/30, 7/14

Harvest - September 13, 2000 - 2 rows (3.66') X 8' + 29.28 sq. Ft. - 111487.7 acre

Table l.-Chemical control of onion thrips on onions. Thrips counts. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Treatment'		AI[2]	Thrips Counts[3]					
			7/3	7/7	7/13	7/20	7/27	Season[4] Avg.
Warrior T	1CS	.03	3.67	8.47	3.87	5.00	1.27	5.26
+Lannate LV	2.4WS	.90						
Metasystox-R	2SC	.375	6.74	10.47	8.34	5.20	0.94	7.69
+Warrior T	1CS	.0234						
Warrior T	1CS	.03	7.94	11.27	10.47	6.14	1.27	8.96
Metasystox-R	2SC	.375	11.27	9.80	10.80	7.54	1.00	9.86
+Warrior T	1CS	.0156						
Mustang	1.5EW	.05	9.94	9.27	12.14	8.47	1.60	9.96
	*				*			
Mustang	1.5EW	.05	7.47	12.00	12.14	10.87	1.07	10.62
+Lannate LV	2.4WS	.90						
Lannate LV	2.4WS	.90	12.14	16.54	19.60	16.20	1.87	16.11
Metasystox-R	2SC	.75	23.47	17.87	25.47	18.47	6.94	21.32
Metasystox-R	2SC	.50	19.07	21.60	26.80	19.80	6.74	21.82
Untreated			21.00	21.27	18.00	24.47	3.00	21.19

1 - Treated (*) June 30 + Silwet L-77 8 oz./100 gal.
July 14 + PAS-800 8 oz./100 gal.

2 - Active technical insecticide per acre,

3 - Average number per plant, 5 plants counted per plot, 3 replications per treatment,

4 - Seasonal average from first four counts only.

Frank C. Schweissing

BULB ONION: *Allium sativum* L.
Onion thrips: *Thrips tabaci* Lindemann

Whitney Cranshaw
Department of Bioagricultural Sciences and Pest Management
Colorado State University
Ft. Collins, CO 80523; and
Frank Schweissing
Arkansas Valley Research Center
27901 Rd. 21
Rocky Ford, CO 81067

CONTROL OF ONION THRIPS ON BULB ONIONS, ROCKY FORD, CO 2000: Trials were conducted at the Arkansas Valley Research Center, in Rocky Ford, CO on seeded onions established in double-row beds at spacing of 36-in centers. Plots consisted of 26-ft of the bed and were arranged in a completely randomized design with 4 replications. Treatments were applied June 20 and retreated July 5 using a CO, compressed air sprayer directed over the top of the plants. An additional application of Ecozin was made June 28. All treatments included the wetting agent Kinetic (0.05% v:v). Evaluations were made by counting all thrips in 10 plants in the center of each plot.

Greatest control resulted from applications including lambda-cyhalothrin (Warrior, Karate), alone or in combination. Modest suppression was observed on the July 5 evaluation from applications of spinosad (Spintor) and abamectin (Avid). No phytotoxicity was observed following any treatment.

	Thrips/plant[1]		
Treatment and Rate	28 June	5 July	14 Jul
Untreated Check	54.6 a	63.6 a	32.8
Warrior T 3.2 fl oz/A	14.6 bc	11.3 bc	4.0
Karate 1E 3.2 fl oz/A	15.7 bc	12.7 bc	4.8
Metasystox-R 3 pts/A	41.7 ab	35.9 abc	34.8
Metasystox-R 1.5 pts/A + Warrior T 3.2 fl oz/A	14.4 bc	10.3 bc	5.5
Spintor SC 8 fl oz/A	33.3 abc	23.8 bc	9.5
Ecozin 8 fl oz/A + Trilogy 1.0% v:v	52.5 a	40.5 ab	38.6
Lannate LV 3 pts/A	37.1 abc	36.2 abc	19.9
Lannate LV 3 pts/A + Warrior T 3.2 fl oz	7.7 c	7.0 c	5.6
Avid 6 fl oz	35.2 abc	24.6 bc	12.8 n.s.

[1] Numbers within the same column that are not followed by the same letter are significantly different ($P > 0.05$) by SNK.

Onion Response to Dual Magnum and Outlook Applications
Colorado State University - Weed Science

Project Code: ON10050

Location: Rocky Ford-AVRC

Cooperator: Mike Bartolo
COA
BASF

Site Description

Crop: Onion
Plot Width: 6.7 ft

Variety: X202 (Waldo)
Plot Length: 30 ft

Planting Date: 3-9-2000
Reps: 3

Irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Silty Clay Loam	1.7	7.8

Application information

Application Date	5-17-2000
Time of Day	7:00 **AM**
Application Method	Broadcast
Application Timing	Layby
Air Temp (°F)	64.4
Soil Temp (°F)	57
Relative Humidity (%)	44
Wind Velocity (mph)	

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
Backpack CO_2	3	Flat Fan	11002	13"	20"	6.7 ft	20	30

Summary Comments

Layby applications of Dual Magnum have become an important part of many weed control programs in onions. Outlook, which is a more active form of Frontier also known as BAS 656, will be available in a year or two for layby applications to onions. Outlook provides many of the same benefits of Dual Magnum. The purpose of this research project was to compare crop safety of Dual Magnum and Outlook applied at medium and high labeled rates and at a 2X rate. Onions were grown in a weed free environment. Plots were harvested on September 19 and graded.

Number of plants per acre and yield per acre were not significantly different comparing the non-treated check to other herbicide treatments. Dual Magnum and Outlook appear to be equal in crop safety at least under the environmental conditions of the 2000 growing season.

Colorado State University

Onion Response to Dual and Outlook Applications

Trial ID: ONIO050 Investigator: Dr. Scott Nissen
Location: AVRC-Rocky Ford Study Dir.: Weed science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Onion C&J No./acre g-13-00	Onion Medium No./acre g-13-00	Onion Total No./acre g-13-00	Onion Colossal 50#/acre g-13-00	Onion Jumbo 50#/acre g-13-00	Onion Medium 50#/acre g-13-00	Onion Total 50#/acre g-13-00
1	Nontreated				39070 a	40059 a	79128 a	0 a	500 a	254 a	755 a
2	Outlook	0.65	LB WA	2 LEAF	38081 a	40553 a	78634 a	24 a	512 a	297 a	833 a
3	Outlook	0.94	LB A/A	2LEAF	37091 a	50939 a	88030 a	23 a	486 a	346 a	855 a
4	Outlook	1.88	LB A/A	2 LEAF	35113 a	51433 a	88546 a	0 a	451 a	349 a	800 a
5	Dual Magnum	1.0	LB A/A	2 LEAF	39564 a	38575 a	78139 a	37 a	509 a	260 a	806 a
6	Dual Magnum	1.6	LB A/A	2 LEAF	41542 a	41048 a	82590 a	47 a	548 a	298 a	892 a
7	Dual Magnum	3.2	LB A/A	2 LEAF	36597 a	38575 a	75172 a	12 a	435 a	269 a	716 a
LSD (P=.05)					14323.2	16785.4	16195.3	48.7	212.4	98.9	193.0
Standard Deviation					8050.6	9434.5	9102.9	27.4	119.4	54.5	108.5
c v					21.1	21.93	11.21	134.92	24.28	18.38	13.42

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

Onion Weed Control with Fluroxypyr
Colorado State University -Weed Science

Project Code: ON10040 | Location: Rocky Ford-AVRC | Cooperator: Mike Bartolo

Site Description

Crop: Onion | Variety: X202 (Waldo), yellow; Redwing (Bejo), red; Blanco Duro (Sunseed). white | Planting Date: 4-7-2000

Plot Width: 10 fl | Plot Length: 30 fl | Reps: 3

irrigation Type: Furrow

Soil Description

Texture	%OM	pH
Silty Clay Loam	1.7	7.8

Application Information

	A	B
Application Date	5-16-2000	6-1 I-2000
Time of Day	7:00PM	9:00 am
Application Method	Broadcast	Broadcast
Application Timing	Post	Post
Air Temp (F)	79.2°F	75°F
Soil Temp (F)	57°F	55°F
Relative Humidity (%)	6%	7%
Wind Velocity (mph/dir.)	3 MPH W→E	1-2 MPH

Application Equipment

Sprayer Type	Speed (mph)	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	PSI
Backpack CO,	3	Flat Fan	11002	20"	20"	10	20	30

Summary Comments

Major Species:

Kochia: 4 - 6'
Pigweed: 4 - 6
Prostrate Pigweed
Buffalo Bur: 2 - 3
Bindweed
Volunteer Peppers/Melons

Colorado State University

onion WeedControlwithFluroxypyr

Trial ID: ONIO040 Investigator: Dr. Scott Nissen
Location: AVRC-Rocky Ford StudyDir. Weed science

Trt No.	Treatment Name	Rate	Rate Unit	Grow Stg	Yellow Onion Phyto 6-l 0-00		Red Onion Phyto 6-l 0-00		White Onion Phyto 6-1 0-00		Kochia Control % 6-l 0-00	
1	Nontreated				0.0	g	0.0	b	0.0	e	0.0	f
2	Fluroxypyr	0.125	LB A/A	2 LEAF	2.7	def	0.0	b	2.0	cde	91.7	bcd
3	Fluroxypyr	0.187	LB A/A	2 LEAF	0.7	fg	1.0	ab	3.7	cde	86.7	de
4	Fluroxypyr	0.25	LB A/A	2 LEAF	6.3	ab	0.0	b	1.7	cde	90.0	cd
5	Fluroxypyr	0.5	LB A/A	2 LEAF	4.3	bcd	1.7	ab	8.0	b	94.3	abc
6	Fluroxypyr	0.125	LB A/A	2 LEAF	1.0	efg	2.0	a	2.0	cde	91.7	bcd
6	Fluroxypyr	0.125	LB A/A	6 LEAF								
7	Fluroxypyr	0.187	LB A/A	2 LEAF	5.3	abc	0.7	ab	4.3	bcd	93.3	abc
7	Fluroxypyr	0.187	LB A/A	6 LEAF								
8	Fluroxypyr	0.25	LB A/A	2 LEAF	7.0	a	2.3	a	1.0	de	91.7	bcd
8	Fluroxypyr	0.25	LB A/A	6 LEAF								
9	Fluroxypyr	0.5	LB A/A	2 LEAF	0.3	fg	0.0	b	0.7	de	93.3	abc
9	Fluroxypyr	0.5	LB A/A	6 LEAF								
IO	Goal	0.15	LB A/A	2 LEAF	5.3	abc	0.0	b	1.0	de	94.3	abc
10	Buctril	0.2	LB A/A	2 LEAF								
11	Fluroxypyr	0.125	LB A/A	2LEAF	4.7	a-d	1.0	ab	12.7	a	94.3	abc
11	Goal	0.15	LB A/A	2 LEAF								
12	Fluroxypyr	0.125	LB A/A	2 LEAF	1.7	efg	0.0	b	3.7	cde	96.0	ab
12	Buctril	0.20	LB A/A	2 LEAF								
13	Fluroxypyr	0.125	LB A/A	2 LEAF	3.3	cde	2.3	a	5.0	bc	97.7	a
13	Goal	0.15	LB A/A	2 LEAF								
13	Buctril	0.20	LB A/A	2 LEAF								
14	Fluroxypyr	0.125	LB A/A	2 LEAF	0.7	fg	0.0	b	0.0	e	96.0	ab
14	Dual Magnum	1.0	LB A/A	2 LEAF								
15	Fluroxypyr	0.125	LB A/A	2 LEAF	0.0	g	0.0	b	2.7	cde	97.7	a
15	Dual Magnum	1 .O	LB A/A	2 LEAF								
15	Goal	0.15	LB A/A	2 LEAF								
15	Buctril	0.20	LB A/A	2 LEAF								
16	Prowl	1.2	LB A/A	2 LEAF	0.0	g	0.0	b	0.0	e	83.3	e
16	Goal	0.15	LB A/A	2 LEAF								
16	Buctril	0.20	LB A/A	2 LEAF								
LSD (P=.05)					2.55		1.89		3.85		5.22	
Standard Deviation					1.53		1.14					
c v					56.42		165.13		76.48	2.31	3.13	3.6

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

Control of Lepidopterous Larvae on Cabbage - 2000
Arkansas Valley Research Center
Rocky Ford, Colorado

This was an average year for precipitation during the months of August through October and there was ample irrigation water. The first freeze occurred on September 25th at 28°F when the cabbage had six to eight well developed leaves. The plants continued to grow, even though there were light frosts after the first freeze, and by the last observation on November 3, heads five to six inches in diameter had formed.

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

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

Insecticides were applied, September 22, with a compressed air sprayer mounted on bicycle wheels at 27 p.s.i. using TX12 nozzles at about 25 g.p.a. Dyne-Amic (.005 v/v) was added to all insecticides.

Five plants were examined per plot on each evaluation date,

Results and Discussion - The cabbage lopper (CL), *Trichoplusia ni* (Hubner) made up about 80% of the larvae present with the diamondback moth (DM), *Plutella xylostella* (L.) making up the remainder. The imported cahbageworm, *Pieris rapae* (L.) was not present in this year's test.

It was apparent that the untreated plots had substantially higher larval population and infestations than any of the treatments. It appears the Avaunt, at the highest rate, Avaunt plus Asana XL, Capture and Warrior provided the best larval control along with no damaged heads at the end of the test. The damage to the outer leaves can partially be attributed to a light infestation of grasshoppers.

Frank Schweissing

Test Plot Information - Cabbage - 2000
Arkansas Valley Research Center

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

Data - 1. Species
2. Counts
3. Infested plants

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

Design - Randomized complete block (3 replications)

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

Fertilizer - 50 lbs. P_2O_5 + 10 Ibs. N as 1 l-52-00 + 150 lbs. N as NH, - preplant/acre

Herbicide - Prefar 6 lbs. AI/Acre - 8/1/2000, Hoe & thin - 8/29/2000

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

Plant - August 4, 2000

Irrigate - 8/5, 8/9, 8/14, 9/5, 10/12

Treated - September 22, 2000. Compressed air bicycle sprayer - 27 p.s.i.
25 g.p.a. - TX12 cone nozzle

Table L-Control of Lepidopterous larvae* on cabbage. Counts and infested plants. Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado. 2000.

Treatment*		AI[2]	9/29			10/9			10/16			11/3	
			Counts[1]		Inf.[4]	Counts[3]		Inf.[4]	Counts[3]		Inf.[4]	OL[5]	Head[6]
			DM	CL	%	DM	CL	%	DM	CL	%	%D	%D
Avaunt	30WG	.065	0.33	0.33	13	**0.00**	0.67	13	0.00	1.33	27	20	20
Avaunt	30WG	.09	0.00	1.00	20	**0.00**	0.67	13	0.00	1.00	20	20	0
Avaunt	30WG	.11	0.00	0.00	0	**0.00**	0.00	0	0.00	0.33	7	7	0
Avaunt + Lannate LV	30WG 2.4	.065 .9	0.00	0.00	0	**0.00**	0.00	0	0.00	0.00	0	20	7
Avaunt + Asana XL	30WG .66	.065 .032	**0.00**	**0.00**	**0**	**0.00**	**0.00**	**0**	**0.00**	**0.00**	0	0	0
Lannate LV	2.4	.9	1.33	1.33	47	0.33	0.67	20	0.00	1.33	27	60	27
Asana XL	.66	.032	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	27	13
SpinTor	2sc	.094	0.00	0.67	7	0.00	0.00	0	0.00	0.00	0	7	7
Proclaim	5SG	.015	0.00	0.33	7	0.00	0.00	0	0.00	0.00	0	13	13
Capture	2EC	.04	0.67	0.00	13	0.00	0.00	0	0.00	0.00	0	0	0
Warrior T	1CS	.03	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	7	0
Untreated			0.33	3.67	67	0.67	1.67	40	0.00	1.67	33	93	67

1 - Treated - September 22, *2000* + Dyne Amic (.005 V/V)

2 - Actual active insecticide in pounds per acre.

3 - Average number of larvae per 5 plants, 3 replications per treatment.

4 - Percent infested (Inf.) plants - 5 plants examined per plot, 3 replications per treatment.

5 - Percent of plants with damaged outer leaves (OL)

6 - Percent of plants with damaged heads

* - The cabbage looper(CL), *Trichaplusia ni* (Hubner) constituted about 80% of the counted larvae and the diamondback moth (DM), *Plutella xylostella.* (L.) the remainder. The imported cabbageworm, *Pieris rapae* (L.) was not a factor in this year's test.

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. As seen in previous studies. new varieties and production techniques can help expand the production period and improve yields for early market melons.

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.

During the 2000 season, 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 19.

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 l-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* (Cowan Chemical) and *Alanap* (Uniroyal Chemical) for weed control. The beds were covered with clear embossed plastic mulch (Mechanical Transplanter) on April 14 using a one-bed mulch layer.

A fresh-market variety, *Earligold* (Hollar Seeds), and a western shipping type. *Early Delight* (Petoseeds) 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.

The following twelve production methods were evaluated:

1. *Earligold* transplanted April 18 into clear mulch and covered with a perforated row cover plus a spun-bound polyester fabric cover.
2. *Early Delight* transplanted April 18 into clear mulch and covered with a perforated row cover plus a spun-bound polyester fabric cover
3. *Earligold* transplanted April 18 into clear mulch and covered with perforated plastic
4. *Early Delight* transplanted April 18 into clear mulch and covered with perforated plastic.

5. Earligoldtransplanted April 25 into clear mulch and covered with slitted plastic
6. *Early Delight* transplanted April 25 into clear mulch and covered with slitted plastic
7. *Earligold* transplanted April 25 into dear mulch and covered with perforated plastic.
8. *Early Delight* transplanted April 25 into clear mulch and covered with perforated plastic Seeded April 21
9. *Earl&old* seeded April 18.
10. *Early Delight* seeded April 18.
11. Earligoldtransplanted May 5
12. *Early Delight* transplanted May 5

All row covers were suspended by wire hoops spaced 34 feet apart and were made of clear polyethylene plastic or spun-bound polyester fabric (American Agrifabrics Pro17). The plastic row covers were either perforated (Mechanical Transplanter) or slitted plastic (Ken-Bar Inc.). The fabric rows cover were placed directly over the plastic row covers for the earliest treatments only (April 18) and removed on May 4. Large slits were cut into the tops of the plastic row covers for ventilation in early May and the row covers were completely removed off the transplanted and seeded treatments in late May to early June depending on the treatment. Generally, row covers were removed from a treatment when the first fruiting flowers were discovered. 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.

Temperature **(°F)in** April and May during establishment period of early **cantaloupe.**

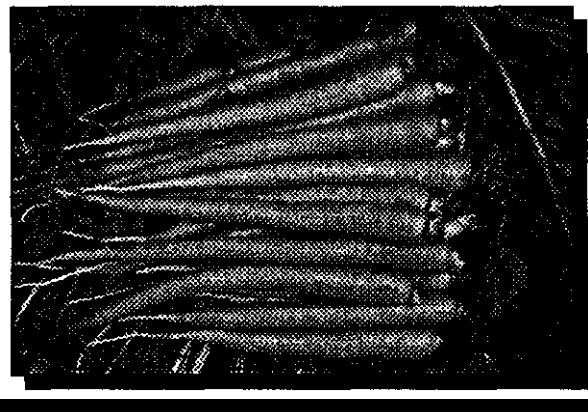
Date-April	High	Low	Date-May	High	Low
18	89	39	1	64	41
19	71	36	2	72	33
20	72	33	3	81	39
21	82	33	4	91	43
22	84	40	5	95	47
23	70	50	6	92	49
24	80	39	7	90	48
25	75	31	8	68	52
26	85	38	9	74	43
27	72	39	10	90	42
28	80	40	11	89	65
29	89	44	12	67	37
30	49	46	13	73	32

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

Variety and Seeding or Transplanting Date	Row Cover	First Harvest	Aveage Fruit Size (lbs)	Market. Fruit per acre	Market. Yield (lbs/acre)
Earligold Transplanted April 18	perforated plus fabric	June 19	2.90	11,957	34,882
Early Delight Transplanted April 18	perforated plus fabric	July 6	3.68	6,832	25,162
Earligold Transplanted April 18	perforated	June 24	2.89	13,153	37.991
Early Delight Transplanted April 18	perforated	July 3	3.78	8,541	31.158
Earligold Transplanted April 25	slitted	June 26	3.21	11,103	35,633
Early Delight Transplanted April 25	slitted	July 7	3.94	5.466	21.335
Earligold Transplanted April 25	perforated	June 28	3.23	12.299	*39,784*
Early Delight Transplanted April 25	perforated	July 7	4.02	4,612	18,534
Earligold Seeded April 18	none	July 10	3.51	14,007	49,197
Early Delight Seeded April 18	none	July 12	3.48	12,470	43.491
Earl&old Transolanted Mav 5	none	July 10	3.90	9,907	38,776
Early Delight Transplanted May 5	none	July 12	3.92	9,224	36,197
LSD(0.05)=			*0.50*	*2.867*	*9.370*

Carrot Disease Trial

Mike Bartolo
Arkansas Valley Research Center
Colorado State University



The purpose of this trial was to test the efficacy of Ridomil Gold EC (Notvartis) as a pre- and post emergence fungicide for carrot disease control.

Three treatments were tested and they were: a preemergence application followed by two additional applications spaced 30 days apart. a post-emergence application followed by two additional applications spaced 30 days apart, and an untreated control.

There was not a significant difference in yield or incidence of disease between any of the treatments. Stand loss due to treatment was not evident and the carrots showed no signs of chemical injury.

Methods

This study was conducted in a field trial in 2000 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 April 12, 2000. Seeds were sown at a rate of 1 million live seed per acre. Weeds were controlled by pre-plant herbicides and cultivation; insecticides were not needed. The crops were irrigated as needed via gravity-flow furrows spaced 44 in. apart.

The Ridomil Gold EC treatments were initiated just prior to planting on April 12. All product applications were 0.5 pint of material per acre (280 g ai/ha) in 30 gal per acre water. The product I was applied with a CO^2 pressurized hand-held backpack sprayer. The pre-plant application was incorporated with a rotary hoe. Post-emergence applications were directed toward the base of the carrot rows and were incorporated with an irrigation immediately afterwards. Three treatments were in the trial. They were:

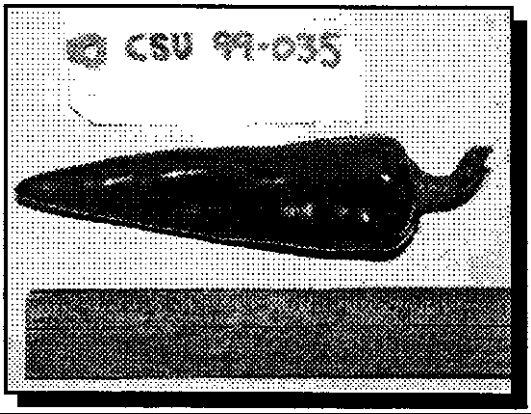
1. Untreated control
2. Pre-Plant application (April 12) followed by post-emergence applications on May 12 &June 12.
3. Post-Emergence applications on May 5, June 5, and July 6.

Stand characteristics were noted after emergence. The carrots were harvested and weighed on October 5.

Effect of Ridomil Gold EC on incidence of disease, injury, and yield of carrot (var. Caropak) in 2000.

Treatment	Stand Relative to Control - %	Crop Injury	Diseased Culls at Harvest %	Marketable Yield lbs/acre
Untreated Control		**0**	**0.14**	**65,439**
Pre-plant plus two Post-emergence	**100**	**0**	**0.24**	**75,834**
Three Post-emergence	**100**	**0**	**0.00**	**69,102**
LSD (0.05) =			NS	NS

Pepper Variety Trial



Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Several new pepper varieties are introduced into the market each year. Many new varieties are hybrids with excellent yield and quality potential. In addition, some are resistant to diseases like the *Phytothora* Wilt. Few of these new varieties, however, have been evaluated under Colorado growing conditions.

In this study over 80 different jalapeno. chile, bell, and speciality pepper varieties were evaluated under local conditions. Some varieties were grown with black plastic mulch and drip irrigation and some with conventional production techniques.

Methods

1. Plastic Mulch Trial: Sixty-five pepper varieties were transplanted through black plastic mulch (Mechanical Transplanter) on May 12" . 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. A single application of Sevin (Rhone-Poulenc) was made to control flower thrips.

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 April 21st , 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). Over 30 different pepper varieties (mainly chile types) were grown in the conventional trial. Please contact the Research Center (719-254-6312) for specific information on performance and seed availability.

Table 1: *Pepper varieties in the 2000 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	7-20	Ornamental bushy type with small round fruit
Super Chili	Total. Tomato	7	7-22	Ornamental with small yellow fruit
Omnicolor	NMSU	7	7-27	Ornamental, busy plant with yellowish fruit
Numex Twilight	Johnny's	7	7-22	Ornamental, Multi-colored as plant matures
Prairie Fire	Hollar	8	7-20	Ornament with compact habit. Excellent
Red Habanero	Johnny's	5	8-25	Specialty, very hot and late maturing
Habanero	Burrell	6	8-25	Specialty, very hot and late maturing
Balada	Petoseeds	8	7-25	Hybrid Asian type narrow and long fruit, very hot
Tuxtlas	Petoseeds	8	7-18	Hybrid serrano, good yield
Inferno	Petoseeds	8	7-18	Hybrid Hungarian wax type, very good yield, hot
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	Ferry-Morse	7	7-22	Hybrid Hot pepper
Santa Fe Grande	Burrells	8	7-25	O.P. Hot yellow fruit. Good standard variety
Perfecto	Petoseeds	7	7-21	Hybrid jalapeno
Big Top	Petoseeds	8	7-20	Hybrid Asian type narrow and long fruit, very hot
Sweet Jalapeno	Petoseeds	8	7-24	Hybrid jalapeno. Large mild and heavy yields
Mitla	Petoseeds	7	7-23	Hybrid jalapeno. Very productive. Medium size.
Ball Park	Petoseeds	7	7-24	Hybrid jalapeno with very elongated shape.
Ole	Harris Moran	6	7-22	Hybrid jalapeno. Good yield and fruit size.
Grande	Petoseeds	8	7-22	Hybrid jalapeno. Very large fruit and productive
Tula	Petoseeds	8	7-22	Hybrid jalapeno. Large fruit and productive
SH 5000	Abbott Cobb	7	7-22	Hybrid jalapeno. Good yield er and uniform
SH 6000	Abbot Cobb	7	7-22	Hybrid jalapeno. Good yielder and uniform
Dulce	Petoseeds	7	7-28	Hybrid jalapeno
Anch San Martin	Petoseeds	7	7-28	Hybrid ancho type. Fair yield.
Cherry Pick	Petoseeds	8	7-22	Hybrid cherry pepper. Excellent yield and quality.
Cherry Bomb	Petoseeds	8	7-24	Hybrid cherry pepper. Excellent yield and quality.
Mesilla	Petoseeds	7	7-20	Hybrid cayenne type. Elongated fruit & high yields
Rio Verde	Ferry Morse	6	8-10	Hybrid serrano type. Good yield, late maturing
CSU - 002	CSU	6	7-10	Short mira sol type. Low heat and compact habit.
Paprika Supreme	Petoseeds	7	7-24	Mild anaheim hybrid used for drying
Sonora	Petoseeds	8	7-24	O.P. Large MILD Anaheim type chile. Good yield
Navojoa	Petoseeds	9	7-18	Hybrid Anaheim type. Extremely productive. Mild
Taurus	Rogers	7	7-24	Productive O.P. Bell pepper. Good yield and size.
Valiant	Petoseeds	8	7-20	Blocky type hybrid bell. Early and productive

P19-Y	Harris Moran	7	7-22	Green to yellow hybrid 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	8	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	8	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.
Ironsides	Petoseeds	8	7-21	Semi-elongated hybrid bell. Very good yield
Aladdin XR3	Petoseeds	7	7-23	Green to yellow hybrid bell. Nice shape and yield.
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	8	7-21	Hybrid bell pepper. Phytophthora tolerant
Boyton Bell	Harris Moran	7	7-25	Blocky type hybrid bell
Hvbrid 860	Abbott Cobb	7	7-23	Hybrid bell. Green to yellow blocky type.
Early Sunsation	Stokes	6	7-28	Hybrid bell. Green to yellow type.
Purple Beauty	Tot. Tomatoes	6	7-30	Purplish colored fruit. Specialty bell.
Lilac	Stokes	6	7-30	Purplish colored fruit. Specialty bell.
Sofia	Stokes	6	7-21	Hybrid Italian type pepper. Elongated and mild.
Italia	Stokes	7	7-20	Italian type. Mild and productive
Keywest	Petoseeds	8	7-25	Hybrid cubanelle type. Very Productive
Jumbo Stuff	Stokes	8	7-14	Very Productive Italian Frying type. Yellow Fruit
Marconi	Total. Tomato	6	7-20	Productive Italian frying type. Good yields.

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

Recommendations: Bells- *King Arthur. Paladin, Figaro, Bonita, Merlin, Camelot*
Jalapenos: *Grande, Mitla,* **Ball Park, Sweet Jalapeno**
Speciality- *Praire* **Fire, Banana Supreme.** *Hot Spot, Cherry Bomb,* **Jumbo Stuff**

Note: Paladin bell pepper is resistant to Phytoohthora Wilt.

Hybrid Chile Establishment Trial.

Mike Bartolo
Arkansas Valley Research Center
Colorado State University

A small but growing percentage of chile is transplanted in the Arkansas Valley. Having a good quality pepper transplant is important if earliness and yield are to be maximized. With the introduction of expensive hybrid chile varieties, it is even more critical that transplants are grown and handled properly.

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 and transplanting different sized peppers at different in-row spacings were compared.

Overall. direct-seeding produced the highest yielding and best quality peppers. Yields were on average 60% higher for direct-seeded peppers than transplanted peppers. In addition, direct-seeded peppers produced fruit that were straighter and bigger (length and width) than the fruit from transplanted peppers. Also. transplanted pepper plants were consistently shorter than the direct-seeded plants and as a result, the fruit had a tendency to touch the ground.

In terms of earliness, the fruit from large transplants (75 cells per tray) matured about 7-10 days earlier than those from smaller sized transplants and about 20 days earlier than those from direct-seeded peppers.

Transplants grown in flats containing 75, 200. and 288 plants per tray ail produced peppers with acceptable yields and quality. Notably, the larger 75 cell transplants, yielded the least and had the shortest and most curved fruit.

Although not significant. there was a tendency for the 6 and 9 inch in-row spacing to yield more than the 12 inch spacing. Fruit quality was not much different between the different in-row spacings. Regardless of in-row spacing, the pods on transplanted peppers were consistently shorter and more curved than the pods on direct-seeded peppers.

Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 30 inches between centers, were shaped in early April. Peppers were direct-seeded on April 20 with a Stanhey vacuum planter and later

thinned to an in-row spacing of 9 inches. Transplants were set out by hand on May 16. All transplants were set into the ground to the depth of their first true leaves. Experimental plots consisted of four rows 12.5 feet long. Plots were randomized within each of five blocks.

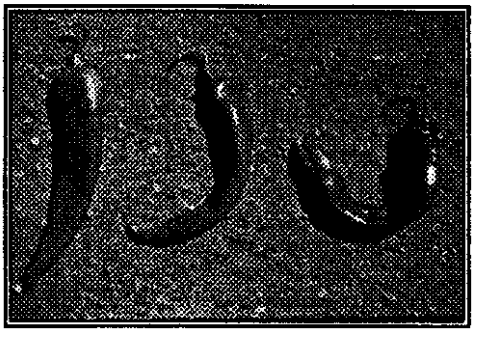
Weeds were controlled by mechanical cultivation, and hoeing. No other pest controls were needed. Irrigation was by furrows with every-other row being used.

The trial was harvested beginning August 15. All marketable sized fruit were weighed and recorded. A 25 fruit sub-sample was taken from each plot was to determine fruit length and degree of fruit curvature.

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

Treatment	In-Row Spacing	Fruit Width (in)	Fruit Length (in)	% of curved fruit			Marketable Yield (lbs/acre)
				straight	slight'	severe'	
Direct-Seeded	~9	1.66	9.74	73	19	8	57,902
200 cell	6	1.51	8.66	55	32	13	39,643
200 cell	9	1.58	7.87	52	36	13	39,169
288 cell	12	1.56	8.45	57	31	12	33,649
200 cell	12	1.57	8.45	57	31	12	36,492
75 cell	12	1.37	7.37	39	37	24	31,391
lsd (0.05) =		0.11	0.62	7.0	8.7	6.7	9,271

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



Jalapeno Establishment Trial

Mike Bartolo
Arkansas Valley Research Center
Colorado state University

With the introduction of high yielding but expensive jalapeno varieties, it is critical that growers reduced seed cost as much as possible. Precision planting and transplanting are common ways to reduce seed cost. Of the two methods, transplanting has the added benefit of ensuring a good stand. Even so. proper handling and placement of pepper transplants is important if yields are to be maximized. One important thing to consider when using transplants is how transplanted peppers respond to harvesting. Since mechanical harvesting is becoming the only economical way to pick jalapeno peppers used for processing, it is important to note if transplanting methods alter plant size. shape, and lodging characteristics.

This study, therefore, was conducted to determine how different methods of crop establishment affect the yield, fruit. and plant characteristics of a hybrid jalapeno . Direct-seeding and transplanting at different in-row spacings were compared.

In the 2000 trial, there was not a significant difference in marketable yield or fruit size between any of the treatments. Although not significant. the 6 inch spacing produced slightly higher yields than the 12 inch spacing. All transplants. regardless of in-row spacing. produced peppers plants of the same height yet. significantly shorter than the direct-seeded peppers. In addition, the fruit were set closer to the ground in transplanted peppers compared to direct-seeded peppers. Unfortunately, shorter plants and fruit close to the ground make the transplanted peppers less amenable to mechanical harvest. Overall, there was no noticeable lodging in any treatment.

Methods

This study was conducted at the Arkansas Valley Research Center in Rocky Ford. Beds, 30 inches between centers, were shaped in early April. Jalapeno peppers (*Grande* - Petoseeds) were direct-seeded on April 20 with a Stanhey vacuum planter and later thinned to an in-row spacing of 9 inches. Transplants were grown in the greenhouse for six weeks in 200 cell flats. The transplants were set out by

hand on May 16 and were placed into the ground to the depth of their first true leaves. Experimental plots consisted of four rows 12.5 feet long. Plots were randomized within each of five blocks.

Weeds were controlled by mechanical cultivation and hoeing. No other pest controls were needed. Irrigation was by furrows with every-other row being used.

The trial was harvested beginning August 15 for the transplanted peppers and September 12 for the direct-seeded peppers. All marketable sized fruit were weighed and recorded. A 25 pepper sub-sample was taken from each plot to determine average fruit weight

*Marketable yield and **fruit** and plant size of the hybridjalapeno pepper Grande **(Petoseeds).***

Treatment	In-Row Spacing	Ave Fruit Weight (oz)	Plant Height (in)	Marketable Yield (lbs/acre)
Direct-Seeded	9	1.22	26.5	40,970
Transplant	6	1.15	18.4	42.681
Transplant	9	1.20	19.1	41,706
Transplant	12	1.10	19.2	38.862
lsd (0.05) =		0.17	2.0	7.446

Bell Pepper Production Trial

Mike Bartolo
Arkansas Valley Research Center
Colorado State University

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.

This study was conducted to determine the yield and fruit quality of green and red hybrid bell peppers grown at a 6.8. and 12 inch in-row spacing and using black plastic mulch and. drip irrigation.

The variety *King Arthur* (Petoseeds) was harvested at the green stage starting on July 31st. Total marketable yield was not significantly different between the in-row spacings; however. there was a slight trend that showed the closer the in-row spacing the higher the yield. Similarly. there was not a significant difference in fruit quality as measured by % culls. Nonetheless. the 12 inch in-row spacing exhibited slight more fruit defects (sunscald) than the closer in-row spacings. Fruit size was nearly identical in all treatments.

In the second trial. *King Arthur* was harvested at the red mature stage starting on August 31" . Like the green bells, total marketable yields were not significantly different but the closer in-row spacing tended to have higher yields and better fruit quality.

Overall, both the green and the red peppers had excellent yields and quality. With intensive production methods and hybrid varieties, red bell peppers could be easily produced within a typical growing season.

Methods

All peppers were transplanted through black embossed plastic mulch (Mechanical Transplanter) on May 16"'. Mulched beds were on 60 inch centers and had a covered surface of 32 inches A double row of peppers (spaced 6.8, or 12 inches apart in the row), was transplanted on each bed. The distance between the two rows of peppers was 18 inches. Individual plots were two rows/one bed (5 feet) wide and 10 feet long. Green bells were harvested from

one row and red bells from the second row in each plot.

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. A single application of *Sevin* (Rhone-Poulenc) was made to control thrips.

Yield and fruit quality of King Arthur (Petoseeds) hybrid bell pepper grown at an in-row spacing of 6.8, or 12 inches and harvested at the green stage.

In-row Spacing	Average Fruit Weight (Lbs)	% Culls	Marketable Yield lbs/acre
6 inches	0.44	7.69	62,160
8 inches	0.44	5.62	60,417
12 inches	0.45	9.75	59.502
LSD (0.05) =	0.04	8.0	13.574

Yield and fruit quality of King Arthur (Petoseeds) hybrid bell pepper grown at an in-row spacing of 6,8, or 12 inches and harvested at the red stage.

In-row Spacing	Average Fruit Weight (Lbs)	% Culls	Marketable Yield lbs/acre
6 inches	0.45	8.00	58,980
8 inches	0.44	10.58	54,537
12 inches	0.45	10.98	53,970
LSD (0.05) =	0.06	9.05	8.248

Spinach. Hail Damage Trial

Mike Bartolo
Arkansas Valley Research Center
Colorado State University

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 spinach foliage at three dates, spaced 10 days apart, during the middle of the growing period. In 2000, similar to our findings in 1999, 67% defoliation reduced marketable yield more than did 33% defoliation at all growth stages. Likewise, yield losses were most pronounced when the damage came later in the season. Spinach leaves continued to grow after a defoliation event but some leaves still had visible signs of injury and as a result, overall quality was lessened.

Methods

This study was conducted in a field trial in 2000 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 2.2000. 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 3rd , 2000. 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 13). and 20 (May 23) days later. At each defoliation date. leaf number and leaf area were recorded. The spinach leaves were harvested on June 1st . 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 **2, 2000.**

Date	Stage of Development
1. May 3	**Spinach has 20-21 leaves per plant. Leaf area is 300 -350 cm^2.**
2. May 13	**Spinach has 21-22 leaves per plant. Leaf area is 450-500 cm^2.**
3. May 23	**Spinach has 21-22 leaves per plant. Leaf area is 650-700 cm^2.**

Effect of defoliation on spinach (var. Indian Summer) yield in 2000. Defoliation occurred at three different intervals during development.

Date of Defoliation	Defoliation (%)	Total Marketable Leaf Weight (lbs/acre)
Control / No Damage	**0**	**40.873**
May 3	**33**	**40,277**
May 3	**67**	**31,120**
May 13	**33**	**32,385**
May 13	**67**	**20,920**
May 23	**33**	**30,747**
May 23	**67**	**19,580**
LSD (0.05) =		**7,172**

Tomato Production Trials

Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Five tomato trials were conducted in 2000 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 30 fresh market varieties for earliness and adaptability to the Arkansas Valley. 3. To determine the marketable yield and size of three high yielding 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 Shady Lady)* were transplanted through clear plastic mulch on April 20th. 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 perforated row covers (clear plastic) and spun-bound polyester fabric (Pro 17 - 0.5oz/yd2) immediately after transplanting. Row covers were supported by wire hoops placed 4 feet apart. On April 26th. the same three varieties plus *Sunrise* were transplanted into either red or black mulch and then covered with a perforated row cover. As the weather warmed up in early May. the fabric row covers were removed and ventilating slits were cut into the perforated row covers. Row covers were completely removed in late May.

The crop was irrigated via drip lines placed 3 inches below the soil surface and down the center of the bed. Weed were controlled with a pre-transplant application of *Treflan*, (trifluralin) beneath the clear mulch and seasonal hoeing.

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

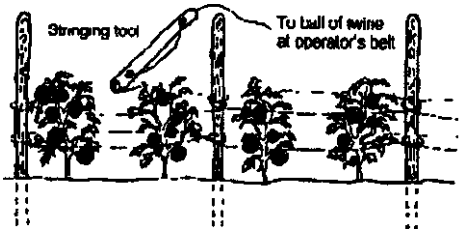
2. Fresh-Market Variety Demonstration: Thirty tomato varieties were transplanted through black plastic mulch on May 9"' and 10"' . Tomatoes were staked and trained starting on June 9th . The crop was irrigated via drip lines. Weeds between the mulched beds were controlled by hoeing.

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

*3. **Fresh-Market** Yield Triak* Three slicing tomato varieties *(Mountain Fresh, Shady Lady, and Sunbrite)* were transplanted through black plastic mulch on May 9th and pruned. staked, and maintained as in the previous trials. Each variety plot was 15 feet long and one bed (5 feet) wide and was replicated three times. There were ten plants per plot. The plots were harvested seven times, beginning on July 18"' and ending August 31'. At each harvest, the number and weight of marketable fruit were recorded. Fruit were considered marketable if they were

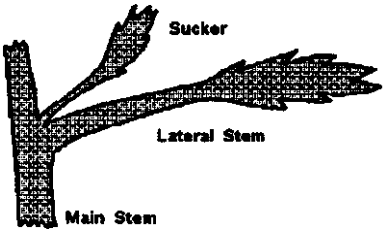
showing color, free of major defects, and over 5 oz. in weight. Yield data and comments are listed in Section 3.

4. Staking Triak The tomato variety *Shady Lady* was transplanted through black plastic mulch on May 9th 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 18th and ending September 5th . 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 Triak The tomato variety *Shady Lady* was transplanted through black plastic mulch on May 10th 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 7th 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 seven times, beginning on July 18"' and ending September 5th . 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 5.



Section 1: Early Trial

Early fresh market tomato trial. Tomatoes were transplanted on April 20th or April 26th through plastic mulch and covered with a row cover to enhance earliness.

Variety	Row Cover	Trans-plant Date	Mulch Color	% Stand Loss BEFORE Row Covers were Removed	% Stand Loss AFTER Row Covers were Removed	First Harvest
Redrider	Perforated plus fabric	April 20	Clear	0	30	June 25
	Perforated	April 26	Red	5	25	July 9
	Perforated	April 26	Black	20	0	July 11
Mt Spring	Perforated plus fabric	April 20	Clear	0	30	July 5
	Perforated	April 26	Red	2	25	July 12
	Perforated	April 26	Black	10	0	Julv 15
Shady Lady	Perforated plus fabric	April 20	Clear	0	30	July 9
	Perforated	April 26	Red	0	25	July 14
	Perforated	April 26	Black	30	0	July 18
Sunrise	Perforated	April 26	Red	0	25	July 11
	Perforated	April 26	Black	22	0	July 13

Comments:

Despite having ventilating slits. plastic row covers caused severe stand loss due to excessive temperature build-up. Perforated row covers worked extremely well but allowed too much heat to accumulate inside the tunnel. This was especially true when used in conjunction with black mulch. Floating row covers, provided excellent frost protection and because they shaded the crop. did not allow too much heat to accumulate inside the tunnels. Once the fabric row covers were removed, however, it became too hot for the tomatoes and many plants were killed. The clear and red soil mulch worked well very early, but after the first week in May, soil temperature became excessive and tomato plants were killed or stunted.

Recommendation:

Plastic row covers and clear or red mulch are not recommended for early tomato production in the Arkansas Valley at this time. Transplanting into black mulch after the last frost (-May 10th) or earlier (if a fabric row cover alone is used) may be the best way to produce the earliest tomatoes. Although it doesn't have a lot of leaf cover, *Red Rider* is an excellent early season variety that should also enhance early production.

Section 2: Fresh Market Variety Demonstration

Fresh market tomato varieties in the 2000 trial. Varieties were transplanted through black plastic mulch on May 11th and 12th and were staked and drip-irrigated.

Variety	Source	First Harvest	Quality Rating*	Type and Comments
Emperador	Petoseeds	7-16	7	Medium large fruit, Heavy vine cover
Sanibel	Petoseeds	7-27	7	Greenish shoulder fruit, good vine cover
XLT 1200	Abbott & Cobb	7-25	7	Medium large fruit, good quality
Balboa	Harris Moran	7-30	8	Excellent vine cover and fruit quality.
Show Girl	Sunseeds	7-31	7	A good dicer overall. Quality fruit.
Sunrise	Asgrow	7-19	7	Early slicer with very good size and yield.
Springfield	Harris Moran	7-25	6	A very good slicer but some clacking.
Sunbeam	Asgrow	8-I	9	One of the top dicers. Good quality.
ACR 8625	Abbott &Cobb	7-16	7	Large pear-shaped fruit. Good yield
Pik Ripe 193	Petoseeds	7-27	8	A good slicer overall. Good yield.
Flavormore 223	Harris Moran	8-1	7	Slicer with long shelf-life. Good yields
Lucky Lady	Sunseeds	8-1	7	A good slicer overall. Quality fruit
Carolina Gold	Totally Tomatoes	8-1	7	Hybrid Yellow slicer.
Mountain Cold	Totally Tomatoes	8-1	4	Yellow dicer. Prone to some cracking
Leading Lady	Sunseeds	8-1	7	A very good consistent slicer overall.
Mountain Spring	Stokes	7-17	8	Large early dicer. Small canopy.
Mountain Fresh	Ferry-Morse	7-30	8	Excellent dicer with good yield and size.
Shady Lady	Sunseeds	7-18	9	The best overall slicer in the trial.
Sunbrite	Asgrow	735	9	Slicer. Very large size and great yields.
Stallion	Harris Moran	8-1	7	Very good pear-shaped fruit. Good yield.
Mt Supreme	Asgrow	8-1	7	Slicer with excellent yield and fruit color.
Sunstart	Asgrow	7-11	5	Early. cracks, poor vine cover
Daybreak	Totally Tomatoes	7-26	8	Large firm fruit with good canopy cover
Sunchief	Asgrow	7-24	9	Early. Good vine cover and heavy yield
Sunration	Asgrow	7-30	9	Large fruit and heavy yield. Canopy fair
Viva Italia	Totally Tomatoes	7-31	8	Roma type. Good yield
Tirano	Harris Moran	7-29	8	Roma type. Good yield and quality.
Puebla	Petoseeds	7-29	9	Roma type. Excellent yield and quality
Mountain Belle	Totally Tomatoes	74	8	Excellent cherry
Cherry Grande	Totally Tomatoes	74	8	Excellent cherry

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

Comments:

Overall. *Shady Lady, Sunbrite, and Sunbeam* were the best slicers. These varieites were high yielding and had large firm fruit. *Sunsatation* and *Sunchief* were also good early varieties. *Puebla* and *Tirano* were good roma types and *Mountain Belle* and *Cherry Crande* 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 9th 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.)
	7-27		8-2		8-6		8-12		8-17		8-26		8-31			
Shady Lady	174	7.20	4123	7.25	3175	8.20	4220	7.37	9002	7.85	6214	7.73	15739	6.67	42,650	7.30
Sunbrite	580	8.00	3194	8.80	4588	8.62	2536	7.88	8847	8.94	11635	8.18	15507	7.06	46,889	7.85
Mt. Fresh	154	6.40	425	7.04	793	7.28	677	5.42	2787	7.33	5846	6.48	8983	6.01	19,669	6.22
LSD (0.05) =															18,253	0.30

Comments:

Shady Lady and *Sunbrite* had equally good yields. *Mountain Fresh* was later in maturity and less productive. In terms of fruit size, *Sunbrite* was the best. *Sunbrite* had many large fruit (10 oz. +) especially early in the season. For all varieties. fruit size gradually diminished in later harvests. Fruit appearance, taste, and quality, were good in all three varieties. *Shady* Lady had the firmest fruit overall and has been a consistent performer over the past several years.

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 9th and were staked and drip-irrigated.

Treatment	Harvest Date Marketable Yield (lbs/acre) and Average Fruit Weight (oz)														Total Marketable Yield (lbs/acre)	Average Fruit Weight (oz)
	7-18		7-27		8-3		8-7		8-14		8-22		9-5			
Staked	2509	8.15	4623	8.79	5424	7.20	3136	7.50	16610	7.39	6888	7.32	12266	6.32	51,458	7.16
Control	3124	7.28	4750	8.04	4030	7.49	1591	7.30	20513	7.16	7585	7.36	11894	6.14	53,491	7.01
LSD (0.05) =															14,861	0.37

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 fruit size. 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.

Section 5: Pruning Trial

The marketable yield and average fruit weight of Pruned and Non-pruned (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 10th and were staked and drip-irrigated.

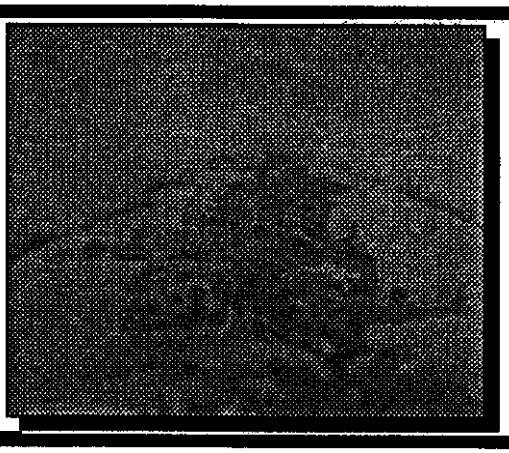
Treat-ment	Harvest Date Marketable Yield (lbs/acre) and Average Fruit Weight (oz.)														Total Marketable Yield lbs/acre	Ave. Fruit Wt oz.
	7-18		7-30		8-3		8-10		8-16		8-22		9-5			
Pruned	662	7.84	3914	7.93	4077	6.80	9501	7.63	18144	7.70	4234	6.85	14659	6.57	55,199	7.21
Control	545	6.26	2625	7.67	4425	7.69	11313	7.41	27936	7.67	8770	6.76	10117	5.63	65,734	6.87
LSD (0.05) =															*9.562*	*0.44*

Comments:

Unpruned (control) tomatoes had a significantly higher yield than pruned tomatoes. However, 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 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.

Early Watermelon Trial



Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Both seeded and seedless watermelons are becoming increasingly popular food items with consumers. Although growing conditions for watermelons are excellent in the Arkansas Valley. the season is relatively short. Early varieties grown with intensive production practices may help extend the marketing period for locally-grown watermelons.

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

In the 2000 trial. both seeded and seedless watermelons produced high yields and matured as early as July 7"' when grown with placticulture methods. Higher yields and market prices would offset the increased cost of producing early season watermelons.

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 l-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* (Cowan 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.

The seeded variety *Arriba* (Hollar Seeds) and seedless variety *Premiere* (Colorado Seeds) were used in this study. Watermelons were seeded in the greenhouse in 72-cell flats 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 seven watermelon plants. The treatments transplanted April 26" (before the last frost date) were covered with a slitted or perforated row cover. Later transplanted treatments (May 10th) and the direct-seeded treatment 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 in late May .

The following seven production combinations were evaluated:

1. Arriba • Transplanted April 26 into clear mulch and covered with slitted plastic.
2. Premiere -Transplanted April 26 into clear mulch and covered with slitted plastic
3. Arriba- Transplanted April 26 into clear mulch and covered with perforated plastic.
4. Premiere- Transplanted April 26 into clear mulch and covered with perforated plastic.
5. Arriba -Transplanted into clear mulch May 10.
6. Premiere -Transplanted Into clear mulch May 10.
7. Arriba -Seeded into clear mulch April 24th

Each plot was harvested over a 5-7 day period. Only fully ripe melons were selected and each marketable melon was individually weighed. Watermelons were considered marketable if they weighed over 8 lbs. and were free of any physical defects.

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

Variety	Seed (S) or Transplant (TP) Date	Row Cover	First Harvest	Ave. Fruit Size (lbs)	Market. Yield (lbs/acre)
Arriba	TP - April 26	slitted	July 7	16.07	47.943
Premiere	S - April 26	slitted	July 12	11.47	43,827
Arriba	TP - April 26	perforated	June 7	12.69	41.931
Premiere	S - April 26	perforated	July 11	11.82	41.794
Arriba	TP - May 10	none	July 20	19.12	38.771
Premiere	TP - May 10	none	July 23	14.03	26.012
Arriba	S - April 24	none	Julv 23	15.80	29.480
L S D (0.05)=				3.69	24.078

Transplanted vs Seeded Watermelon

Earliness and yield are two factors to consider when adopting intensive practices for growing watermelon. Hybrid watermelon varieties, although costly, help maximize the productivity of an intensive system. This study was conducted to compare different establishment methods for the watermelon variety *Stars* and *Stripes* (Asgrow Seeds). Melons were transplanted and grown using black plastic mulch and drip iirigation.

Hybrid watermelons were extremely productive when grown with intensive production methods. In terms of earliness, transplanted melons matured 5-7 days before seeded melons. There was not a significant difference in fruit size between the treatments; however, the seeded melons showed higher overall yields. Overall, yield and quality was excellent for both treatments.

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 l-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 (Mechanical Transplanter) on April 17th.

The hybrid watermelon variety *Stars and Stripes* (Asgrow), an elongated Allsweet type was seeded through holes in the center of the plastic mulch on April 24th . Two to three seeds were set in each hill and later thinned down to one plant. Four-week old transplants were set out on May 8th . The transplants were grown in the greenhouse in 72-cell flats. All plants were placed in single rows down the center of the bed at an in-row spacing of 36 inches. Each plot was one bed wide (5 ft) and 24 ft long and was replicated four 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. Only fully ripe melons were selected. Each marketable melon was individually weighed. Watermelons were considered marketable if they weighed over 11 lbs and were free of any physical defects.

Yield and earliness of seeded and transplanted hybrid watermelon (*Stars and* Stripes) grown using intensive production practices.

Treatment	Maturity Date	Average Fruit Weight	Weight of Melons >15 lbs (lbs/acre)	Total Marketable Yield (lbs/acre)
Transplanted	July 25	19.5	56,591	64.822
Seeded	July 31	19.2	83.744	94.071
LSD (0.05) =			64,560	70,351

Zinnia Stand Loss Trial

Mike Bartolo
Arkansas Valley Research Center
Colorado State University

Stand loss in crops can occur due to a variety of environmental stresses. In terms of yield. different plants have different capacities to compensate for reduced populations. This study was conducted to determine the yield response of zinnia *(Zinnia elegans* Jacq.) grown for seed to stand loss incurred at different stages of plant development. The effect of removing 25%. 50%. and 75% of the zinnia stand at the pre-bloom. early. mid, and late-bloom stages was examined.

Zinnias were able to compensate for some stand loss, especially if the loss occurred early in the season. Accordingly, the most significant yield loss in terms of total flower weight and seed weight occurred when a 75% stand reduction occurred at the late bloom stage. In general, yield losses increased as the amount of stand loss increased and as the loss occurred later in the season.

Introduction

The plains of eastern Colorado are often exposed to extreme environmental conditions including low and high temperatures and severe storms that contain hail (Doesken, 1994). Zinnias grown for flower seed production in the Arkansas Valley of Colorado are subjected to a variety of weather-related stresses. To date, there have been no studies describing how zinnias respond to stand losses.

Our objective was to determine how different levels of stand reduction during zinnia development affect seed yield. This information is needed to document the effects of stand loss on zinnia and gain insights into possible production options after stand has occurred.

Materials and Methods

This study was conducted in field trials at the Arkansas Valley Research Center, Rocky Ford. Colorado. on a Rocky Ford silty clay loam [Ustic Torriorthents, fine silty, mixed, (calcareous, mesic)]. Seeds of *California Giant - Mixed Colors* (Burrell Seed Co.) were sown on 25 May 2000. Plots, 15 ft long X 10 ft wide, were used. The plot area was over-seeded and thinned to a uniform stand (6 inch in-row spacing) in all plots soon after emergence. There were approximately 120 plants per plot.

Weeds were controlled by cultivation and hand weeding. No other pest controls were used. The crop was irrigated as needed via gravity-flow furrows spaced

30 inches apart. The experiment was a randomized complete block with four replications.

On 30 June, prior to the blooming of the first flowers, the stand reduction treatments were initiated. Zinnia plants were removed by hand. Either 25%, 50%. or 75% of the plants were removed from plots. Equal numbers of plants were removed from each row within the plot. Stand reduction was repeated on other plots wet-y two weeks corresponding to the early, mid, and late-bloom stages (Table 1). The plots were harvested on 9 October 2000. All flower heads were hand-picked and placed in a paper bag. The harvested material was air-dried in a greenhouse for 10 days and then weighed (Table 2).

Mature seeds were separated from the remaining flowers structures (cones. petals. immature seeds) by breaking up the heads by hand and running the mixture through an air-blowing seed cleaner. This process was repeated three times until the zinnia seed was free of debris. The mature seed was then weighed (Table 2)

Analysis of variance was performed on seed yield. The means were separated using Duncan's multiple range test.

Literature Cited

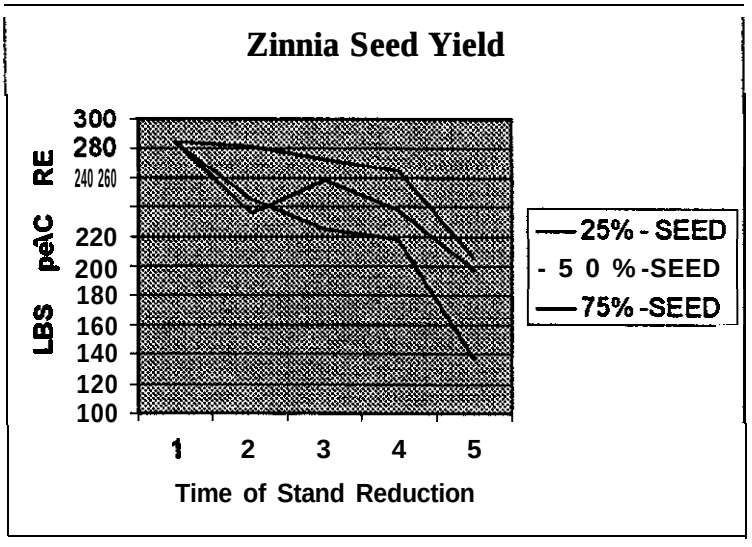
Doesken, N.J. 1994. Hail, hail, hail -The summertime hazard of eastern Colorado. Colo. Climate 17(7):84.

'able 1. Stages of zinnia develoomenl at different stand reduction dates

Stage	Date	Description
Pre-Bloom	June 30	Plant height 16-19 cm. Leaf area is 200-225 $cm^{2.}$ Plant has 1 unopened buds.
Early Bloom	July 14	Plant height 40-50 cm. Leaf area is 1500-1900 $cm^{2.}$ Plant has 3-5 unopened buds and one open flower.
Mid-Bloom	July 28	Plant height 68-75 cm. Leaf area is 2500-3200 $cm^{2.}$ Plant has 47 unopened buds and 3-5 open flowers.
Late Bloom	August 11	Plant height 79-90 cm. Leaf area is 35004500 $cm^{2.}$ Plant has 47 unopened buds and 6-9 open flowers. Some of the older flower heads are drying out.

Table 2. Effect of stand reduction on zinnia flower and seed weight in 2000. Stand reduction occurred at four different intervals during development.

Stage of Development	Stand Reduction %	Total Flower Weight lbs/acre	Seed Weight lbs/acre
Control	0	828.3	284.5
Pre-bloom	25	763.1	281.9
	50	778.3	235.9
	75	707.7	245.9
Early Bloom	25	773.7	273.1
	50	745.3	258.5
	75	647.2	224.6
Mid-Bloom	25	783.4	264.9
	50	742.6	238.3
	75	573.2	218.5
Late Bloom	25	612.3	205.4
	50	569.6	197.6
	75	337.5	137.4
sd 0.05 =		94.4	47.4



2001 Research Plots
Arkansas Valley Research Center
Colorado State University
Rocky Ford, Colorado

Field Crops

ALFALFA - 23.4 acres
Variety Trials - 28 entries, 4th year, 24 entries, 1st year
Alfalfa Weevil - Varietal Resistance - 6 entries - 6th year
Insecticide Trial - 11 treatments

BEANS (Pinto)
Variety Trial - 20 entries

CORN - 23.7 acres
Variety Trial - 22 grain entries, 19 forage entries
PAM Persistance - 2 treatments
Tillage Study - 2 types
Acaricide Trial - Banks Grass Mite - 12 treatments
Insecticide Trial - SW Corn Borer - 7 treatments, 2 dates
Corn Borer Resistant (Bt) corn - 21 entries
SW Corn Borer Pheromone Traps - Arkansas Valley - 9
Weed Management - 14 post emergence treatments

FERTILITY - N fertility Response - Long Term 6 rates, 2 types

SMALL GRAINS

Winter Wheat	Harvest	Plant
Variety Trial	Hail	30 entries

SORGHUM - 6.6 acres
Variety Trial - 8 forage entries
Greenbug Management
Resistant Variety Trial - 24 entries, 2 treatments
Insecticide Trial - 15 treatments

SOYBEANS - 11.3 acres
Variety Trial - 11 entries

ALTERNATIVE CROPS
Canola Trial - National Winter Canola Trial - 24 entries - winterkill, Plant - 34 entries
Great Plains Intermediate Canola Nursery - winterkill, Plant - 32 entries

Birdsfoot Trefoil - 2 varieties

Vegetable Crops

ONIONS - 6.1 acres
Variety Trial - 40 entries
Drip vs furrow - 2 treatments
Salinity Trial - 5 varieties - 3 levels of salinity
Fertility - N trial - 19 treatments
Disease Management - Fungicide Trial - 15 treatments;
Bactericide Trial - 8 treatments, 6 treatments;
Auxigro Study - 3 treatments
Thrips Management - Tolerance Trial - 20 varieties, 2 treatments
Insecticide Trial = 8 treatments
Weed Management - Preemergence - 14 treatments
Dual Tolerance - 7 treatments

CABBAGE - Insect Control - 6 treatments

CANTALOUPE
Plastic Mulch Study-Fresh Market - 2 varieties, 12 treatments
Shipping Melons - 28 varieties, demonstration

PEPPERS
Variety Demonstration - 40 seeded entries
Plastic Mulch Demonstration - drip irrigation, black plastic, 90 varieties
Bell Pepper Spacing Trial - 1 variety, 3 treatments
Hybrid Anaheim Plant Establishment - 1 variety, 14 treatments
Jalapeno Establishment Trial - 1 variety, 4 treatments
Variety Screening - 3 varieties

SPINACH - Bail Simulation - 9 treatments
Disease Trial = 10 treatments

TOMATOES - Drip Irrigation and Plastic
Staked and Mulch Variety Demonstration - 40 entries
Early Tomato Production - 3 varieties, 3 row cover
Pruning Trial - 2 treatments
Canning Variety Demonstration - 11 varieties
Spacing Trial - 3 treatments

WATERMELONS
Early Watermelon Study - 3 varieties, 7 treatments-plastic mulch
Seedless Variety Trial - 8 varieties
Establishment - seeded vs transplant - 2 treatments

OTHER
Sweet corn Variety Demonstration - 24 entries
Cucumber, squash, eggplant, edamame

ZINNIAS - 1.0 acre
Stand Reduction = 13 treatments