Texas High Plains Vegetable & Weed Control Research Program

Research Summary Reports

2004 - 2005

Texas A & M University
Department of Horticultural Sciences
Texas Agricultural Experiment Station &
Texas Cooperative Extension

Russell W. Wallace, Ph.D.
Extension Vegetable Specialist

John C. Hodges
Research Technician

Texas Cooperative EXTENSION
The Texas A&M University System

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INTRODUCTION:

The High Plains Vegetable & Weed Control Research Program is located at the Texas A & M University Research & Extension Center in Lubbock. The main objective of the program is to evaluate herbicides and other weed control options for vegetables and field-grown ornamentals produced on the High Plains of Texas, as well as leafy green vegetables in the Wintergarden Region of Texas, and to assist with vegetable research in cooperation with other universities through the United States.

This program would not be as successful without the support of many support staff, private companies and other volunteers. Many thanks to John C. Hodges, Research Technician with Texas Agricultural Experiment Station, and to our past summer assistants Dan Fouts, Shiloh Adams, Aaron Blanton, and Jennifer Landry for their assistance with field work and data collection throughout the season. The assistance and expertise of Debbie Kline and Roy Riddle with vegetable trials conducted at the Carolyn Lanier Youth Farm supported by the South Plains Food Bank is greatly appreciated. The cooperative support I receive from Jeff Koym, Potato Breeding Research Associate and from the farm crew at the Lubbock Research & Extension Center is invaluable. Also, many thanks to Wendy Durrett, Extension Secretary for her office support, and to those Lubbock Master Gardeners who volunteered their time to help out with the harvesting of several of the trials.

***Note**: This report is not intended as a book of recommendations for using unregistered pesticides on vegetables or field-grown ornamental crops in Texas. Growers should always read and follow label directions of any pesticides or other chemicals used in production of vegetables and ornamentals*.

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IR-4 Leafy Greens Project	Dow AgroSciences
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Agriliance	Georgia-Pacific, Inc.

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South Plains Food Bank Farm	Bayer CropScience
Texas Tech University Research Farm	Del Monte Company
Dow AgroSciences	Entex Energy
Gowan Company	UAP – Plainview
BioWorks	Kelly Green Seeds
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Valent	Agriliance

COOPERATORS:

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CHEMICALS USED FOR HERBICIDE TRIALS

PRODUCT	CHEMISTRY	COMPANY
Alanap-L 2EC	Naptalam	Chemtura
Barricade 4FL	Prodiamine	Syngenta
Basagran 4L	Bentazon	UAP
Bolero 8EC	Thiobencarb	Valent
Buctril 4EC	Bromoxynil	Bayer Cropsciences
Callisto 4SC	Mesotrione	Syngenta
Caparol 4L	Prometryn	Syngenta
Cobra 2EC	Lactofen	Valent
Command 3ME	Clomazone	FMC
Dacthal 6F	DCPA	AMVAC
Define 4SC	Flufenacet	Bayer Cropsciences
Dimension T & O 1EC	Dithiopyr	Dow AgroSciences
Dinamic 70G	Amicarbazone	Arvesta
Dual Magnum 7.62E	s-Metolachlor	Syngenta
Envoke 75WDG	Trifloxysulfuron	Syngenta
Eptam 7E	EPTC	Gowan
Eptam 7E	EPTC	Gowan
Eradicane 6.7-E	EPTC + safeners	Gowan
Eradicane 6.7-E	EPTC + safeners	Gowan
Eradicane 6.7-E	EPTC + safeners	Gowan
Eradicane 6.7-E	EPTC + safeners	Gowan
Everest 70WG	Flucarbazone-sodium	Arvesta
Exceed 57WG	Prosulfuron	Syngenta
Gallery 75DF	Isoxaben	Dow AgroSciences
Goal 2XL	Oxyfluorfen	Dow AgroSciences
Goal 2XL	Oxyfluorfen	Dow AgroSciences
GoalTender 4L	Oxyfluorfen	Dow AgroSciences
Gramoxone Max 3EC	Paraquat	Syngenta
Grasp 2SC (GF-443)	Penoxsulam	Dow AgroSciences
Guardsman Max	Dimethenamid-p + Atrazine	BASF
KIH-485 60WDG		Kumai Chem. Ind.
Kerb 50W	Pronamide	Dow AgroSciences
Linex 50DF	Linuron	Griffin
Mandate 2EC	Thiazopyr	Dow AgroSciences
Matrix 25DF	Rimsulfuron	Dupont
Nortron 4SC	Ethofumesate	Bayer Cropsciences
Option 35WG	Foramsulfuon	Bayer Cropsciences
Outlook 6E	Dimethenamid-P	BASF
Paramount 75DF	Quinclorac	BASF
Prefar 4E	Bensulide	Gowan
Prefar 4E	Bensulide	Gowan
Progress 1.8EC	Etho. + Phen. + Desmed.	Bayer Cropsciences
Prowl H20 (3.8 ACS)	Pendimethalin	BASF
Python 80WDG	Flumetsulam	Dow AgroSciences
Raptor 1AS	Imazamox	BASF
Regiment 80WP	Bispyribac-sodium	Valent
Rely 1EC	Glufosinate-ammonium	Bayer Cropsciences

PRODUCT	CHEMISTRY	COMPANY
Ro-Neet 6E	Cycloate	Helms-Agro
Roundup Original Max	Glyphosate	Monsanto
Sandea 75WDG	Halosulfuron	Gowan
Sandea 75WDG	Halosulfuron	Gowan
Sandea 75WDG	Halosulfuron	Gowan
Select 2EC	Clethodim	Valent
Select 2EC	Clethodim	Valent
Sencor 75DF	Metribuzin	Bayer Cropsciences
Solicam DF	Norflurazon	Syngenta
Spartan 75WDG	Sulfentrazone	FMC
Spin-Aid 1.3EC	Phenmedipham	Bayer Cropsciences
Starane 1.5EC	Fluroxypyr	Dow AgroSciences
Stinger 3EC	Clopyralid	Dow AgroSciences
Strategy	Ethalfluralin + Clomazone	UAP
Suprend 80WDG	Prometryn + Trifloxysulfuron	Syngenta
Surflan A.S.	Oryzalin	Dow AgroSciences
Targa	Quizalafop	Gowan
Targa	Quizalafop	Gowan
Target 6Plus	MCPA	
Thistrol 2EC	MCPB	Nu-Farm Americas
UltraBlazer 2EC	Acifluorfen-sodium	BASF
UpBeet 50DF	Triflusulfuron-methyl	Dupont
V-10137 1EC		Valent
V-10142 75WDG		Valent
V-10139 1.6EC		Valent
V-10146 3.3SC	Unknown	Valent
Valor 51WDG	Flumioxazin	Valent
Valor SX 51WDG	Flumioxazin	Valent

PRODUCT	CHEMISTRY	COMPANY
SURFACTANTS		
Activator 90	NIS	UAP
Activator 90	NIS	UAP
Herbimax	COC	UAP
Herbimax	COC	UAP
Superb HC	COC	Agriliance
Class Act Next Gen.	Corn-based NIS + Amm. Sulf.	Agriliance
Preference	Soybean NIS	Agriliance
Prime Oil	Petro.-based COC	Agriliance
Interlock	Penetrant/Drift Reduction	Agriliance

Maximum High Temperatures at the Lubbock Agricultural Research & Extension

Day of The Week	March	April	May	June	July	August	Sept.	October
1	55.0	60.9	70.1	80.7	97.1	89.7	87.5	93.2
2	64.5	77.5	45.8	90.5	93.6	91.2	87.1	88.6
3	66.3	79.2	45.3	86.2	102.2	91.0	86.0	86.1
4	60.5	85.9	50.5	90.3	91.8	90.5	86.1	85.4
5	53.5	69.1	73.2	87.1	88.5	78.7	82.2	86.5
6	59.9	69.2	77.4	87.4	90.7	85.1	87.1	50.2
7	62.3	71.9	83.6	92.2	88.6	87.8	85.7	61.8
8	71.7	77.7	84.3	95.8	89.2	85.8	84.4	69.6
9	68.0	84.9	88.8	92.7	90.6	87.2	84.6	62.7
10	67.1	71.1	92.9	83.6	89.8	87.5	88.7	71.6
11	67.8	64.2	90.9	88.7	92.3	89.2	89.6	68.6
12	84.2	73.0	86.2	93.0	91.1	88.7	90.4	77.5
13	60.4	77.6	91.4	97.7	93.3	84.2	92.6	69.9
14	50.2	77.7	79.1	88.9	95.2	71.0	91.0	75.2
15	40.3	75.6	64.1	---	88.2	73.5	82.4	71.1
16	58.6	74.0	74.4	99.1	91.2	83.8	81.5	78.5
17	---	73.6	89.8	93.4	91.6	88.1	96.1	84.1
18	---	84.1	91.0	102.9	91.0	90.7	96.1	86.8
19	58.6	87.4	92.6	96.3	92.8	88.4	92.9	86.3
20	71.2	89.6	94.3	93.2	93.8	87.2	90.9	72.5
21	66.1	81.9	95.7	92.3	90.3	85.3	90.7	78.1
22	62.8	69.8	98.1	93.3	92.9	89.1	95.2	75.2
23	73.8	67.1	101.6	93.3	---	91.7	90.4	57.6
24	70.6	52.8	94.2	92.4	93.8	91.3	89.6	61.5
25	61.1	68.5	84.5	90.1	95.1	92.1	98.5	---
26	41.7	66.6	70.5	---	81.0	94.2	85.3	---
27	64.8	82.3	75.4	94.2	69.6	90.8	91.8	---
28	81.1	84.3	71.2	96.4	80.8	82.6	---	---
29	76.1	67.5	78.7	96.2	84.3	84.8	---	62.2
30	69.6	---	81.4	71.5	90.2	87.6	84.5	75.9
31	60.2		79.6		90.8	89.4		61.1

Monthly Rainfall Totals at the Lubbock Agricultural Research & Extension Center

Rainfall (inches)	0.58	0.22	2.06	1.31	2.49	2.31	0.29	2.53

Direct-Seeded Cantaloupe Herbicide Screen: 2004

Final Report

Objective: To evaluate and compare the efficacy of selected herbicide treatments on Palmer Amaranth (*Amaranthus palmeri*) control, crop injury and yield in cantaloupes (*Cucumis melo*).

Materials and Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock on an Acuff clay loam with an approximate pH of 7.6 and 1.1% organic matter. The trial site was plowed in the fall and the soil prepared by applying a pre-plant anhydrous fertilizer (80 lbs/A nitrogen) followed by listing the furrows into beds 40" apart. Cantaloupe (var. "Jumbo Hale") was direct-seeded using a 2-row Monosem vacuum planter on May 24 followed immediately by the PRE treatments. Supplemental fertilizer (45-0-0) was broadcast on July 2 at 30 lbs N /A, then irrigated in. All herbicides were applied using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 30 PSI. Application data are found in Tables 1 through 3 for the PRE and EPOST treatments, respectively. Plots were furrow-irrigated as needed during the season. No yield data was collected in this trial due to extreme heavy weed pressure as a result of abnormally high rainfall during the growing season. The experimental design was a randomized complete block with 3 replications. All crop injury and weed control data were subjected to ANOVA using SAS (SAS Institute Inc., Cary, NC), and means were separated using the Least Significant Difference (α = 0.05).

Table 1. Application Data for PRE Herbicide Treatments

Location	Lubbock	Wind speed / direction	5 – 15 mph/SW
Date	May 24, 2004	Crop	Cantaloupe
Time of day	9:00 a.m.	Variety	Jumbo Hale
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	75
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	76
GPA	20	Soil beneath	Semi-moist
PSI	30	Soil surface	Dry
Nozzle tips	Teejet 8002VS	% Relative humidity	Low
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.5'	# Replications	3
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for EPOST (2-LF) Treatments

Location	Lubbock	Wind speed / direction	5 – 10 mph / S
Date	June 9, 2004	Crop	Cantaloupe
Time of day	9:00 a.m.	Variety	Jumbo Hale
Type of application	Broadcast	Crop stage	1 – 2 leaves
Carrier	Water	Air temp. (^oF)	72
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	Teejet 8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.5'	# Replications	3
Boom height (")	18"	Sprayed by	RWW
Weeds present: Palmer amaranth (cotyledon – 2-LF)			

Table 3. Application Data for EPOST (4-LF) Treatments

Location	Lubbock	Wind speed / direction	5 – 10 mph / S
Date	June 18, 2004	Crop	Cantaloupe
Time of day	11:00 a.m.	Variety	Jumbo Hale
Type of application	Broadcast	Crop stage	3 – 4 leaves
Carrier	Water	Air temp. (^oF)	83
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	73
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Moist
Nozzle tips	Teejet 8002VS	% Relative humidity	High
Nozzle spacing	18”	Sky conditions	Partly cloudy
Boom width (“)	6.5’ / 3.25’	# Replications	3
Boom height (“)	18”	Sprayed by	JCH
Weeds present: Palmer amaranth (2” – 12”)			

Results and Discussion: Extremely high rainfall throughout the 2004-growing season likely had a significant impact on herbicide movement in the soil and this may have influenced crop injury ratings. Preemergence applications of Alanap-L, Spartan, Dual Magnum, and V-10146 caused significant crop stunting (> 30.0%) when compared plants observed in the untreated control plots 18 DAT (Table 4). While not significantly injured, cantaloupes treated PRE with Sandea and Outlook had 16 and 25% stunting, respectively. Crop injury continued to decrease over time, but continued to remain too injurious in plots treated with Spartan, Dual Magnum and V-10146 by 45 DAT. Ratings recorded on July 23 (59 DAT), however, showed that all plants in all herbicide treatments had outgrown the previous crop injury. What effect this may have had on yield is unknown in this trial.

Palmer amaranth populations were extremely high as a result of the significant increase in rainfall, and this likely also impacted herbicide efficacy. Early-season of Palmer amaranth was 85% or better for all herbicide treatments at 18 DAT. However, by June 30 (37 DAT) control greatly decreased in plots treated with Prefar, Strategy and Spartan. There were slight decreases for all other herbicide treatments. Weed control ratings recorded on July 23 (59 DAT) showed that poor Palmer amaranth control was observed in all Prefar treatments, regardless or rate, and in plots treated with Alanap-L, Alanap-L + Prefar, Strategy, Spartan, and V-10146. The best treatments in this study included Alanap-L + Matrix (post), Sandea applied PRE + Sandea applied POST twice, and PRE applications of Dual Magnum or Outlook. However, even these treatments had less than good result.

The results of this trial indicate that under the environmental conditions of this study (high rainfall, excessive weed pressure) all herbicide treatments performed fair to poor in controlling Palmer amaranth. The poor results were likely due to leaching of the herbicides out of the zone where weed populations germinated. However, this also moved the herbicides into the cantaloupe root zone resulting in somewhat higher crop phytotoxicity than expected. It is likely that under more “normal” conditions, many of these treatments would have had a significant improvement in herbicide efficacy, and perhaps less crop injury.

Table 4. The Effect of Herbicide Treatments on Cantaloupe Injury

Chemical	Rate lbs a.i.	Timing	June 11	June 30	July 9	July 23
			------------% Crop Injury ------------			
Untreated			0	0	0	0
Handweed		Season	0	0	0	0
Prefar 4E		PRE	0	0	0	0
Prefar 4E		PRE	6.7	5.0	0	0
Prefar 4E		PRE	5.0	0	0	0
Alanap-L		PRE	30.0	16.7	16.7	0
Alanap-L + Matrix 25DF + NIS		PRE POST 4-LF	31.7	0	5.0	0
Alanap-L + Prefar 4E		PRE PRE	0	18.3	0	0
Sandea 75WDG + Sandea 75WDG + NIS Sandea 75WDG + NIS	0.048 0.012 0.012	PRE POST 2-LF POST 3-LF	16.7	8.3	3.3	0
Strategy		PRE	0	0	0	0
Spartan 75WDG		PRE	38.3	38.3	23.3	0
Dual Magnum 7.62E		PRE	38.3	20.0	20.0	0
Outlook 6E		PRE	25.0	15.0	0	0
V-10146 3.3SC		PRE	45.0	45.0	28.3	0
LSD (0.05)			**29.9**	**23.2**	**19.5**	**0**

Table 5. The Effect of Selected Herbicides on Palmer Amaranth Control in Cantaloupes

Chemical	**Rate lbs a.i.**	**Timing**	**June 11**	**June 30**	**July 9**	**July 23**
			-----------% Palmer Amaranth Control ------------			
Untreated			0	0	0	0
Handweed		Season	99.0	99.0	99.0	99
Prefar 4E		PRE	85.0	61.7	20.0	16.7
Prefar 4E		PRE	86.7	68.3	48.3	35.0
Prefar 4E		PRE	88.3	76.7	58.3	13.3
Alanap-L		PRE	91.3	70.0	45.0	30.0
Alanap-L + Matrix 25DF + NIS		PRE POST 4-LF	97.7	86.7	78.3	76.7
Alanap-L + Prefar 4E		PRE PRE	96.3	88.3	78.3	56.7
Sandea 75WDG + Sandea 75WDG + NIS Sandea 75WDG + NIS	0.048 0.012 0.012	PRE POST 2-LF POST 3-LF	96.3	91.7	81.7	63.3
Strategy		PRE	86.7	63.3	53.3	0
Spartan 75WDG		PRE	91.0	53.3	48.3	41.7
Dual Magnum 7.62E		PRE	99.0	84.7	80.0	63.3
Outlook 6E		PRE	97.7	86.7	81.7	66.7
V-10146 3.3SC		PRE	96.3	88.3	88.3	50.0
LSD (0.05)			**11.6**	**31.5**	**42.9**	**43.9**

High Plains Pumpkin Herbicide Evaluation

Final Report

Objective: To determine the efficacy of selected preemergence (PRE) and postemergence (POST) herbicides on crop injury, weed control and yield of pumpkins (*Cucurbita pepo*).

Materials & Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock during the 2004 growing season. The soil on the site was an Acuff clay loam with an average pH of 7.6 and 1.1% organic matter. The trial site was plowed the previous fall and in the spring the soil was prepared by applying pre-plant fertilizer (80 lbs/A nitrogen). The field was then disked and furrows listed. Pumpkins (var. "Howden") were planted on June 14 using a 2-row Monosem Vacuum Planter spaced at 40" centers with 2 rows/plot. PRE-applied herbicides were sprayed immediately following planting on the same date. POST-applied treatments were sprayed on July 5 to corresponding plots when the pumpkins were at the 3 – 5 leaf stage. The test site was treated uniformly in regards to insect and disease management and fertility throughout the season. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi (Tables 1 and 2). The trial was conducted as an RCB design replicated 4 times in single row plots measuring 13.0' x 30'. All data were subjected to ANOVA using SAS statistical procedures and means separated at the 5% level.

Table 1. Application Data for PRE-applied Herbicides

Location	Lubbock	Wind speed / direction	5 – 10 MPH / S
Date	June 14, 2004	Crop	Pumpkins
Time of day	9:00 a.m.	Variety	Howden
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	78
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	76
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for POST Treatments

Location	Lubbock	Wind speed / direction	5 – 10 MPH / E
Date	July 5, 2004	Crop	Snap beans
Time of day	7:30 a.m.	Variety	Pumpkins
Type of application	Broadcast	Crop stage	Howden
Carrier	Water	Air temp. (^oF)	74
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	76
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: Careless weed (2 – 10 leaves)			

Results and Discussion: Pumpkin crop growth was generally excellent during the early to mid-season for 2004, however, excessive and untimely rainfalls created unusual environmental conditions that likely influenced late season crop growth, herbicide performance and disease control in this study. Early season crop injury (4 weeks after planting) was significantly higher (compared to the untreated control) in plots treated with Sandea (0.032 lbs a.i. or 0.048 lbs a.i.) applied PRE plus POST. Injury with Sandea was observed as stunting plus mild chlorosis of the leaves. However, by mid-to-late season, crop injury was 15% or less in all plots except the high rate of Sandea. These results suggest that over time, pumpkins can outgrow the temporary injury associated with Sandea applications. Control of Palmer amaranth (*Amaranthus palmeri*) was excellent for all herbicide treatments during the early season (data not shown) however, by August 17, control was poor in plots treated with Prefar, Sandea, Dual Magnum and Strategy. Only Outlook plots had moderately acceptable weed control ratings. This poor performance is likely a result of the excessive rainfall that occurred throughout the growing season that likely leached the chemicals from the treated zone. Excessive weed pressure made it difficult to spray fungicides for control of powdery mildew during this trial, and only two applications were sprayed and this likely had an impact on final yields. Pumpkin numbers and overall yields were 50% or less than those reported in 2003, however, similar trends did occur with the herbicide treatments. Fair to good yields were observed in plots treated with Dual Magnum, Outlook and Strategy, while adequate to poor yields were recorded in plots treated with Prefar and Sandea. The early crop injury and stunting from Sandea likely influenced yields in those plots, however, lower yields in Prefar treatments were likely the result of poor weed control. Yields in Outlook treated plots were highest of all herbicide treatments and yields were directly associated with good weed control. The results of this study suggest that while all of the evaluated herbicides gave excellent weed control early in the season, that POST or POST-DIRECT applications would be needed when high rainfall is expected or occurs during the growing season to successfully extend weed control for pumpkins.

Table 3. Crop Injury, Weed Control and Yields of Pumpkins

Product	**Rate lbs a.i. /A**	**Timing**	**% Crop Injury 7/1**	**% Crop Injury 7/14**	**% Crop Injury 8/17**	**% Control Palmer Amaranth 8/17**	**Yield (No. Fruit/ A) 11/11**	**Yield (lbs/ A) 11/11**
Untreated		Season	0	0	0	0	381.3	3050
Handweeded		Season	0	0	0	95.0	1334.4	18697
Prefar 4E	4.0	PRE	10.0	2.5	0	38.8	599.1	6438
Prefar 4E	6.0	PRE	8.8	0	5.0	50.0	789.7	9512
Sandea 75WDG + Sandea 75WDG + NIS	0.024 0.024 0.25% v/v	PRE POST	12.5	26.2	0	63.8	980.4	10103
Sandea 75WDG + Sandea 75WDG + NIS	0.032 0.032 0.25% v/v	PRE POST	21.3	38.8	6.3	41.3	517.4	4924
Sandea 75WDG + Sandea 75WDG + NIS	0.048 0.048 0.25% v/v	PRE POST	26.3	42.5	15.0	66.3	789.7	7872
Dual Magnum 7.62E	0.65	PRE	12.5	5.0	0	68.8	898.7	11105
Outlook 6E	0.75	PRE	15.0	8.8	0	75.0	1034.8	13572
Strategy	4 pints	PRE	10.0	3.8	0	65.0	1062.0	12292
		LSD (0.05)	**13.5**	**13.7**	**13.6**	**30.9**	**492.9**	**5900**

Effects of Targa Herbicide on Grass Control and Crop Injury in Summer Squash

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in summer squash (*Cucurbita pepo* var. "Senator").

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Three-week old zucchini plants, previously grown in a greenhouse were transplanted (spacing = 30" in-row and 6.67' between rows) using a 1-row transplanter on May 5. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Tables 1 and 2). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left for spraying and evaluations. On May 31 the entire test site was hit by a hail storm which injured most of the plants within the test area. However, all plants recovered sufficiently to allow for a second treatment and yield analysis (harvesting). Plants were harvested by hand eight times throughout the test period. All data was subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0 – 5 mph / SW
Date	May 26, 2005	Crop	Squash
Time of day	3:00 p.m.	Variety	Senator
Type of application	Broadcast	Crop stage	4 – 7 leaves
Carrier	Water	Air temp. (^oF)	64
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Cloudy
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	JCH
Weeds present: Lovegrass (2 – 3"), Sandbur (2 – 3")			

Table 2. Application Data for Second POST Treatment

Location	South Plains Food Bank	Wind speed / direction	5 – 10 mph / SW
Date	June 13, 2005	Crop	Squash
Time of day	1:00 p.m.	Variety	Senator
Type of application	Broadcast	Crop stage	12 – 15"
Carrier	Water	Air temp. (^oF)	92
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (5– 8")			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after the second treatment (WAT) and showed that there was no significant stunting with quizalofop except at the highest (12.0 oz/A) application rate (see Table 3). Control of grasses (Lovegrass [*Eragrostis* spp.] and sandbur [*Cenchrus* spp.]) was excellent with all herbicides and rates applied, and averaged over 95% for all treatments. Squash yield was somewhat variable, and could have been influenced by the hail storm on May 31. No individual treatment yields were significantly different from the hand weeded check, however; highest yields were found with quizalofop applied 8.0 oz/A while the lowest were found in plots treated with 12.0 oz/A. The results of this study indicate that two applications of quizalofop are safe on summer squash when applied at rates of 8 oz/A or less. More testing is needed to determine whether the crop injury and drop in yields for quizalofop at 12 oz/A rate is repeated.

Table 3. Herbicide Effects on Crop Injury, Grass Control and Yield of Summer Squash

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	Total Yield (lbs/plot)	Weight of Squash (lbs/plant)
Hand weed			0	0	25.9	3.7
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	97.7	22.5	3.8
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	40.4	6.7
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	15.0	97.7	9.1	1.4
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	3.3	95.3	20.1	3.5
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	97.7	15.9	2.2
		LSD (0.05)	2.1	2.5	20.6	3.5

Wheat Stubble Direct-Seeded Watermelon Herbicide Screen: 2004

Final Report

Objective: To evaluate and compare the efficacy of selected herbicide treatments on Palmer Amaranth (*Amaranthus palmeri*) control, crop injury and yield in watermelons (*Citrullus lanatus*).

Materials and Methods: The trial was conducted on land provided by Springlake Potatoes, Inc. located in the town of Springlake, TX. The soil type was a sandy loam and was previously planted to wheat. The trial site was plowed the previous fall and wheat over-wintered and harvested in the spring of 2004. Following a spring harvest, the fallen wheat seed was allowed to germinate and grow until approximately 8" to 12" tall when it was killed with a combination of Glyphomax plus Aim 2EC herbicides (controlled the wheat and volunteer potatoes). The single row plots measured 6' wide with a single planted row down the middle of the plot. Watermelons (Var. "Jubilee II") were planted on June 7, 2004. Herbicides were applied on June 8 using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 30 PSI. Application data are found in Table 1. Plots were irrigated and fertilized, as needed using an overhead, center pivot system. Gramoxone Max herbicide was applied using a hooded sprayer to the between-row areas of each plot to reduce the high weed pressure on July 26. No yield data was collected in this trial due to extreme heavy weed pressure as a result of abnormally high rainfall during the growing season. The experimental design was a randomized complete block with 4 replications. All crop injury and weed control data were subjected to ANOVA using SAS (SAS Institute Inc., Cary, NC), and means were separated using the Least Significant Difference (α = 0.05).

Table 1. Application Data for PRE Herbicide Treatments

Location	Springlake	Wind speed / direction	5 – 15 mph/SW
Date	June 8, 2004	Crop	Watermelon
Time of day	12:30 p.m.	Variety	Jubilee II
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	80
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	80
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	Teejet 8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.5'	# Replications	4
Boom height (")	18"	Sprayed by	JCH
Weeds present: Killed wheat stubble (8 – 12" tall)			

Results and Discussion: Extremely high rainfall throughout the 2004-growing season likely had a significant impact on herbicide movement in the soil for this test. Approximately 4 WAT, there was no visible injury to the watermelon plants in any of the herbicide treatments with the exception of Dual Magnum. However, 3 weeks later there was no injury observed to any plants within the test site. Control of Palmer amaranth was generally fair to poor for all herbicide treatments and again, this was likely due to excessive rainfall during the crop season. Best herbicide treatments include Sandea (0.67 to 2.0 oz/A), and Dual Magnum, all applied PRE. However, weed control in general was not commercially acceptable and thus no crop yields were recorded.

Table 2. The Effect of Herbicide Treatments on Direct-seeded Watermelon Injury

Chemical	Rate (lb a.i./ A)	Timing	% Crop Injury 7/05	% Palmer Amaranth Control 7/05	% Crop Injury 7/26	% Palmer Amaranth Control 7/26
Untreated			0	0	0	0
Handweed			0	0	0	0
Sandea 75WDG	0.024	PRE	0	60.0	0	12.5
Sandea 75WDG	0.032	PRE	0	70.0	0	35.0
Sandea 75WDG	0.048	PRE	0	75.0	0	37.5
Sandea 75WDG	0.096	PRE	0	78.8	0	48.8
Prefar 4E + Sandea 75WDG	5.0 0.024	PRE	0	35.0	0	25.0
Prefar 4E + Sandea 75WDG	5.0 0.032	PRE	0	22.5	0	22.5
Strategy	4.0 PINTS	PRE	0	65.0	0	52.5
Spartan 75WDG	0.10	PRE	0	36.3	0	18.8
Outlook 6E	0.75	PRE	0	55.0	0	35.0
Dual Magnum 7.62E	1.42	PRE	17.5	78.8	0	56.3
		LSD (0.05)	**5.7**	**27.3**	**0**	**34.3**

Wheat Stubble Transplanted Watermelon Sandea Screen: 2004

Final Report

Objective: To evaluate and compare the efficacy of selected Sandea treatments on Palmer Amaranth (*Amaranthus palmeri*) control, crop injury and yield in watermelons (*Citrullus lanatus*).

Materials and Methods: The trial was conducted on land provided by Springlake Potatoes, Inc. located in the town of Springlake, TX. The soil type was a sandy loam and was previously planted to wheat. The trial site was plowed the previous fall and wheat over-wintered and harvested in the spring of 2004. Following a spring harvest, the fallen wheat seed was allowed to germinate and grow until approximately 8" to 12" tall when it was killed with a combination of Glyphomax plus Aim 2EC herbicides (controlled the wheat and volunteer potatoes). The single row plots measured 6' wide with a single transplanted row down the middle of the plot. Watermelons were spaced 3' apart in the row. "Sweet Slice" seedless variety watermelon transplants were planted by hand on June 8 (0-day PRE) and again on June 15 (7-day PRE). Pollinator plants (Var. "Jubilee II) were planted at the beginning and end of each plot. Sandea was applied on June 8 using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 30 PSI. Application data are found in Table 1. Plots were irrigated and fertilized, as needed using an overhead, center pivot system. Gramoxone Max herbicide was applied using a hooded sprayer to the between-row areas of each plot to reduce the high weed pressure on July 26. No yield data was collected in this trial due to extreme heavy weed pressure as a result of abnormally high rainfall during the growing season. The experimental design was an RCBD with 4 replications. All crop injury and weed control data were subjected to ANOVA using SAS (SAS Institute Inc., Cary, NC), and means were separated using the Least Significant Difference (α = 0.05).

Table 1. Application Data for PRE Herbicide Treatments

Location	Springlake	Wind speed / direction	5 – 15 mph/SW
Date	June 8, 2004	Crop	Watermelon
Time of day	10:00 a.m.	Variety	Jubilee II
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	80
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	80
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	Teejet 8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.5'	# Replications	4
Boom height (")	18"	Sprayed by	JCH
Weeds present: Killed wheat stubble (8 – 12" tall)			

Results and Discussion: Extremely high rainfall throughout the 2004-growing season likely had a significant impact on herbicide movement in the soil for this test. Approximately 4 WAT, there was visible injury to the watermelon transplants in the Sandea 0.048 and 0.096 lb ai/A treatments (applied 7-days PRE), as well as in the Sandea 0.096 lb a.i. 0-day PRE treatment. However, 3 weeks later there was little to no injury observed within test site. Control of Palmer amaranth was generally fair to poor for all Sandea treatments, but improved as the rate of Sandea increased with best weed control found in the 0.096 lb ai/A rates. However, weed control in general was not commercially acceptable and thus no crop yields were recorded.

Table 2. Crop Injury and Weed Control from Sandea Applications to Watermelons

Trt #	Chemical	Rate / A	Timing	% Crop Injury 7/05	% Palmer Amaranth Control 7/05	% Crop Injury 7/26	% Palmer Amaranth Control 7/26
1	*Untreated*			0	0	0	0
2	*Handweed*			0	0	0	0
3	Sandea 75WDG + NIS	0.5 OZ 0.25% V/V	7 DAYS PRE	0	65.0	0	22.5
4	Sandea 75WDG + NIS	0.67 OZ 0.25% V/V	7 DAYS PRE	2.5	40.0	0	27.5
5	Sandea 75WDG + NIS	1.0 OZ 0.25% V/V	7 DAYS PRE	10.0	63.8	1.3	42.5
6	Sandea 75WDG + NIS	2.0 OZ 0.25% V/V	7 DAYS PRE	15.0	81.3	5.0	52.5
7	Strategy		7 DAYS PRE	0	0	0	10.0
8	Sandea 75WDG + NIS	0.5 OZ 0.25% V/V	0 DAYS PRE	0	0	0	0
9	Sandea 75WDG + NIS	0.67 OZ 0.25% V/V	0 DAYS PRE	0	38.8	0	0
10	Sandea 75WDG + NIS	1.0 OZ 0.25% V/V	0 DAYS PRE	0	51.3	0	6.3
11	Sandea 75WDG + NIS	2.0 OZ 0.25% V/V	0 DAYS PRE	8.8	76.3	0	18.8
12	Strategy		0 DAYS PRE	0	62.5	0	37.5
			LSD (0.05)	**10.1**	**38.4**	**4.1**	**28.9**

Tolerance of Seedless Watermelons to Increasing Rates of Sandea: 2004

Final Report

Objective: To evaluate and compare potential crop injury and yield of transplanted watermelons (*Citrullus lanatus*) to increasing rates of Sandea applied the same day or 1, 3, 5 and 7 days prior to transplanting.

Materials and Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock on an Acuff clay loam with an approximate pH of 7.6 and 1.1% organic matter. The trial site was plowed in the fall and the soil prepared by applying a pre-plant anhydrous fertilizer (80 lbs/A nitrogen) followed by listing the furrows into beds 40" apart. Sandea was applied using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 30 PSI. The herbicide was applied on May 12 and watermelons transplanted into corresponding specified plots on May 12, May 13, May 15, May 17 and May 19. Watermelons were transplanted at 3' in-row and 10' between row spacing. All plants received one cup of starter fertilizer liquid at transplanting, and no irrigation or rainfall occurred until after the 7-day PRE transplants were planted in the field. Application data are found in Table 1. Supplemental fertilizer (45-0-0) was broadcast in July at 30 lbs N /A, and irrigated in. Plots were furrow-irrigated as needed during the season. Yield data was collected on August 25. Abnormally high rainfall during the growing season resulted in excessive weed pressure and all plots were cultivated (twice) and hand weeded (three times) as needed during the growing season. The experimental design was a randomized complete block with 4 replications. All crop injury and weed control data were subjected to ANOVA using SAS (SAS Institute Inc., Cary, NC), and means were separated using the Least Significant Difference ($\alpha = 0.05$).

Table 1. Application Data for PRE Herbicide Treatments

Location	Lubbock	Wind speed / direction	5 – 15 mph/SW
Date	May 12, 2004	Crop	Watermelons
Time of day	2:00 p.m.	Variety	Sweet Slice
Type of application	Broadcast	Crop stage	Transplants
Carrier	Water	Air temp. (^oF)	85
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Drying
Nozzle tips	Teejet 8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear/Sunny
Boom width (")	6.5'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Results and Discussion: Comments (In reference to table below): Although average injury to 7-Day PRE treatments was greatest, this did not ultimately influence crop growth as these treatments had the highest yields at the end of the trial.

Table 2. Effects of Sandea Herbicide Applied at 3 Rates Followed by Transplanting Watermelons at 0, 1, 3, 5 and 7 Days After Treatment on Crop Injury and Yield

Trt #	Chemical	Rate lbs a.i.	Timing	% Injury 6/09	% Injury 7/22	No. melons / A	Yield (lbs /A)	Ave. Wt. per melon (lbs)
1	*Untreated*			0	0	1379.4	19185	15.2
2	*Handweed*		All season	0	0	1669.8	26919	16.1
3	Sandea 75WDG	0.024	7- DAY PRE	27.5	6.3	2178.0	33370	15.1
4	Sandea 75WDG	0.032	7-DAY PRE	46.3	3.8	2032.8	31146	15.7
5	Sandea 75WDG	0.048	7-DAY PRE	28.8	6.3	2758.8	38633	14.1
6	Sandea 75WDG	0.024	5-DAY PRE	27.5	8.8	2105.5	35214	16.7
7	Sandea 75WDG	0.032	5-DAY PRE	20.0	0	1742.4	23165	13.7
8	Sandea 75WDG	0.048	5-DAY PRE	26.3	6.3	1669.8	25769	15.7
9	Sandea 75WDG	0.024	3-DAY PRE	12.5	0	1960.2	28668	14.9
10	Sandea 75WDG	0.032	3-DAY PRE	3.3	0	2323.2	35539	14.8
11	Sandea 75WDG	0.048	3-DAY PRE	7.5	0	1960.2	32117	16.5
12	Sandea 75WDG	0.024	1-DAY PRE	3.8	2.5	2032.8	30527	14.9
13	Sandea 75WDG	0.032	1-DAY PRE	7.5	0	1887.6	29618	15.9
14	Sandea 75WDG	0.048	1-DAY PRE	15.0	5.0	1306.8	18096	13.1
15	Sandea 75WDG	0.024	IMMEDIATE	0	0	1960.2	31963	16.4
16	Sandea 75WDG	0.032	IMMEDIATE	6.3	6.3	3097.2	33593	15.6
17	Sandea 75WDG	0.048	IMMEDIATE	5.0	3.8	1815.0	29085	16.1
			LSD (0.05)	**15.2**	**10.5**	**1012.6**	**14033**	**3.4**

Table 3. Average of Sandea Timing Across Herbicide Rate on Crop Injury and Yield

Treatments (averaged across rates)	**Average % Crop Injury on June 9 (4 WAT)**	**Average Yields (lbs / A)**
Sandea 7-Day PRE	34.2	34383
Sandea 5-Day PRE	24.6	28049
Sandea 3-Day PRE	7.8	32108
Sandea 1-Day PRE	8.8	26080
Sandea 0-Day PRE	3.8	31547
Untreated	0	19185
Handweed	0	26919

Effects of Targa Herbicide on Grass Control and Crop Injury in Cucumbers

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in cucumbers (*Cucumis sativus* var. “Dasher II”).

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Cucumbers were seeded on June 10 (spacing = 12” in-row and 6.67’ between rows) using a 1-row Earthway seeder. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left for spraying and evaluations. During the season, a heavy rainfall event occurred which caused some damage and flooding to the test area. Cucumbers were harvested by hand multiple times during the test period. All data was subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0 – 5 mph / SW
Date	July 7, 2005	Crop	Cucumber
Time of day	3:00 p.m.	Variety	Dasher II
Type of application	Broadcast	Crop stage	3– 5 leaves
Carrier	Water	Air temp. (^oF)	70
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18”	Sky conditions	Partly Cloudy
Boom width (“)	6.67’	# Replications	4
Boom height (“)	18 – 20”	Sprayed by	JCH
Weeds present: Lovegrass (2 – 3”)			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after treatment (WAT) and showed that there was no stunting with quizalofop at any application rate (see Table 2). Control of grasses (Lovegrass [*Eragrostis* spp.]) was excellent with all herbicides and rates applied, and averaged 99% for all treatments. Cucumber yields were somewhat variable and significant differences in yield were attributed to the heavy rainfall and flooding that occurred rather than any treatment effect. The results of this study indicate that applications of quizalofop are safe on cucumbers when applied at rates of 12 oz/A or less.

Table 2. Herbicide Effects on Crop Injury, Grass Control and Yield of Cucumbers

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	Total Yield (lbs/plot)	Weight of Cucumbers (oz/fruit)
Hand weed			0	0	17.5	10.2
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	20.3	11.5
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	13.3	10.9
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	23.9	11.2
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	18.4	11.0
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	99.0	12.9	9.8
		LSD (0.05)	0	0	12.2	1.6

Effects of Targa Herbicide on Crop Injury and Yield in Watermelons

Final Report

Objective: To evaluate phytotoxicity of postemergence (POST) applications of Targa (quizalofop) for crop injury and yield in watermelons (*Citrullus lanatus* var. "Orange Sunshine").

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. Sandea herbicide was applied pre-transplant (0.024 lb ai) on May 9, and five-week old watermelon plants, previously grown in a greenhouse, were transplanted (spacing = 30" in-row and 80" between rows) using a single-row transplanter on May 10. The entire test site was fertilized, drip-irrigated, and all pests controlled using standard grower practices. POST herbicide treatments were applied on June 6 using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded several times to remove any broadleaf weeds present in the test area. No grasses were present in the test area; therefore no grass control ratings were recorded. Mature watermelons were harvested by hand on July 26 and August 8. Yields were totaled for final analysis. All treatments were replicated three times and data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application data for POST treatments

Location	TAMU Res. & Ext. Center	**Wind speed / direction**	10 – 15 mph / S
Date	June 6, 2005	**Crop**	Watermelon
Time of day	2:00 p.m.	**Variety**	Orange Sunshine
Type of application	Broadcast	**Crop Stage**	5 – 10 leaves
Carrier	Water	**Air temp. (^oF)**	81
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	70
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	6.67'	**# Replications**	3
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: Percent crop injury ratings showed very little (less than 5%) crop injury and were not significantly different two or five weeks after treatment (WAT) for any of the herbicides when compared to the untreated plots (see Table 2). Yield of watermelons treated with the high and low rates of quizalofop and the untreated plot were significantly lower than those treated with quizalofop applied at 8 oz/A rate. This indicates that quizalofop yield reductions are likely an anomaly, and not likely a treatment effect. Average fruit weight was not significantly different between any herbicide treatments within the study indicating that significant yield reductions were likely the cause of some other factor other than quizalofop applications. More research is likely needed to determine whether quizalofop actually has a significant impact on watermelon yields.

Table 2. Treatment Effects on Crop Injury and Yield of Seedless Watermelons

Treatment	Product Rate / A	Timing	% Crop Injury 2 WAT	% Crop Injury 5 WAT	Total Yield (lbs/plot)	Ave. Fruit Wt. (lbs)
Hand weed			0	0	122.8	12.7
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	117.1	12.4
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	3.3	0	203.9	12.9
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	3.3	0	147.6	12.3
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	162.1	13.4
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	0	158.6	12.3
		LSD (0.05)	5.4	0	48.6	1.8

Effects of Targa Herbicide on Crop Injury and Yield in Cantaloupes

Final Report

Objective: To evaluate phytotoxicity of postemergence (POST) applications of Targa (quizalofop) for crop injury and yield in cantaloupes (C*ucumis melo* var. "PMR 45").

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. Sandea herbicide was applied pre-transplant (0.024 lb ai) on May 9, and five-week old cantaloupe plants, previously grown in a greenhouse, were transplanted (spacing = 30" in-row and 80" between rows) using a single-row transplanter on May 10. The entire test site was fertilized, drip-irrigated, and all pests controlled using standard grower practices. Rabbit feeding damage resulted in the test area being replanted (seeded) on May 26. POST herbicide treatments were applied on June 27 using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded several times to remove any broadleaf weeds present in the test area. No grasses were present in the test area; therefore no grass control ratings were recorded. Mature cantaloupes were harvested by hand on August 22 and August 26. Yields were totaled for final analysis. All treatments were replicated three times and data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for POST Treatments

Location	TAMU Res. & Ext. Center	**Wind speed / direction**	5 – 10 mph / S
Date	June 6, 2005	**Crop**	Cantaloupe
Time of day	11:30 a.m.	**Variety**	PMR 45
Type of application	Broadcast/Directed	**Crop stage**	5 – 8 leaves
Carrier	Water	**Air temp. (^oF)**	93
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	80
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Clear
Boom width (")	6.67'	**# Replications**	3
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: Percent crop injury ratings showed no crop injury and thus were not significantly different four or eight weeks after treatment (WAT) for any of the herbicides when compared to the untreated plots (see Table 2). Yields of cantaloupes treated with quizalofop (6.0 and 8.0 oz/A) were not significantly different from the untreated plots and were also not significantly lower than those treated with quizalofop applied at the 12 oz/A rate. These results indicate that quizalofop caused no yield reductions in this test. Similarly, average fruit weight of the cantaloupes was not significantly different between any herbicide treatments within the study indicating that the significant yield reduction in the untreated plots were likely the cause of some other factor. Results of this study indicate that quizalofop is safe on cantaloupes when applied at rates of 12.0 oz/A or less.

Table 2. Treatment Effects on Crop Injury and Yield of Cantaloupes

Treatment	Product Rate / A	Timing	% Crop Injury 4 WAT	% Crop Injury 8 WAT	Total Yield (lbs/plot)	Ave. Fruit Wt. (lbs)
Hand weed			0	0	70.6	2.15
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	104.1	2.24
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	92.0	2.43
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	112.4	2.39
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	0	116.4	2.32
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	0	118.9	2.32
		LSD (0.05)	**0**	**0**	**38.7**	**0.6**

Effects of Herbicides on Crop Injury, Weed Control and Yield in Drip-Irrigated Pumpkins

Final Report

Objective: To evaluate phytotoxicity of preemergence (PRE) and postemergence (POST) applications of herbicides for crop injury, weed control and yield in pumpkins (*Cucurbita pepo* var. "Howden").

Materials & Methods: The trial was conducted at the Texas Tech University Crops Research Farm located in Lubbock (Lubbock County). The trial site was located on an Amarillo clay loam soil with a pH of 8.1 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. The entire test site was fertilized, drip-irrigated, and all pests controlled using standard grower practices. Following seeding on June 10, PRE herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). POST herbicide treatments were applied on June 27 to pumpkins that had 4 –5 leaves (Table 2). Plots measured 16.7' x 30' and contained a single row of pumpkins (10 plants/plot) and all treatments were replicated 4 times in a randomized complete block design. Plots were harvested by hand during the week of September 26 and pumpkins were weighed and counted. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for PRE Treatments

Location	TTU Crops Res. Farm	**Wind speed / direction**	15 mph / S
Date	June 10, 2005	**Crop**	Pumpkins
Time of day	10:00 a.m.	**Variety**	Howden
Type of application	Broadcast	**Crop stage**	Seed
Carrier	Water	**Air temp. (^oF)**	75
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	70
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	High
Nozzle spacing	18"	**Sky conditions**	Overcast
Boom width (")	6.67'	**# Replications**	4
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Table 2. Application Data for POST Treatments

Location	TTU Crops Res. Farm	**Wind speed / direction**	5 – 10 mph / S
Date	June 27, 2005	**Crop**	Pumpkins
Time of day	9:00 a.m.	**Variety**	Howden
Type of application	Broadcast	**Crop stage**	4 – 5 leaves
Carrier	Water	**Air temp. (^oF)**	80
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	77
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	6.67'	**# Replications**	4
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: Volunteer cotton (4 – 6"); Palmer amaranth (4 – 5 lvs)			

Results and Discussion: Percent crop injury ratings were significantly higher 1 week after treatment (WAT) only for those plots treated POST with Sandea, and there were no visible injury signs from plots sprayed with POST Targa or other PRE applied herbicides (Table 3). By 5 WAT, crop injury was 5% or less for all treatments. Control of Palmer amaranth (*Amaranthus palmeri*) was good to excellent with all herbicide treatments when observations were recorded 5 WAT and this continued throughout the trial period. There was no grass present within the trial site, thus no grass control ratings were taken. The numbers of fruit (pumpkins) per plot did not differ between herbicide treatments; however, plots sprayed with the high rate of Targa (12.0 oz/A), Select, and the Dual Magnum (PRE) + Sandea (POST) treatments had significantly lower yields when compared to the highest yielding plots (hand weeded). The results of this study indicate that in general, all herbicide treatments are safe for use on pumpkins, though more research is needed to determine whether high rates of Targa and Select do cause a significant reduction.

Table 3. Herbicide Effects on Crop Injury and Yield of Pumpkins

Treatment	Product Rate lb ai / A	Timing	% Crop Injury 1 WAT	% Crop Injury 5 WAT	% Palmer Amaranth Control 5WAT	Yield (No. of Fruit/plot)	Total Yield (lbs/plot)
Untreated			0	0	0	44.8	680.5
Handweeded			0	0	97.0	49.8	809.9
Prefar 4E+ Targa + COC	5.0 QTS 6.0 OZ 1.0% V/V	PRE POST	0	0	94.8	41.0	623.9
Prefar 4E+ Targa + COC	5.0 QTS 8.0 OZ 1.0% V/V	PRE POST	0	0	91.8	43.8	694.2
Prefar 4E+ Targa + COC	5.0 QTS 12.0 OZ 1.0% V/V	PRE POST	0	0	90.8	40.2	601.1
Prefar 4E+ Select + COC	5.0 QTS 8.0 OZ 1.0% V/V	PRE POST	3.8	0	97.0	39.5	586.6
Prefar 4E + Poast + COC	5.0 QTS 2.0 PINTS 1.0% V/V	PRE POST	3.8	0	97.0	50.3	776.4
Dual Magnum 7.62E	0.67 PINTS	PRE	0	0	95.8	48.8	774.8
Outlook 6E	0.67 PINTS	PRE	2.5	5.0	96.0	46.3	678.1
Prefar 4E + Sandea 75WDG + Targa + COC	5.0 QTS 0.5 OZ 8.0 OZ 1.0 V/V	PRE POST	16.3	0	98.0	47.0	713.1
Dual Magnum 7.62E + Sandea 75 WDG COC	0.67 PINTS 0.5 OZ 1.0% V/V	PRE POST	20.0	5.0	94.5	39.0	579.8
Strategy	4.0 PINTS	PRE	0	0	94.5	45.5	679.9
Define 4SC	1.2 PINTS	PRE	0	0	98.0	49.3	739.6
		LSD (0.05)	4.9	4.5	9.3	12.9	192.1

** Treatments applied with 1.0% COC v/v unless otherwise indicated.

Evaluation of Herbicides for Weed Control and Crop Injury in Garden Beets

Final Report

Objective: To determine the effects of preemergence (PRE) and postemergence (POST) herbicide applications on weed control, crop injury and yield of garden beets in the Texas Wintergarden.

Introduction: A trial was conducted in 2004 to evaluate the effects of PRE and POST herbicides applied alone or in combination for crop injury, weed control and yields in processing garden beets (*Beta vulgaris*) grown in the Texas Wintergarden. The trial was established at the Del Monte Ag Research Farm located near Crystal City on a clay loam soil with a pH of 8.1 and less than 2% organic matter. Standard crop management and pest control (fertilizer, pesticides, etc.) measures were applied as needed during the growing season to maximize beet production. Following bed shaping on August 31, garden beets (var. "Red Ace") were planted using 4-bed (2 lines/bed) gravity-fed planter boxes that seeded at commercial spacing and depth. Plot size measured 13.34' x 25' with 4 beds/plot. Pre-plant incorporated (PPI) and PRE treatments were applied using a CO_2-pressurized backpack sprayer and hand-held boom equipped with four flat fan nozzles that delivered 20 GPA at 30 PSI (for application data see Tables 1 and 2). PPI treatments were incorporated using a hand-held rake for this trial. Following seeding and herbicide applications the trial site was irrigated within 24 hours. The trial was designed as randomized complete block (RCBD) replicated 4 times. Percent weed control and crop injury ratings were recorded during the season and beets were harvested on November 18 (80 days after planting). All data were subjected to ANOVA procedures and means separated using the LSD at the 5% level.

Results and Discussion: Crop injury ratings recorded 18 days after treatment (DAT) showed that significant early stunting (Table 3) was caused by Dual Magnum 7.62E (0.65 lb ai), Outlook 6E (0.5 lb ai), Nortron 4SC (2.0 lb ai), Eptam 7-E (3.06 lb ai), and significant plant death occurred with Prefar 4E applications (both rates). Eptam injury may have possibly been reduced had the herbicide been incorporated using standard field equipment rather than being raked in after seeding. Crop injury recorded 32 DAT did not vary greatly from that of the earlier observations with the exception of Ro-Neet followed by Progress 1.8EC. Progress POST applications caused minor stunting and leaf burn on beets when applied at the 2 – 3 leaf stage. Control of pigweed 32 DAT was 90% or better when Dual Magnum, Outlook and Nortron (except 1.0 lb ai rate) were applied PRE. However, only fair to good control of pigweed was observed in plots treated with Eptam or Prefar. In this study, Ro-Neet (the grower standard) failed to adequately control pigweed 32 DAT, but control significantly increased when POST treatments of UpBeet 50DF (0.016 or 0.032 lb ai) and Progress were applied. Similar trends for all herbicide treatments were observed for control of signalgrass in this trial. Ro-Neet failed to adequately control signalgrass, however, POST applications of Nortron, UpBeet and Progress significantly improved control. Beet yields were highest in the handweeded control plots in this study, averaging 18.35 tons/A. While significant injury by some herbicide treatments was observed in this trial, beets were apparently able to overcome this injury to produce sufficient yields in this study. Treatments of Ro-Neet and Dual Magnum had lower yields (approximately 20%), though not significantly, when compared to the control. Nortron treatments showed a linear response, in that as the rate of Nortron applied PRE increased, yields tended to decrease. Outlook caused a significant (32%) decrease in yields. Though lower, yields in Eptam-treated plots may have been a response to lower weed control at the low rate and crop injury at the higher rate. Where UpBeet was applied POST following Ro-Neet PPI applications, yields increased an average 8%. Progress treatments significantly reduced beet yields in this trial. Prefar plots were not harvested. These results indicate the potential for Dual Magnum, Nortron, Eptam and UpBeet as herbicides for use in weed control programs for processing garden beets grown in the Texas Wintergarden area.

Table 1. Application Data for PPI's and PRE's

Location	Crystal City	**Wind speed / direction**	SE / 5 – 15 mph
Date	August 31	**Crop**	Garden Beets
Time of day	2:00 p.m.	**Variety**	Red Ace
Type of application	Broadcast	**Crop stage**	Seed
Carrier	Water	**Air temp. (^{o}F)**	90
Gas	CO_2	**Soil temp. (^{o}F)**	87
GPA	20	**Soil beneath**	Moist
PSI	30	**Soil surface**	Dry
Nozzle tips	8002	**% Relative humidity**	High
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	6.5'	**# Replications**	4
Boom height (")	18"	**Sprayed by**	RWW / JCH
Weeds present: None			

Table 2. Application Data for EPOST's

Location	Crystal City	**Wind speed / direction**	E / 5 – 15 mph
Date	September 17	**Crop**	Garden Beets
Time of day	2:30 p.m.	**Variety**	Red Ace
Type of application	Broadcast	**Crop stage**	2 – 3 leaves
Carrier	Water	**Air temp. (^{o}F)**	97
Gas (if not CO_2)	CO_2	**Soil temp. (^{o}F)**	80
GPA	20	**Soil beneath**	Semi-moist
PSI	30	**Soil surface**	Dry, compact
Nozzle tips	8002	**% Relative humidity**	High
Nozzle spacing	18"	**Sky conditions**	Sunny
Boom width (")	6.5'	**# Replications**	4
Boom height (")	18"	**Sprayed by**	RWW
Weeds present: Pigweed (2 – 6 leaves), volunteer corn (6"), signalgrass (2 – 4")			

Table 3. The Effects of Selected Herbicide Treatments on Crop Injury, Weed Control and Yield of Garden Beets

Product(s)	Rate (lb a.i./A)	Timing	% Beet Injury 18 DAT	% Beet Injury 32 DAT	% Control Pigweed 32 DAT	% Control Signalgrass 32 DAT	Beet Yield Tons/A 11/18
Weedy Check		Season	0	0	0	0	14.17
Handweed		Season	0	0	99.0	99.0	18.35
Ro-Neet 6-E	2.25	PPI	5.0	11.3	59.8	53.8	14.97
Dual Magnum 7.62E	0.65	PRE	22.5	23.3	99.0	95.0	14.77
Outlook 6E	0.5	PRE	40.0	41.3	99.0	95.0	12.49
Nortron 4SC	0.5	PRE	0	0	95.8	81.3	17.54
Nortron 4SC	1.0	PRE	0	5.0	72.3	86.3	15.88
Nortron 4SC	2.0	PRE	27.5	30.0	92.3	93.8	14.06
Eptam 7-E	2.63	PPI	7.5	11.3	72.0	77.5	13.35
Eptam 7-E	3.06	PPI	28.8	26.3	77.3	78.8	12.70
Prefar 4-E	5.0	PRE	98.0	92.3	85.8	97.0	0
Prefar 4-E	6.0	PRE	85.8	79.8	83.5	95.8	0
Ro-Neet 6-E + Nortron 4SC + NIS	2.25 0.164 0.25% v/v	PPI EPOST	0	0	66.3	83.8	13.46
Ro-Neet 6-E + UpBeet 50DF + NIS	2.25 0.016 0.25% v/v	PPI EPOST	0	0	95.8	87.5	15.50
Ro-Neet 6-E + UpBeet 50DF + NIS	2.25 0.032 0.25% v/v	PPI EPOST	0	0	95.8	87.5	16.87
Ro-Neet 6-E + Progress 1.8EC + NIS	2.25 0.34 0.25% v/v	PPI EPOST	0	16.3	95.8	87.5	9.95
		LSD (0.05)	**12.9**	**14.9**	**32.6**	**18.7**	**4.4**

Herbicide Evaluation for Fall-Planted Spinach in the Wintergarden Area: 2003 - 2004

Final Report

Objective: To evaluate the effects of preemergence (PRE) and postemergence (POST) herbicides applied alone or in combination for weed control and spinach crop injury.

Materials & Methods: The trial was conducted at the Del Monte Ag Research Farm located northeast of Crystal City on a clay loam soil with a pH of 8.1 and less than 2% organic matter. All standard crop management and pest control (fertilizer, pesticides, etc.) measures were utilized as needed during the growing season to maximize spinach production. Del Monte spinach, varieties DMC 66-09 and DMC 66-07 (processing types) were planted October 28, 2003 using a gravity-fed spinach planter box seeder at commercial spacing (8 seeds/linear foot) and depth. Spinach seed was double-row planted onto previously formed beds centered at 40-inches with a 15-inch distance between seeded rows. Each plot measured 6.67 x 25 ft with two beds for a total of 4 rows of spinach. Immediately following planting, all preemergence herbicide treatments were applied using a CO_2-pressurized backpack sprayer and hand-held boom equipped with four flat fan nozzles that delivered 20 gallons per acre at 30 PSI at a speed of 3 mph. The trial was designed as a randomized complete block (RCBD) with 2 varieties/plot and 24 treatments replicated 4 times. All plots were handweeded one week prior to harvest. Percent weed control and crop injury ratings were recorded throughout the season and the trial was harvested on February 5, 2004.

Results and Discussion: Major weeds present in the trial included henbit (*Lamium amplexicaule*) and London Rocket (*Sisymbrium irio*). Weed control was generally good to excellent (greater than 90%) for all of the PRE applied herbicides including: Dual Magnum (grower standard), Ro-Neet, Outlook, Nortron (both rates) and Ro-Neet combinations with Linex and Define (Table 1). Bolero applied PRE failed to give good control overall, especially for London Rocket. When applied EPOST, Dual Magnum, Outlook and Nortron failed to adequately control both weeds indicating that weeds were present at application and an additional POST herbicide would be needed to control emerged weeds. Ro-Neet followed by EPOST applications of Stinger or Starane gave excellent season long henbit control, though control was slightly lower at the January 23rd rating. Raptor gave excellent weed control but also killed both spinach varieties. Crop injury (stunting – see Table 2) from PRE-applied herbicides was greatest earlier in the season with Outlook, Dual Magnum and Nortron (high rate). Nortron caused significant injury when applied at the 2.0 lb a.i. rate, however; the lower rate gave tolerable injury and the spinach was able to compensate for the injury by harvest time. Tank-mix combinations of Ro-Neet plus Dual Magnum, Outlook or Nortron resulted in increased crop injury when compared to the herbicides applied alone. Yields in Nortron-treated plots for DMC 66-09 were statistically equivalent but averaged 10 and 15% higher (low and high rate, respectively) than the standard Dual Magnum plots. Though injury was significant early, Outlook treated plots also yielded 9% higher than Dual Magnum alone. These results indicate than some minor yield losses may be occurring as a result of Dual Magnum applications. Yields of DMC 66-07 spinach were lower on average and appeared to be more susceptible to herbicide injury, though most trends remained the same. Nortron however, applied the high rate caused significantly lower yields.

Conclusions*:* Dual Magnum continues to be an excellent choice for weed control in Wintergarden spinach production; however, Outlook and Nortron (more evaluation of rates is needed) are excellent candidates for PRE applications as well. The rate of Outlook should be reduced by at least 1/3 to allow for more crop safety and this should not reduce herbicide performance. More research is needed to evaluate tank-mix combinations of preemergence herbicides applied with Ro-Neet. Linuron and Define, while not causing significant crop injury did not increase the performance of Ro-Neet in this test. More evaluation of these herbicides applied alone is needed to determine their potential for spinach production in the Texas Wintergarden and other spinach growing regions.

Table 1. Effect of Herbicides on Weed Control in Spinach: 2004

Trt #	Chemical	Rate (lbs a.i./A)	Timing	Henbit	London Rocket	Henbit	London Rocket
				----- % Control -----		------- % Control -------	
				December 12, 2003		January 23, 2004	
1	*Untreated*			0	0	0	0
2	*Handweed*			99.0	99.0	99.0	99.0
3	Ro-Neet 6-E	3.0	PRE	99.0	85.8	99.0	72.3
4	Ro-Neet 6-E Dual Magnum 7.62E	3.0 0.65	PRE PRE	98.0	97.0	99.0	99.0
5	Ro-Neet 6-E Dual Magnum 7.62E	3.0 0.325	PRE EPOST[1]	99.0	92.5	99.0	70.0
6	Dual Magnum 7.62E	0.65	PRE	99.0	98.0	99.0	95.8
7	Dual Magnum 7.62E	0.325	EPOST[1]	32.5	36.3	82.3	53.8
8	Ro-Neet 6-E Outlook 6E	3.0 0.65	PRE PRE	99.0	98.0	99.0	97.0
9	Ro-Neet 6-E Outlook 6E	3.0 0.325	PRE EPOST[1]	96.8	92.3	99.0	78.8
10	Outlook 6E	0.65	PRE	98.0	98.0	95.8	98.0
11	Outlook 6E	0.325	EPOST[1]	54.8	69.5	99.0	62.5
12	Nortron 4SC	1.0	PRE	99.0	99.0	98.0	98.0
13	Nortron 4SC	2.0	PRE	99.0	99.0	99.0	99.0
14	Nortron 4SC	0.164	EPOST[1]	32.5	93.5	94.3	82.5
15	Ro-Neet 6-E Nortron 4SC	3.0 0.164	PRE EPOST[1]	74.3	74.3	99.0	68.8
16	Ro-Neet 6-E Nortron 4SC	3.0 1.0	PRE PRE	99.0	99.0	99.0	99.0
17	Ro-Neet 6-E Linex 50DF	3.0 0.10	PRE PRE	99.0	99.0	99.0	99.0
18	Ro-Neet 6-E Define 4SC	3.0 0.15	PRE PRE	99.0	99.0	99.0	99.0
19	Ro-Neet 6-E Stinger 3EC	3.0 0.12	PRE EPOST[1]	98.0	97.0	99.0	82.5
20	Ro-Neet 6-E Starane 1.5EC	3.0 0.02	PRE EPOST[1]	99.0	96.0	99.0	78.8
21	Ro-Neet 6-E Raptor 1AS	3.0 0.015	PRE EPOST[1]	99.0	99.0	99.0	99.0
22	Ro-Neet 6-E Raptor 1AS	3.0 0.03	PRE EPOST[1]	99.0	99.0	99.0	99.0
23	Bolero 8EC	1.0	PRE	96.0	61.0	95.8	60.0
24	Bolero 8EC	2.0	PRE	72.3	72.3	89.5	52.5
			LSD (0.05)	**28.2**	**29.7**	**7.7**	**27.6**

Table 2. Effect of Herbicides on Crop Injury and Yield of Two Spinach Varieties Grown in the Texas Wintergarden

Chemical	Rate (lbs a.i./A)	Timing	DMC 66-09 % Injury 11/17/03	DMC 66-07 % Injury 11/17/03	DMC 66-09 % Injury 12/12/03	DMC 66-07 % Injury 12/12/03	DMC 66-09 % Injury 1/23/04	DMC 66-07 % Injury 1/23/04	DMC 66-09 Yield (Tons/A) 2/5/04	DMC 66-07 Yield (Tons/A) 2/5/04
Untreated			0	0	0	0	0	0	5.78	5.29
Handweed			0	0	0	0	0	0	6.32	5.89
Ro-Neet 6-E	3.0	PRE	0	0	0	2.5	0	0	6.82	5.97
Ro-Neet 6E + Dual Magnum 7.62E	3.0 0.65	PRE PRE	12.5	13.8	8.8	13.8	0	0	6.51	5.88
Ro-Neet 6-E + Dual Magnum 7.62E	3.0 0.325	PRE EPOST	0	0	2.5	3.8	0	0	6.64	5.95
Dual Magnum 7.62E	0.65	PRE	0	2.5	3.8	3.8	0	0	5.61	5.26
Dual Magnum 7.62E	0.325	EPOST	0	0	2.5	3.8	0	0	4.86	4.15
Ro-Neet 6-E + Outlook 6E	3.0 0.65	PRE PRE	48.8	43.8	43.8	46.3	8.8	0	4.91	4.8
Ro-Neet 6-E + Outlook 6E	3.0 0.325	PRE EPOST	0	0	6.3	3.8	0	0	5.95	5.81
Outlook 6E	0.65	PRE	35.0	31.3	27.5	30.0	0	2.5	6.13	5.73
Outlook 6E	0.325	EPOST	0	0	2.5	8.8	0	0	6.31	5.28
Nortron 4SC	1.0	PRE	15.0	21.3	8.8	20.0	0	0	6.23	5.56
Nortron 4SC	2.0	PRE	37.5	52.5	28.8	56.3	3.8	18.8	6.62	3.81
Nortron 4SC	0.164	EPOST	0	0	0	2.5	0	0	6.11	5.54
Ro-Neet 6-E + Nortron 4SC	3.0 0.164	PRE EPOST	0	0	1.3	10.0	0	0	6.26	5.16
Ro-Neet 6-E + Nortron 4SC	3.0 1.0	PRE PRE	37.5	40.0	25.0	31.3	1.3	2.5	5.84	5.29
Ro-Neet 6-E + Linex 50DF	3.0 0.10	PRE PRE	3.8	2.5	5.0	5.0	0	0	6.48	6.17

Table 2. The Effect of Herbicide Applications Crop Injury and Yield of Two Spinach Varieties Grown in the Texas Wintergarden (Continued)

Chemical	Rate (lbs a.i./A)	Timing	DMC 66-09 % Injury 11/17/03	DMC 66-07 % Injury 11/17/03	DMC 66-09 % Injury 12/12/03	DMC 66-07 % Injury 12/12/03	DMC 66-09 % Injury 1/23/04	DMC 66-07 % Injury 1/23/04	DMC 66-09 Yield (Tons/A) 2/5/04	DMC 66-07 Yield (Tons/A) 2/5/04
Ro-Neet 6-E + *Define 4SC*	3.0 0.15	PRE PRE	10.0	12.5	11.3	13.8	0	0	6.56	6.07
Ro-Neet 6-E + *Stinger 3EC*	3.0 0.12	PRE EPOST	0	0	0	0	0	0	5.66	4.84
Ro-Neet 6-E + *Starane 1.5EC*	3.0 0.02	PRE EPOST	0	0	3.8	1.3	0	0	5.06	5.76
Ro-Neet 6-E + *Raptor*	3.0 0.015	PRE EPOST	99.0	99.0	99.0	99.0	99.0	99.0	0	0
Ro-Neet 6-E + *Raptor*	3.0 0.03	PRE EPOST	99.0	99.0	99.0	99.0	99.0	99.0	0	0
Bolero 8EC	1.0	PRE	0	0	0	0	0	0	5.50	5.28
Bolero 8EC	2.0	PRE	2.5	0	0	1.3	0	0	5.40	5.16
		LSD (0.05)	**8.2**	**7.2**	**7.7**	**8.3**	**5.6**	**3.0**	**1.54**	**1.23**

Trial Name: Spinach Preemergence Trial - 2004

Application: PRE's

Location	Crystal City	Wind speed / direction	0 – 5 MPH / SW
Date	Oct. 28, 2003	Crop	Spinach
Time of day	1:00 p.m.	Variety	DMC66-09
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	82
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present:			

Application: EPOST's

Location	Crystal City	Wind speed / direction	5 – 10 MPH / SW
Date	Nov. 17, 2003	Crop	Spinach
Time of day	3:00 p.m.	Variety	DMC66-09
Type of application	Broadcast	Crop stage	2 – 4 leaves
Carrier	Water	Air temp. (^oF)	72
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Semi-moist
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: Henbit (2 leaves), Careless weed (2 leaves) London Rocket			

The Wintergarden Spinach Producers Board supported this project financially. Thanks also to Aaron Phillips and Cruz Hernandez of the Del Monte Company for their time and assistance with the trial.

Effects of Herbicides on Crop Injury and Yield in Spring-Planted Spinach

Final Report

Objective: To evaluate phytotoxicity of preemergence (PRE) and early postemergence (EPOST) applications of herbicides for crop injury and yield in spinach (*Spinacia oleracea* var. “Baker”).

Materials & Methods: The trial was conducted on the farm of Donny Hellmer located in Clovis, New Mexico, on the western border of the Texas High Plains. The trial site was located on a sandy loam soil. The field was chisel-plowed, disked and planted (drilled) on March 9, 2005. The entire test site was fertilized, irrigated (center pivot), and all pests controlled using standard grower practices. Following seeding, PRE herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). EPOST herbicide treatments were applied on April 11 to spinach at the cotyledon to 2-leaf stage (Table 2). Plots measured 6.67’ x 20’ and contained approximately 6 rows of spinach/plot. All treatments were replicated 3 times in a randomized complete block design. Spinach was cut and harvested by hand on May 19 using randomly placed 0.5 m^2 quadrats from which the spinach was weighed. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for PRE Treatments

Location	Donny Hellmer Farm	**Wind speed / direction**	10 -15 mph / S/SW
Date	March 11, 2005	**Crop**	Fresh cut spinach
Time of day	12:00 p.m.	**Variety**	Baker
Type of application	Broadcast	**Crop stage**	Seed
Carrier	Water	**Air temp. (^oF)**	65
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	55
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Moist
Nozzle tips	8002 EVS	**% Relative humidity**	Low
Nozzle spacing	18”	**Sky conditions**	Clear
Boom width (“)	6.67’	**# Replications**	3
Boom height (“)	18 – 20”	**Sprayed by**	RWW
Weeds present: None			

Table 2. Application Data for EPOST Treatments

Location	Donny Hellmer Farm	**Wind speed / direction**	10 -15 mph / S/SW
Date	April 11, 2005	**Crop**	Fresh cut spinach
Time of day	10:00 a.m.	**Variety**	Baker
Type of application	Broadcast	**Crop stage**	Cotyledon – 2 leaves
Carrier	Water	**Air temp. (^oF)**	55
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	50
GPA	20	**Soil beneath**	Semi-moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Low
Nozzle spacing	18”	**Sky conditions**	Partly cloudy
Boom width (“)	6.67’	**# Replications**	3
Boom height (“)	18 – 20”	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: Percent crop injury ratings (Table 3) were significantly higher (compared to hand weeded control) 7 weeks after treatment (WAT) for spinach treated with Define (PRE), Outlook (PRE) or Outlook (PRE) + Outlook (EPOST), while all other treatments had crop injury ratings of 8.3% or less. By 9 WAT, only Define and Outlook (both applied PRE) had significantly higher crop injury compared to the control, though injury in the Outlook + Outlook plots remained at 16.7%. There were no weeds present in this study; therefore, no weed ratings were obtained. Following the trend with crop injury ratings, spinach yields in Outlook and Define treatments, when applied PRE were significantly less when compared to the hand weeded control. All other herbicide treatments did not significantly reduce crop yields. The results of this study indicate that all herbicide treatments (except Outlook and Define applied PRE) are generally considered safe for use on spring-planted spinach. Continued research is needed to determine additional timings and rates of herbicides for use in spinach on the Texas High Plains.

Table 3. Herbicide Effects on Crop Injury and Yield of Spring-Planted Spinach

Treatment	Product Rate lb ai / A	Timing	% Crop Injury 7 WAT	% Crop Injury 9 WAT	Yield (tons/A)
Weedy Check		Season	0	0	20.4
Handweed		Season	0	0	23.8
Dual Magnum 7.62E	0.65	PRE	0	0	20.9
Dual Magnum + Dual Magnum	0.325 0.325	PRE EPOST	8.3	5.0	18.1
Outlook 6E	0.5	PRE	41.7	31.7	15.9
Outlook Outlook	0.25 + 0.25	PRE EPOST	20.3	16.7	20.9
Nortron 4SC	0.5	PRE	0	0	21.0
Nortron	0.75	PRE	3.3	0	19.8
Nortron	1.0	PRE	6.7	5.0	20.5
Dual Magnum + Nortron 4SC + NIS	0.65 0.164 0.25%v/v	PRE EPOST	6.7	6.7	19.5
Dual Magnum + Stinger 3EC	0.65 0.188	PRE EPOST	0	5.0	19.6
Define 4SC	0.6	PRE	41.7	25.0	16.2
LSD (0.05)			13.4	23.9	6.8

Effects of Herbicides on Crop Injury in Fall-Planted Leafy Brassicas

Final Report

Objective: To evaluate phytotoxicity of preemergence (PRE) applications of 15 herbicides on crop injury in four direct-seeded leafy green vegetable crops.

Materials & Methods: The trial was conducted at the Texas Tech University Crops Research Farm located in Lubbock (Lubbock County). The trial site was located on an Amarillo clay loam soil with a pH of 8.1 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. The entire trial site was fertilized, drip-irrigated, and all pests controlled using standard grower practices. Following direct-seeding with a Monosem vacuum planter on September 1, preemergence herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1 for application data). Plots measured 16.7' x 13' and contained 4 rows (1 row per crop) with 40" row spacing, and all treatments were replicated 3 times in a randomized complete block design. The crops and varieties used in the test included mustard greens (*Brassica juncea* var. Southern Giant Curled), turnip greens (*Brassica rapa* var. = Seven Top), Kale (*Brassica oleracea* var. = Dwarf Blue Curled Scotch), and collards (*Brassica oleracea* var. *acephala,* cultivar = Vates). Plots were visually rated on October 12 and 28 for crop injury. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for PRE Herbicide Treatments

Location	TTU Crops Res. Farm	**Wind speed / direction**	15 mph / S
Date	September 1, 2005	**Crop**	Leafy Greens
Time of day	3300 p.m.	**Variety**	See Above
Type of application	Broadcast	**Crop stage**	Seed
Carrier	Water	**Air temp. (^oF)**	88
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	75
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Moist (spotty)
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	6.67'	**# Replications**	3
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: Crop injury varied from 0% (no injury) up to 99.0% (complete death) within each crop depending on the herbicide applied. Crop injury evaluated 6 weeks after treatment (WAT) was not visible from applications of ET, and this herbicide is considered to have postemergence activity only. Other residual herbicides that generally gave a relatively low percentage of crop injury across 2 - 4 crops include Dual Magnum, Outlook, Nortron, Prefar and Spartan. Though Nortron injury was moderate, it did cause leaves to have reduced waxy appearances, and this could reduce crop quality. Collard greens showed some potential crop safety with a few of the herbicides including KIH 485, GoalTender, and Barricade where crop injury was 30% or less. In general, percent crop injury did not decrease when ratings were evaluated at 8 WAT in all crops. Dual Magnum, Outlook and Spartan show promise for further testing in most crops, as does KIH 485 and Barricade in collards. This test is currently being repeated in Crystal City to determine whether soil types have an influence on crop injury from these herbicides to leafy brassicas. More research is needed to determine the effects of pre-applied herbicides on crop injury and weed control in leafy vegetables in Texas.

This project is supported and funded in part with a grant from the IR-4 Leafy Greens Pilot Project.

Table 2. Effect of Preemergence Herbicides on Crop Injury in 4 Leafy Greens Six Weeks After Application

Trt #	Chemical	Product Rate (lbs ai)/A	Timing	Mustard Greens	Collard Greens	Turnip Greens	Kale
				---------- % Crop Injury 6 WAT ----------			
1	*Handweed*			0	0	0	0
2	Define 4SC	0.6	PRE	99.0	68.3	94.7	97.7
3	Everest 70WG	0.026	PRE	90.0	45.0	90.0	73.0
4	KIH 485 60WDG	0.056	PRE	56.3	21.7	76.3	56.3
5	Prowl H_2O 3.8ACS	1.0	PRE	79.7	55.0	75.0	93.0
6	V-10142 75WDG	0.1	PRE	96.3	78.3	96.3	91.0
7	GoalTender 4L	0.25	PRE	76.7	28.3	63.3	66.7
8	Grasp 2SC	0.125	PRE	81.7	58.3	91.7	78.3
9	ET	1.0 fl oz prod	PRE	0	0	0	0
10	Dual Magnum 7.62E	0.65	PRE	16.7	5.0	15.0	15.0
11	Outlook 6E	0.5	PRE	58.3	13.3	28.3	33.3
12	Barricade 4FL	0.66	PRE	88.3	20.0	61.7	71.7
13	Nortron 4SC	0.75	PRE	68.3	30.0	40.0	15.0
14	Prefar 4E	5.0	PRE	30.0	3.3	18.3	8.3
15	Spartan 75WDG	0.15	PRE	43.3	16.7	8.3	21.7
16	Dinamic 70G	0.113	PRE	73.0	68.3	61.7	96.3
			LSD (0.05)	**43.3**	**30.8**	**33.3**	**35.9**

Table 3. Effect of Preemergence Herbicides on Crop Injury in 4 Leafy Greens Eight Weeks after Application

Trt #	Chemical	Product Rate (lbs ai)/A	Timing	Mustard Greens	Collard Greens	Turnip Greens	Kale
				---------- % Crop Injury 8 WAT ----------			
1	*Handweed*			0	0	0	0
2	Define 4SC	0.6	PRE	97.7	71.7	97.7	99.0
3	Everest 70WG	0.026	PRE	93.3	38.3	64.7	64.7
4	KIH 485 60WDG	0.056	PRE	41.3	21.7	58.3	59.7
5	Prowl H_2O 3.8ACS	1.0	PRE	79.7	60.0	56.7	97.7
6	V-10142 75WDG	0.1	PRE	99.0	89.7	96.3	91.0
7	GoalTender 4L	0.25	PRE	70.0	18.3	50.0	56.7
8	Grasp 2SC	0.125	PRE	83.0	66.7	81.3	76.3
9	ET	1.0 fl oz prod	PRE	0	0	0	0
10	Dual Magnum 7.62E	0.65	PRE	6.7	5.0	8.3	16.7
11	Outlook 6E	0.5	PRE	65.0	23.3	28.3	43.3
12	Barricade 4FL	0.66	PRE	83.0	11.7	48.3	89.7
13	Nortron 4SC	0.75	PRE	65.0	38.3	26.7	30.0
14	Prefar 4E	5.0	PRE	40.0	0	8.3	31.7
15	Spartan 75WDG	0.15	PRE	3.3	26.7	0	20.0
16	Dinamic 70G	0.113	PRE	69.7	71.3	55.0	97.7
			LSD (0.05)	**43.5**	**30.3**	**37.4**	**43.5**

High Plains Herbicide Evaluation for Weed Control in Snap Beans: I

Final Report

Objective: To determine the efficacy of selected preemergence (PRE, PPI) and postemergence (POST) herbicides on crop injury, weed control and yield of snap beans (*Phaseolus vulgaris*).

Materials & Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock on an Acuff clay loam soil with an average pH of 7.6 and 1.1% organic matter. The trial site was plowed in the fall and the soil prepared in the spring by applying a pre-plant fertilizer (80 lbs/A nitrogen) and disking and listing furrows in the soil. Snap beans (Var. "BBL 156") were planted on May 3 using a 2-row Monosem Vacuum Planter spaced at 40" centers with 2 rows/plot. Preplant incorporated herbicides were applied prior to planting on the same date. Following planting, PRE-applied herbicides were sprayed onto corresponding plots. Postemergence (including layby) treatments were applied on June 9 to corresponding plots. Eptam layby treatment was raked in by hand immediately following application. The test site was treated uniformly in regards to pest and fertility management. All treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi (see Tables 1 and 2). The trial was conducted as an RCB design with treatments replicated 3 times in plots measuring 6.5' x 20', and all data subjected to ANOVA and means separated at the 5% level.

Results and Discussion: Early season crop injury (% stunting) was significant ($\alpha = 0.05$) only with PRE-applied Matrix 25DF (0.0313 lb a.i./A), Define 4SC, Caparol 4L, and V-10146 3.3SC (Table 3). However, late season crop injury was greatest (and significantly different) only in plots treated with FirstRate 84WDG and Caparol (Table 3). Palmer amaranth (*Amaranthus palmeri*) populations were high due to excessive and timely rainfalls that occurred during the growing season. Control of Palmer amaranth was generally good to fair with excellent control observed in plots treated with Eptam 7-E (PPI) followed by Sandea 75WDG with or with Basagran 4L applied POST. Excellent control was also observed with Eptam alone, and Matrix, FirstRate, Define and V-10146. Regardless of treatment, snap bean yields (Table 3) were not significantly different when compared to the handweeded control, however, yields in plots treated with FirstRate or Caparol were significantly reduced when compared to the highest-yielding treatment (Eptam at 3.5 lbs a.i./A). The results of this trial indicate that all the evaluated herbicide treatments offer good to excellent control of Palmer amaranth, but applications of FirstRate and Caparol are likely too injurious for snap beans to recover and maintain adequate yields. Matrix has shown good potential as an herbicide choice on the High Plains, but has caused significant crop injury in other locations. More research is needed for V-10146, Dinamic 70G, Outlook 6E, Define as potential candidates in snap beans.

Table 1. Application Data for PRE and PPI-applied Herbicides

Location	Lubbock	Wind speed / direction	0 – 5 MPH / N
Date	May 3, 2004	Crop	Snap beans
Time of day	9:00 a.m.	Variety	BBL 156
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	70
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	59
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Low
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	3
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for POST and Layby Treatments

Location	Lubbock	Wind speed / direction	5 – 10 MPH / S
Date	June 9, 2004	Crop	Snap beans
Time of day	9:00 a.m.	Variety	BBL 156
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (°F)	72
Gas (if not CO_2)	CO_2	Soil temp. (°F)	74
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.7'	# Replications	3
Boom height (")	18"	Sprayed by	RWW
Weeds present: Careless weed (cotyledon);			

Table 3. Crop Injury, Weed Control and Yields of Snap Beans

Product	Rate lbs a.i. /A	Timing	% Crop Injury 5/13	% Crop Injury 5/21	% Crop Injury 7/01	% Control Palmer Amaranth 7/01	Yield (lbs / A) 7/12
Untreated			0	0	0	0	7375
Handweeded			0	0	0	95.0	7336
EPTAM 7E + SANDEA 75WDG + NIS	3.06 0.032 0.25% V/V	PPI POST POST	0	0	0	97.7	8094
EPTAM 7E + SANDEA 75WDG + BASAGRAN 4L NIS	3.06 0.032 0.5 0.25% V/V	PPI POST POST POST	0	0	3.3	95.0	7258
EPTAM 7E	3.5	PPI	0	0	0	96.3	8473
EPTAM 7E	3.06	LAYBY	0	0	3.3	93.0	6021
DUAL MAGNUM 7.62E	065	PRE	0	0	0	92.7	5807
OUTLOOK 6E	0.66	PRE	0	0	0	93.3	6456
SANDEA 75WDG	0.024	PRE	0	1.7	3.3	88.0	8295
MATRIX 25DF	0.0156	PRE	5.0	0	0	94.7	8347
MATRIX 25DF	0.0313	PRE	0	5.0	8.3	93.0	5652
FIRSTRATE 84WDG	0.032	PRE	0	20.0	26.7	96.3	4531
DEFINE 4SC	0.6	PRE	10.0	0	3.3	96.3	7497
CAPAROL 4L	1.5	PRE	6.7	26.7	20.0	88.0	4923
V-10146 3.3SC	0.198	PRE	15.0	20.0	3.3	97.7	7267
DINAMIC 70G	0.113	PRE	0	3.3	5.0	88.0	7406
		LSD (0.05)	**4.9**	**6.0**	**9.2**	**12.8**	**3002.6**

High Plains Herbicide Evaluation for Weed Control in Snap Beans: II

Final Report

Objective: To determine the efficacy of selected preemergence (PRE, PPI) and postemergence (POST) herbicides on crop injury, weed control and yield of snap beans (Phaseolus vulgaris).

Materials & Methods: The trial was conducted on an Allen Canning Compay cooperator's field located in Lazbuddie during the 2004 growing season. The trial site was prepared according to the grower's standard practices that were followed throughout the test period, with the exception of herbicide applications. Snap beans (Var. "BBL 156") were planted on June 27 and spaced at 30" centers with 2 rows/plots (measuring 5' x 25'). Preplant incorporated herbicides were applied July 1 and irrigated in with approximately 1.5" of water. PRE-applied herbicides were also sprayed on July 1 onto corresponding plots. Postemergence (including layby) treatments were applied on July 13 at 2 – 3 trifoliate leaf stage to corresponding plots. An Eptam layby treatment was raked in by hand immediately following application. The test site was treated uniformly in regards to pest and fertility management according to grower practices. All treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi (see Tables 1 and 2). The trial was conducted as an RCB design with 4 replications and all data subjected to ANOVA and means separated at 5% level.

Results and Discussion: Early season crop injury (% stunting) was significant ($\alpha = 0.05$) for plots treated with Eptam 7E + Sandea 75WDG + Basagran 4L, Matrix 25DF (both rates), FirstRate 84WDG and Dinamic 70G (Table 3). Crop injury ratings recorded 3 weeks later showed a similar trend for all treatments. Injury from Matrix and FirstRate was relatively severe in this trial. Control of Palmer amaranth (*Amaranthus palmeri*) populations was poor to excellent in this study, depending on herbicide application. By July 22, all herbicide treatments gave excellent weed control except Eptam 7E applied alone at both rates. By August 12, control had dropped in both Eptam and Dinamic treatments, as well as the Eptam + Sandea + Basagran application. Grower yield averages for this field in 2004 were 3833 lbs/A, and this was similar to the average of all herbicide treatments in this test (3933 lbs/A). Snap bean yields (Table 3) were significantly higher when compared to the untreated control only in plots treated with Caparol 4L (results opposite to the 2004 Lubbock trial). Plots treated with Eptam alone, Matrix, FirstRate and Dinamic failed to yield equal to that of the untreated control plots. The results of this trial indicate that the evaluated herbicides offered fair to excellent control of Palmer amaranth, but applications of Matrix, FirstRate and Dinamic caused sufficient injury to lower yields. Matrix showed good potential as an herbicide choice in a Lubbock trial, but caused significant crop injury and yield reduction in this trial. Caparol, which caused significant injury and a 33% yield loss in Lubbock, was the best treatment in this study. More research is needed to further evaluate these herbicides and why the responses are opposite under differing conditions in Texas.

Table 1. Application Data for PRE and PPI-applied Herbicides

Location	Lazbuddie	Wind speed / direction	0 – 5 MPH / NW
Date	July 1, 2004	Crop	Snap beans
Time of day	11:00 a.m.	Variety	BBL 156
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (°F)	83
Gas (if not CO_2)	CO_2	Soil temp. (°F)	79
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Moist
Nozzle tips	8002VS	% Relative humidity	Moderately high
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	JCH
Weeds present: None			

Table 2. Application Data for POST and Layby Treatments

Location	Lubbock	Wind speed / direction	0 MPH
Date	July 13, 2004	Crop	Snap beans
Time of day	11:15 a.m.	Variety	BBL 156
Type of application	Broadcast	Crop stage	2 – 3 trifol. stage
Carrier	Water	Air temp. (^oF)	82
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	78
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderately high
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	JCH
Weeds present: Careless weed (cotyledon, 0.5 – 1"); morning glory (1" – 2")			

Table 3. Crop Injury, Weed Control and Yields of Snap Beans

Product	Rate lbs a.i. /A	Timing	% Crop Injury 7/22	% Control Palmer Amaranth 7/22	% Crop Injury 8/12	% Control Palmer Amaranth 8/12	Snap Bean Yield (lbs / A) 8/27
Untreated			0	0	0	0	3363
EPTAM 7E + SANDEA 75WDG + NIS	3.06 0.032 0.25% V/V	PPI POST POST	0	99.0	0	92.5	3494
EPTAM 7E + SANDEA 75WDG + BASAGRAN 4L NIS	3.06 0.032 0.5 0.25% V/V	PPI POST POST POST	15.0	96.0	16.3	71.25	4835
EPTAM 7E	3.5	PPI	0	70.0	0	43.8	3189
EPTAM 7E	3.06	LAYBY	5.0	66.0	6.3	40.0	2818
DUAL MAGNUM 7.62E	065	PRE	3.8	97.0	6.3	83.8	5031
OUTLOOK 6E	0.66	PRE	0	99.0	0	95.0	4879
SANDEA 75WDG	0.024	PRE	3.8	98.0	5.0	90.0	5079
MATRIX 25DF	0.0156	PRE	23.8	97.0	23.8	83.8	2631
MATRIX 25DF	0.0313	PRE	57.5	96.8	51.3	92.5	1620
FIRSTRATE 84WDG	0.032	PRE	42.5	98.0	36.3	93.8	3149
DEFINE 4SC	0.6	PRE	0	97.0	0	85.0	4421
CAPAROL 4L	1.5	PRE	11.2	98.0	18.8	90.0	6647
DINAMIC 70G	0.113	PRE	17.5	85.0	15.0	71.3	3354
		LSD (0.05)	**13.8**	**24.9**	**14.7**	**21.9**	**2836**

Evaluation of Herbicides for Weed Control & Crop Injury in Snap Beans: III

Final Report

Objective: To evaluate and compare selected herbicide treatments for control of yellow top and potential phytotoxicity on snap beans (*Phaseolus vulgaris*) grown in the Pearsall, Texas.

Materials and Methods: The trial was conducted on the farm of Gary Boyd located in Derby, TX on a sandy loam soil. The trial site was prepared according to standard grower practices by applying a pre-plant fertilizer, then disking the field and planting beans in 5-row beds. Snap beans (var. “BBL 156”) were planted on February 28, and plots measuring 6.67” x 20’ were replicated throughout the field. Herbicides were applied using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 30 PSI. Application data can be found in Tables 1 and 2 below for the preemergence (PRE) and postemergence (POST) treatments, respectively. The field containing the plots was irrigated as needed by a center pivot system, and all other yield-enhancing production practices performed according to grower needs. The experimental design was a randomized complete block with 3 replications. All data were subjected to ANOVA and means were separated using the Least Significant Difference (α = 0.05).

Table 1. Application Data for Preemergence Herbicides

Location	Derby, TX	Wind speed / direction	5 mph / NW
Date	Mar. 1, 2003	Crop	Snap Beans
Time of day	12:30 p.m.	Variety	“BBL 156”
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^{o}F)	76
Gas (if not CO_2)	CO_2	Soil temp. (^{o}F)	68
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Semi-Moist
Nozzle tips	8002	% Relative humidity	High
Nozzle spacing	18”	Sky conditions	Overcast/Partly cloudy
Boom width (“)	6.5’	# Replications	3
Boom height (“)	18”	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for Postemergence Treatments

Location	Derby, TX	Wind speed / direction	5 – 10 mph / NE
Date	Mar. 18, 2003	Crop	Snap Beans
Time of day	2:30 p.m.	Variety	“BBL 156 ”
Type of application	Broadcast	Crop stage	1 – 2 trifoliates
Carrier	Water	Air temp. (^{o}F)	84
Gas (if not CO_2)	CO_2	Soil temp. (^{o}F)	75
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002	% Relative humidity	High
Nozzle spacing	18”	Sky conditions	Overcast
Boom width (“)	6.5’	# Replications	3
Boom height (“)	18”	Sprayed by	RWW
Weeds present: Redroot Pigweed (2 leaves); Morningglory (2”)			

Results: Crop ratings (injury/stunting) recorded on April 14 showed that only those treatments where Matrix 75DF was applied had significantly higher stunting (greater than 50%) and moderate leaf chlorosis compared to all other herbicide treatments (see Table 3). This injury would not be considered commercially acceptable. Where Sandea 75WDG and Dual Magnum 7.62E were applied

PRE there was 10% stunting with no chlorosis, and this was considered to be commercially acceptable. However, by harvest (May 6) crop injury in the Matrix treatments was greatly reduced (15% or less).

Unfortunately, there was no yellow top (Golden Crown Beard) found within the test site. However, there was low to moderate populations of Redroot Pigweed in the area. Control of redroot pigweed was generally excellent for all treatments (Table 3) recorded on April 14, and this trend continued until harvest (May 6) except where Matrix was applied alone. In that treatment, control dropped to 70% by harvest.

Snap bean yields were not significantly influenced by weed pressure, as indicated by the relatively good yields in the untreated plots. However, significantly reduced yields were found for plots treated PRE with Matrix or POST Sandea (0.67 oz/A) plus Basagran 4L (1 pint/A) applications (see Table 3). Matrix reduced yields an average 30% compared to the highest-yielding treatment (Sandea applied 0.5 oz/A POST) or 23% compared to the untreated check. While the POST-applied Sandea plus Basagran combination had reduced yields when applied alone, it did not reduce yields when combined with PRE-applied Treflan 4HFP or Dual Magnum. This indicates that the yield reduction in that treatment was likely the function of field variation and not herbicide treatment. All other treatments that compared selected combinations of Dual Magnum, Treflan, Sandea or Eptam 7E did not result in significantly lower yields. However, it was interesting to note that the average of both rates of Sandea applied PRE was 15% lower than the average of Sandea applied POST. This suggests good crop safety with POST-applied Sandea for this particular variety of snap beans.

Conclusions: With the exception of Matrix, all herbicides and their combinations performed well in this 2004 study. More research is needed with these and other herbicides to determine their effects on yellow top. Plants of yellow top have been collected from the test site and are being grown out for seed production and future greenhouse herbicide screening trials. Sandea may be good candidate as it is in the same chemical family as Matrix and is currently labeled on snap beans. More research is needed to evaluate Sandea performance on other snap bean varieties, as well as Matrix in other snap bean growing regions.

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Table 3. Effect of Herbicides on Crop Injury, Redroot Pigweed Control and Yield of Snap Beans

Treatment	Rate /A	Timing	% Crop Injury 4/14	% Control Red Root Pigweed 4/14	% Crop Injury on 5/6	% Control Red Root Pigweed 5/6	No. Plants per 10 feet of row	Yield (Tons/A)
Untreated			0	0	0	0	30.3	10.7
Treflan 4HFP + Dual Magnum 7.62E	1.0 pint 1.0 pint	PPI PRE	1.7	99.0	0	99.0	28.7	9.8
Treflan 4HFP + Dual Magnum 7.62E + Sandea 75WDG + NIS	1.0 pint 1.0 pint 0.67 oz 0.25% v/v	PPI PRE POST POST	3.3	99.0	0	99.0	33.3	11.3
Treflan 4HFP + Sandea 75WDG	1.0 pint 0.5 oz	PPI PRE	3.3	99.0	0	99.0	34.7	10.4
Dual Magnum 7.62E + Sandea 75WDG	1.0 pint 1.0 oz.	PRE PRE	10.0	99.0	0	99.0	34.0	11.4
Dual Magnum 7.62E + Sandea 75WDG + Basagran 4L + NIS	3.5 pints 0.67 oz 1 pint 0.25% v/v	PPI POST POST POST	0	99.0	0	99.0	30.0	10.0
Sandea 75WDG + Basagran 4L + NIS	0.67 oz 1 pint 0.25% v/v	POST POST POST	0	97.7	0	96.3	30.3	9.0
Treflan 4HFP + Eptam 7E	1.0 pint 3.5 pints	PPI Lay-By	0	99.0	0	97.7	30.3	10.0
Matrix 25DF	1.0 oz	PRE	56.7	99.0	10.0	70.0	34.7	7.7
Sandea 75WDG	0.5 oz	PRE	3.3	99.0	0	99.0	26.7	9.1
Sandea 75WDG	1.0 oz	PRE	6.7	97.7	0	99.0	29.3	10.2
Sandea 75WDG+ NIS	0.5 oz. 0.25% v/v	POST POST	1.7	97.7	0	97.7	32.3	11.8
Sandea 75WDG+ NIS	1.0 oz 0.25% v/v	POST POST	0	99.0	0	96.0	35.3	11.0
Treflan 4 HFP + Matrix 25DF	1.0 pint 1.0 oz	PPI PRE	51.7	99.0	15.0	99.0	30.0	8.7
Eptam 7E + Sandea 75WDG + NIS	3.5 pints 0.67 oz 0.25%	POST Lay-By	0	99.0	0	99.0	27.3	9.9
LSD (0.05)			**7.5**	**1.8**	**7.5**	**3.6**	**6.9**	**2.7**

High Plains Herbicide Evaluation for Weed Control in Blackeye Peas

Final Report

Objective: To determine the efficacy of selected preemergence (PRE, PPI) and postemergence (POST) herbicides on crop injury, weed control and yield of blackeye peas (*Vigna unguiculata*).

Materials & Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock on an Acuff clay loam soil with an average pH of 7.6 and 1.1% organic matter. The trial site was plowed in the fall and the soil prepared in the spring by applying a pre-plant fertilizer (80 lbs/A nitrogen) and disking and listing furrows in the soil. Preplant incorporated herbicides were applied May 24 prior to planting (Var. "8046") on the same date using a 2-row Monosem Vacuum Planter spaced at 40" centers with 2 rows/plot. Following planting, PRE-applied herbicides were sprayed onto corresponding plots. Heavy rains resulted in poor stands, thus on June 10 the crop was replanted. With the almost 3 weeks difference in planting, Eptam was reapplied and raked in to corresponding plots. Postemergence treatments were applied on June 29 to corresponding plots. The test site was treated uniformly in regards to pest and fertility management. All treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi (see Tables 1 and 2). The trial was conducted as an RCB design with 3 replications in plots measuring 6.5' x 20', and all data subjected to ANOVA and means separated at the 5% level.

Results and Discussion: Early season crop injury was significant ($\alpha = 0.05$) with treatments of Eptam 7E + Sandea 75WDG + Basagran 4L, Eptam, and where POST treatments of Thistrol 2EC were applied broadcast at 1 – 2 leaf stage (Table 3). Eptam injury was observed to be that of overall plant stunting, while crop injury from Thistrol was similar to that of 2, 4-D applications, though not as extreme and it lasted for ony 10 days or so. However, late season crop injury was greatest (and significantly different) only in plots treated with Thistrol (high rate) + Basagran at the 1 – 2 leaf stage (Table 3). This injury was not considered to be extremely deterimental to blackeye peas at this date.

Palmer amaranth (*Amaranthus palmeri*) populations were very high due to excessive and timely rainfalls that occurred during the growing season of 2004. Control of Palmer amaranth at harvest (September 3) was generally very poor in plots treated with Eptam or the Eptam + Sandea combinations, while control was fair in plots treated with Sandea. It is likely that much of active ingredients for both herbicides were washed out of the germination zone for Palmer amaranth during this trial, resulting in poor control. Good to excellent control was observed in all plots treated with POST applications of Thistrol, regardless of whether it was applied broadcast (at the 1 – 2 leaf stage) or banded with a hooded sprayer (at 2 –3 trifoliates). While Thistrol did tend to curl the blackeye peas, Palmer amaranth seedlings were burned back when applications were made at the cotyledon to 1.0" weed stage.

Blackeye pea yields (Table 3) were significantly lower from the average of the handweeded control plots only when plots were treated with Eptam, Sandea or the Eptam + Sandea combinations. Eptam caused significant early stunting and it is likely that the blackeye peas were unable to recover sufficiently. Where Eptam was applied followed by Sandea POST, there were significant yield losses, likely due not only to poor weed control, but may have also been a result of subtle crop injury of both applications. Stunting and yield losses have been documented in Sandea POST-applied treatments with blackeye peas in other trials. The results of this trial indicate that Thistrol may have potential for use in blackeye peas, especially when banded and applied with a hooded spray rig. Eptam (PPI) and Sandea (POST) may have some interactions that result in significant yield losses, but more studies are needed.

Table 1. Application Data for PRE and PPI-applied Herbicides

Location	Lubbock	Wind speed / direction	5 – 15 MPH / SW
Date	May 24, 2004	Crop	Blackeye peas
Time of day	11:00 a.m.	Variety	8046
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	85
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	78
GPA	20	Soil beneath	Semi-moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Low
Nozzle spacing	18”	Sky conditions	Clear
Boom width (“)	6.7’	# Replications	3
Boom height (“)	18”	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for POST Treatments

Location	Lubbock	Wind speed / direction	0 – 5 MPH / S
Date	June 29, 2004	Crop	Blackeye peas
Time of day	8:30 a.m.	Variety	8046
Type of application	Broadcast	Crop stage	4 – 6”
Carrier	Water	Air temp. (^oF)	73
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Moist
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18”	Sky conditions	Overcast
Boom width (“)	6.7’	# Replications	3
Boom height (“)	18”	Sprayed by	JCH
Weeds present: Careless weed (cotyledon to 1.0”);			

Table 3. Crop Injury, Weed Control and Yields of Blackeye Peas

Product	Rate lbs a.i. /A	Timing	% Crop Injury 6/30	% Crop Injury 7/21	% Control Palmer Amaranth	Yield (lbs / A)
Untreated			0	0	0	653.5
Handweeded			0	0	66.7	1655.4
EPTAM 7E + SANDEA 75WDG + NIS	3.06 0.024 0.25% V/V	PPI 3 – 5 TRIF	8.3	0	23.3	357.2
EPTAM 7E + SANDEA 75WDG + BASAGRAN 4L NIS	3.06 0.024 0.5 0.25% V/V	PPI 3 – 5 TRIF 3 – 5 TRIF	16.7	5.0	10.0	840.8
EPTAM 7E	3.5	PPI	31.7	6.7	40.0	801.6
SANDEA 75WDG	0.024	PRE	0	0	76.7	814.7
PROWL 3.3H20 + THISTROL 2EC	0.83 0.75	PRE 1 – 2 LVS	30.0	5.0	90.0	1132.7
PROWL 3.3H20 + THISTROL 2EC + BASAGRAN 4L	0.83 0.75 0.5	PRE 1 – 2 LVS 1 – 2 LVS	23.3	0	86.7	1420.2
PROWL 3.3H20 + THISTROL 2EC	0.83 1.5	PRE 1 – 2 LVS	33.3	6.7	83.3	1346.2
PROWL 3.3H20 + THISTROL 2EC + BASAGRAN 4L	0.83 1.5 0.5	PRE 1 – 2 LVS 1 – 2 LVS	21.7	10.0	90.0	1564.0
PROWL 3..3H20 + THISTROL 2EC	0.83 0.75	PRE 2 – 3 TRIF**	0	0	90.0	1537.8
PROWL 3.3H20 + THISTROL 2EC + BASAGRAN 4L	0.83 0.75 0.5	PRE 2 – 3 TRIF** 2 – 3 TRIF**	0	0	81.7	1468.1
PROWL 3.3H20 + THISTROL 2EC	0.83 1.5	PRE 2 – 3 TRIF**	0	6.7	81.7	1564.5
PROWL 3.3H20 + THISTROL 2EC + BASAGRAN 4L	0.83 1.5 0.5	PRE 2 – 3 TRIF** 2 – 3 TRIF**	0	0	88.3	1677.2
**** = Applied w/ Hooded Sprayer**		**LSD (0.05)**	**13.8**	**8.4**	**31.4**	**716.5**

Evaluation of the Potential for Bio-Power to Alleviate Herbicide Injury in Blackeye Peas

Final Report

Objective: To evaluate the effect of Bio-Power (manufactured by Stolller Enterprises) plant enhancer to alleviate plant stress from preemergence (PRE) and/or postemergence (POST) herbicide applications.

Materials & Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock during the 2004 growing season. The soil on the site was an Acuff clay loam with an average pH of 7.6 and 1.1% organic matter. The trial site was plowed in the previous fall and the soil disced and prepared in the spring. Pre-plant fertilizer (60 lbs/A nitrogen) was applied prior to discing, listing of furrows and planting. Trifluralin herbicide was applied PPI approximately 8 weeks prior to planting to reduce weed pressure. Blackeye peas (variety "TX123BE) were planted on June 15 using a 2-row Monosem Vacuum Planter with rows spaced on 40" centers and each plot contained 4 rows of peas. At the time of planting, in-furrow Bio-Power treatments were applied directly into the seed furrow and covered immediately with soil. All PRE and POST treatments were applied using a CO_2-charged backpack sprayer equipped with either a single nozzle (in-furrow treatments only) or four hollow cone nozzles that delivered 20 GPA at 35 psi. PRE herbicide treatments were applied immediately following planting. POST treatments were applied on July 3 to corresponding plots. The test site was treated uniformly in regards to insect and disease control and fertility management throughout the season. Peas were harvested on September 4. All data was subjected to ANOVA using SAS statistical procedures and means were separated according to the Least Significant Difference at the 5% level.

Table 1. Application Data for PRE-applied Herbicides

Location	Lubbock	Wind speed / direction	5-15 MPH/ S
Date	June 15, 2004	Crop	Blackeye peas
Time of day	1:30 p.m.	Variety	TX123BE
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	85
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	90
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW /JCH
Weeds present: None			

Table 2. Application Data for POST Treatments

Location	Lubbock	Wind speed / direction	5 – 10 MPH / SW
Date	July 3, 2004	Crop	Blackeye peas
Time of day	8:30 a.m.	Variety	TX123BE
Type of application	Broadcast	Crop stage	2 –3 trifoliates
Carrier	Water	Air temp. (^oF)	75
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	75
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Results and Discussion: Herbicide injury was evaluated as % chlorosis (general yellowing of the leaves) and plant stunting (Table 1). Although Dual Magnum and Sandea were applied PRE at 1X and 2X rates there was no cholorsis and only 3.8% stunting or less, regardless of Bio-Power application when rated 3 and 5 weeks after treatment (WAT). Higher rates of herbicides may have been needed to significantly increase crop injury with the PRE applications. However, Sandea, when applied POST significantly increased cholorosis (47.5 – 50.0%) and crop stunting (45.0 – 57.5%) by July 8, only 5 days after the application. Approximately 3 weeks after the POST treatments were applied, cholorsis was insignificant, but crop stunting continued (17.5 – 23.8%) in all POST Sandea treatments.

Table 1. Effect of Bio-Power Applied In-Furrow or Postemergence on Injury and Yield of Blackeye Peas

Product	**Rate lbs ai / A**	**Herbicide Timing**	**Bio-Power Timing**	**% Crop Injury (Chlorosis) July 8**	**% Crop Injury (Stunting) July 8**	**% Crop Injury (Stunting) July 22**	**Dry Seed Yield Lbs/A**
Untreated		None	None	0	0	0	780.1
Dual Magnum	1.0	PRE	None	0	0	0	676.3
Dual Magnum	2.0	PRE	None	0	0	0	641.6
Sandea	0.024	PRE	None	0	3.8	3.8	583.5
Sandea	0.048	PRE	None	0	2.5	0	686.1
Sandea	0.024	POST	None	50.0	57.5	23.8	540.4
Sandea	0.048	POST	None	47.5	50.0	18.8	584.8
Control I			IN-FURROW	0	0	1.3	660.6
Dual Magnum	1.0	PRE	IN-FURROW	1.3	1.3	0	718.1
Dual Magnum	2.0	PRE	IN-FURROW	0	0	0	690.6
Sandea	0.024	PRE	IN-FURROW	0	0	2.5	629.2
Sandea	0.048	PRE	IN-FURROW	0	0	0	735.1
Sandea	0.024	POST	IN-FURROW	46.3	50.0	18.8	653.4
Sandea	0.048	POST	IN-FURROW	50.0	52.5	17.5	617.5
Control II			POST	6.3	6.3	3.8	673.7
Dual Magnum	1.0	PRE	POST	15.0	20.0	12.5	686.7
Dual Magnum	2.0	PRE	POST	0	2.5	0	754.7
Sandea	0.024	PRE	POST	0	0	0	744.22
Sandea	0.048	PRE	POST	0	3.8	0	722.0
Sandea	0.024	POST	POST	47.5	45.0	17.5	680.2
Sandea	0.048	POST	POST	50.0	52.5	22.5	620.1
			LSD (0.05)	**8.3**	**10.9**	**9.0**	**168.1**

Blackeye pea yields were highest in the untreated plots. Yields were not significantly different from the untreated plots with the exception of where Sandea was applied POST without Bio-Power applied either in-furrow or POST. The data suggest that at least in this study, Bio-Power did not alleviate or reduce the amount of crop injury observed in blackeye peas when injurious rates, applications or herbicides were applied. When comparing Bio-Power applications across herbicide treatments (Table 2), again there were not statistically significant differences, however, there was a moderate increase in average crop yields when Bio-Power was applied in-furrow, and yields continued to increase with POST-applied treatments.

Table 2. Comparison of Bio-Power Treatments Averaged Across Herbicide Applications

Bio-Power Treatment	Bio-Power Rate	% Stunting July 22	Pea Yield Lbs / A	% Increase Compared to Plots With No Bio-Power
None	None	6.6	641.9	0
In-Furrow	1.0 pint/acre	5.7	672.1	4.5
Postemergence	1.0 pint/acre	8.0	697.4	8.0
	LSD (0.05)	3.4	63.5	

The results of this study suggest that both Dual Magnum and Sandea applied PRE had little effect on blackeye peas when applied at both the 1X and 2X rates, and that Bio-Power did not positively influence crop injury and yields when applied either in-furrow or POST. Additionally, when Sandea was applied POST in combination with either an in-furrow or POST-applied Bio-Power treatment, there was no beneficial reduction in crop injury or significant increases in crop yield. However, the data does suggest that Bio-Power can increase (though not significantly) blackeye peas yields when used as an in-furrow or postemergence treatment, and is more likely an appropriate fertilizer/plant enhancer than a potential tool for alleviating herbicide injury in blackeye peas.

Effects of Sandea and Basagran on Crop Injury and Yield in Dry Peas and Beans

Final Report

Objective: To evaluate the phytotoxicity of tank-mixed early postemergence (EPOST) applications of Sandea (halosulfuron) and Basagran (bentazon) for crop injury and yield in dry peas (*Vigna unguiculata* "Texas Pinkeye") and Mung beans (*Vigna radiata)*.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked, the entire site treated with Treflan (trifluralin) and beds shaped prior to initiation of the test. The trial was planted with peas and beans during the first week of June. The test site was fertilized, furrow-irrigated, and all pests controlled using standard grower practices. Herbicide treatments were EPOST-applied on June 27 using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (Table 1). The only weeds present within the test site were a few random deep-rooted perennial weeds; therefore no percent weed control ratings were evaluated. All plots measured 6.67' x 20' with 2 rows of peas or beans per plot. All plots were harvested by hand on August 23 from 5' sections within the plots and yields were adjusted for final analysis. The trials were conducted as randomized complete block designs with all treatments replicated four times. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for POST Treatments

Location	TAMU Res. & Ext. Center	**Wind speed / direction**	10 – 15 mph / S
Date	June 27, 2005	**Crop**	Mung beans, dry peas
Time of day	3:00 p.m.	**Variety**	Texas pinkeye,
Type of application	Broadcast	**Crop stage**	3 – 5 trifoliate
Carrier	Water	**Air temp. (^{o}F)**	93
Gas (if not CO_2)	CO_2	**Soil temp. (^{o}F)**	80
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Clear
Boom width (")	6.67'	**# Replications**	4
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: Significant crop injury was observed 2 weeks after treatment (WAT) in all plots containing Sandea applied EPOST (Table 2), regardless of the rate of tank-mixed Basagran. Higher rates of Basagran mixed with Sandea generally reduced crop stunting; however, stunting was still significantly higher when compared to Basagran applied alone. By 4 WAT stunting was greatly reduced, but still significant in several treatments. The mixing of Basagran (at rates of 0.25 lb a.i./A and higher) with Sandea did appear to assist in dry pea recovery from stunting when tank-mixes were compared to plots where Sandea was applied alone. It was also observed that plots treated with Sandea had a significant delay in flowering and pod set (Table 2) compared to all other plots; however, this effect did not negatively influence yields at harvest. Stunting and leaf chlorosis in dry beans (Table 3) was significantly less when compared to dry peas and generally averaged 13.8% or less. The one exception was where Sandea was mixed with the highest rate of Basagran (28.8% stunting). In general, as the rate of Basagran increased in the dry beans, so did crop stunting and leaf chlorosis, indicating that the dry beans were more sensitive to Basagran than Sandea in this study. Pod set was not influenced by either Sandea or Basagran and was 100% in all plots. Yields, however, were not taken in this study as it was determined later that treatment plots were inadvertently sprayed over several to many varieties of Mung beans. Based on the stunting and pod set data however, it is unlikely that yields would have been negatively affected regardless of Mung bean variety. More research is needed to determine the affects of these treatments on Mung bean yield and quality.

Table 2. Treatment Effects on Crop Injury and Yield of Dry Peas ("Texas Pinkeye")

Treatment	Product Rate / A	Timing	% Crop Stunting 2 WAT	% Crop Stunting 4 WAT	% Pod Set 4 WAT	Total Yield (lbs/A)
Treflan		PPI	0	0	100	1791.0
Treflan + Sandea + Basagran + NIS	0.032 0.125 0.25% V/V	PPI EPOST (2 –3 TRIF)	42.5	21.3	0	3077.5
Treflan + Sandea + Basagran + NIS	0.032 0.25 0.25% V/V	PPI EPOST (2 –3 TRIF)	55.0	13.8	0	3923.0
Treflan + Sandea + Basagran + NIS	0.032 0.50 0.25% V/V	PPI EPOST (2 –3 TRIF)	27.5	3.8	0	3103.0
Treflan + Sandea + Basagran + NIS	0.032 0.75 0.25% V/V	PPI EPOST (2 –3 TRIF)	33.8	10.0	0	2040.2
Treflan + Sandea + NIS	0.032 0.25% V/V	PPI EPOST (2 –3 TRIF)	56.3	20.0	1.3	2899.6
Treflan + Basagran + NIS	0.75 0.25% V/V	PPI EPOST (2 –3 TRIF)	10.0	2.5	96.3	1922.2
Treflan + Raptor + NIS	4.0 OZ PRODUCT 0.25% V/V	PPI EPOST (2 –3 TRIF)	18.8	0	100	2273.1
		LSD (0.05)	**15.4**	**11.4**	**4.1**	**1078.6**

Table 3. Treatment Effects on Crop Injury and Yield of Dry Beans

Treatment	Product Rate / A	Timing	% Crop Stunting 2 WAT	% Leaf Chlorosis 2 WAT	% Crop Stunting 4 WAT	% Pod Set 4 WAT
Treflan		PPI	0	0	0	100
Treflan + Sandea + Basagran + NIS	0.032 0.125 0.25% V/V	PPI EPOST (2 –3 TRIF)	6.3	7.5	0	100
Treflan + Sandea + Basagran + NIS	0.032 0.25 0.25% V/V	PPI EPOST (2 –3 TRIF)	7.5	8.8	0	100
Treflan + Sandea + Basagran + NIS	0.032 0.50 0.25% V/V	PPI EPOST (2 –3 TRIF)	13.8	12.5	2.5	100
Treflan + Sandea + Basagran + NIS	0.032 0.75 0.25% V/V	PPI EPOST (2 –3 TRIF)	28.8	16.3	7.5	100
Treflan + Sandea + NIS	0.032 0.25% V/V	PPI EPOST (2 –3 TRIF)	7.5	8.8	0	100
Treflan + Basagran + NIS	0.75 0.25% V/V	PPI EPOST (2 –3 TRIF)	3.8	3.8	0	100
Treflan + Raptor + NIS	4.0 OZ PRODUCT 0.25% V/V	PPI EPOST (2 –3 TRIF)	1.3	3.8	0	100
		LSD (0.05)	**9.3**	**6.1**	**5.0**	**0**

Herbicide Evaluation for Weed Control in Chile Peppers: 2004

Final Report

Objective: To determine the efficacy of selected preemergence (PRE) and postemergence (POST) herbicides on crop injury, weed control and yield of peppers grown on the High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center in Lubbock during the 2004 growing season. Chile peppers (Var. "Sonora") were seeded in the greenhouse on April 6 with PRE herbicide treatments applied prior to transplanting on May 21 into plots measuring 6.5' x 20'. Postemergence treatments were applied on June 9 (2-Week POST) or June 18 (4-Week POST) to corresponding plots. All plots were treated equally in regards to pest and fertility management. All treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi. The trial was conducted as an RCB design and treatments were replicated 4 times.

Results and Discussion: Weed pressure was extremely heavy due to excessive and timely rainfalls that occurred during the season. Early season crop injury was significant ($\alpha = 0.05$) only with PRE-applied Spartan 75WDG (Table 1), however, this injury decreased to 11.3% five weeks after transplanting. Control of Palmer amaranth (*Amaranthus palmeri*) was generally good to fair, early in the season though following the July 23 rating weed size and pressure increased causing excessive competition and poor crop growth. As a result, no peppers were harvested from this trial.

Table 1. Effect of Herbicide Treatments on Chile Pepper Injury and Control of Palmer Amaranth

Chemical	Rate / A	Timing	% Crop Injury 6/11	% Palmer Amaranth Control 6/11	% Crop Injury 6/30	% Palmer Amaranth Control 6/30	% Palmer Amaranth Control 7/23
Untreated			0	0	0	0	0
Handweed			0	99.0	0	99.0	99.0
Spartan 75WDG	0.18 lb ai	PRE	21.3	94.5	11.3	93.8	78.8
Spartan 75WDG + NIS	0.18 lb ai 0.25% v/v	4 WEEKS POST-DIRECT	0	70.0	0	80.0	53.8
Define 4SC	0.06 lb ai	PRE	0	68.8	0	63.8	12.5
Sandea 75WDG +NIS	0.5 oz 0.25% v/v	2 WEEKS POST	0	66.3	3.8	71.3	17.5
Sandea 75WDG +NIS	1.0 oz 0.25% v/v	2 WEEKS POST	0	70.0	0	87.5	62.5
Prefar 4E + Sandea 75WDG + NIS	5 quarts 0.5 oz 0.25% v/v	PRE 2 WEEKS POST	0	73.5	2.5	80.0	50.0
Command 3ME + Basagran 4L + NIS	2 pints 2 pints 0.25% v/v	PRE 4 WEEKS POST	0	88.8	0	58.8	12.5
		LSD (0.05)	**5.4**	**42.7**	**8.0**	**14.9**	**32.9**

Effects of Plastic Mulch Type on Tomato Vigor and Yield

Final Report

Objective: To evaluate and compare the potential effects of selected plastic mulch types or caged systems on fresh market tomatoes.

Materials and Methods: The trial was conducted during 2004 at the Carolyn Lanier Youth Farm operated by the South Plains Food Bank in Lubbock, TX. In early May soil at the trial site was disced and prepared for laying of the Black, Red and SRM Silver plastic mulches (Figure 1). Six-week old tomato seedlings (Var. "Celebrity") were transplanted in the field on May 22. Within one week caged tomatoes were covered with a Spun-web cloth material that allowed 85% sunlight transmission, and these remained covered for 6 weeks. Permanent sub-surface drip was used to irrigate and fertilize the tomato plants. All pest management control measures were conducted throughout the duration of the trial to ensure adequate crop growth. Crop vigor was recorded during mid-season growth and yields were harvested weekly beginning August 5 through September 30. The trial was designed as a randomized complete block with 5 treatments (Table 1) replicated 8 times. Individual plots measured 8'x 25' and contained 8 plants each.

Table 1. The Effects of Plastic Mulch Type and Caging on Tomato (Var. "Celebrity") Vigor and Yield

Treatment (Plastic Type)	Vigor[A] (7/03)	Vigor (7/27)	Marketable Yield (lbs/acre)	% Increase Compared to Control
Bare Ground (Control)	3.4	4.1	25,627	0
Caged (with Spun web)	4.0	4.6	50,536	49.3
Red	3.1	3.5	29,511	13.2
Black	3.8	4.0	29,834	14.2
SRM Silver	4.1	4.1	33,707	24.0
LSD (0.05)	**0.6**	**0.6**	**7,888**	

[A] Crop vigor (health) ranking: 1 = poor; 2 = fair; 3 = average; 4 = good; 5 = excellent.

Results and Discussion: Excellent growing conditions (rainfall and seasonal temperatures) occurred throughout the duration of the trial. Early (July 3) crop vigor was greatest in tomatoes grown on SRM silver mulch and in cages, though only significantly different (α= 0.05) from the bareground and red plastic mulch treatments (Table 2). By July 27 tomato growth in cages was superior to all others, but only signficantly better than those grown on red plastic film. Tomato yields were significantly higher when grown in cages compared to all other treatments (Table 1). This was likely due to a lower percentage of culls from caged treatments when compared to bare ground and plastic mulch treatments where the fruit would lay on the soil or plastic surfaces. When compared to the bare ground control, marketable yields from caged tomatoes increased 49%. Tomatoes grown on SRM Silver mulch significantly increased yields 24% compared to the bare ground treatment, while Red and Black mulches produced higher though non-significant increases. The results of this trial indicate that caged (plus Spun Web for 6 weeks) tomatoes were superior in crop vigor and marketable yields, followed by SRM Silver, Black and Red plastic mulches when compared to bare ground treatments. The results of this trial suggest that both the caged and SRM Silver plastic mulch are good options for smaller acreage farmers and home gardeners in the Texas High Plains region.

Note: Thanks to cooperators at the South Plains Food Bank for all of their support and assistance including Debbie Cline, Roy Riddle, Cedric Maupin and many of the G.R.U.B. youth participants.

Effects of Postemergence Herbicides on Crop Injury and Yield in Chile Peppers

Final Report

Objective: To evaluate phytotoxicity of postemergence (POST) and post-directed (P-DIRECT) applications of herbicides for crop injury and yield in chile peppers (*Capsicum annuum* var. "Anaheim").

Materials & Methods: The trial was conducted at the Texas Tech University Crops Research Farm located in Lubbock (Lubbock County). The trial site was located on an Amarillo clay loam soil with a pH of 8.1 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. Five-week old chile pepper plants, previously grown in a greenhouse, were transplanted (spacing = 30" in-row and 80" between rows) by hand on June 9. The entire test site was fertilized, drip-irrigated, and all pests controlled using standard grower practices. The test site was also previously treated with trifluralin (applied PPI) one week before transplanting, and all POST herbicide treatments (halosulfuron, V-10142, flumioxazin, trifloxysulfuron and pyrithiobac-Na) were applied on June 24 using a CO_2-charged backpack sprayer equipped with two flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded once following injury ratings (July 1 and July 10) to keep perennial weeds in check. Plots measured 3.3' x 25' with single rows and were replicated 4 times. Plants were harvested by hand on September 9, thirteen weeks after the herbicide treatments were applied. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for POST and P-DIRECT Treatments

Location	TTU Crops Res. Farm	**Wind speed / direction**	10 – 15 mph / S
Date	June 24, 2005	**Crop**	Chile peppers
Time of day	11:00 a.m.	**Variety**	Anaheim
Type of application	Broadcast/Directed	**Crop stage**	10 – 14", 8 – 10 leaves
Carrier	Water	**Air temp. (^oF)**	80
Gas (if not CO_2)	CO_2	**Soil temp. (^oF)**	75
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Semi-moist
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	3.3'	**# Replications**	4
Boom height (")	18 – 20"	**Sprayed by**	JCH / RWW
Weeds present: Silverleaf nightshade, cotton volunteers,			

Results and Discussion: Percent crop injury ratings were significantly higher one and three weeks after treatment (WAT) for treatments of pyrithiobac-Na and trifloxysulfuron (applied POST) when compared to the untreated plots (see Table 2). Crop injury was rated as stunting accompanied by general leaf chlorosis for both herbicides 1 WAT. However, by 3 WAT only stunting was visible in these plots. All other herbicide treatments and rates resulted in no crop stunting, leaf chlorosis or any other herbicide injury symptom during the course of this study. Pepper yields were highest in plots treated P-DIRECT with V-10142 at 0.1 and 0.2 lbs a.i./A as well with V-10142 applied POST at all rates. Less yields were found in plots treated with flumioxazin or combinations of flumioxazin + V-10142 applied P-DIRECT though these yields were generally not statistically lower compared to the untreated plots. The results indicate that V-10142 applied either P-DIRECT or POST is safe for use in chile pepper production in Texas. Trifloxysulfuron and pyrithiobac-Na caused early crop injury in the form of stunting and chlorosis, however, this did not result in significant yield losses compared to the untreated plots. Flumioxazin alone or combined with V-10142 tended to decrease yields (though not always significantly) when compared to V-10142 applied alone. Additional research is needed with V-10142 to determine weed control benefits and improved spray timings.

Table 2. Herbicide Effects on Crop Injury and Yield of Chile Peppers

Treatment	Product Rate lb ai / A	Timing	% Crop Injury 1 WAT	% Crop Injury 3 WAT	Yield (lbs/Plant)	Total Yield (lbs/A)
Untreated			0	0	3.77	39,409
Halosulfuron75 WDG**	0.048	P-DIRECT	0	0	3.49	36,507
V-10142 75WDG	0.1	P-DIRECT	0	0	4.07	42,515
V-10142 75WDG	0.2	P-DIRECT	0	0	4.05	42,300
V-10142 75WDG	0.3	P-DIRECT	0	0	3.29	34,401
Flumioxazin 51WDG	0.14	P-DIRECT	0	0	3.04	31,734
V-10142 75WDG + Flumioxazin 75WDG	0.1 0.14	P-DIRECT	0	0	3.27	34,202
V-10142 75WDG + Flumioxazin 75WDG	0.2 0.14	P-DIRECT	0	0	3.55	37,062
V-10142 75WDG + Flumioxazin 75WDG	0.3 0.14	P-DIRECT	0	0	3.47	36,246
Trifloxysulfuron 75WDG + NIS	0.15 0.25% v/v	POST	20.0	28.8	3.37	35,201
V-10142 75WDG + NIS	0.1 0.25% v/v	POST	0	2.5	3.90	40,784
V-10142 75WDG + NIS	0.2 0.25% v/v	POST	0	0	3.79	39,665
V-10142 75WDG + NIS	0.3 0.25% v/v	POST	0	0	3.95	41,255
Pyrithiobac-Na 85SP	0.0625	POST	17.5	18.8	3.39	35,399
Pyrithiobac-Na 85SP	0.125	POST	22.5	30.0	3.41	35,614
		LSD (0.05)	**3.9**	**5.9**	**0.61**	**6,368**

** Treatments applied with 1.0% COC v/v unless otherwise indicated.

Effects of Targa and Sandea Herbicides on Weed Control and Crop Injury in Tomatoes

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) and Sandea (halosulfuron) herbicides for weed control, crop injury and yield in tomatoes (*Lycopersicon lycopersicum* var. "Celebrity").

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Tomatoes were transplanted on April 28 (spacing = 30" in-row and 6.67' between rows) using a 1-row transplanter. The entire test site was fertilized, drip-irrigated, and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Tables 1 and 2). The test was conducted as a randomized complete block design with 4 replications. On May 31, a significant hail event occurred which caused severe damage to the tomato plants within the test area, and no further crop evaluations could be taken. Early crop injury and weed control ratings were recorded, and all data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST, P-DIRECT and PRE Treatments

Location	South Plains Food Bank	Wind speed / direction	10 – 15 mph / E
Date	May 14, 2005	Crop	Tomato
Time of day	10:00 a.m.	Variety	Celebrity
Type of application	Broadcast/Directed	Crop stage	10 – 12"
Carrier	Water	Air temp. (^oF)	73
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Dry
Nozzle tips	8002 EVS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear, Sunny
Boom width (")	6.67'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (1"), morning glory (cotyledon), careless weed (cotyledon – 2-lf)			

Table 2. Application Data for POST Treatments

Location	South Plains Food Bank	Wind speed / direction	0 – 5 mph / SW
Date	May 26, 2005	Crop	Tomato
Time of day	3:00 p.m.	Variety	Celebrity
Type of application	Broadcast	Crop stage	12 – 15"
Carrier	Water	Air temp. (^oF)	64
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Cloudy
Boom width (")	6.67'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	JCH
Weeds present: Lovegrass (2 – 3"), careless weed (2 – 5 leaves)			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 2 weeks after treatment (WAT) and showed that there was little to no stunting with Sandea + Targa tank mixes at any of the application rates (see Table 3). Control of Lovegrass (*Eragrostis* spp.) was excellent with all treatments applied except when Sandea was applied alone. Control of careless weed (*Amaranthus palmeri*) and morningglory (*Ipomoea* spp.) was 90% or better with all treatments. On June 7, approximately 2 weeks after the Targa alone applications (Treatments 3 – 7), control of Lovegrass was 94% or better (Table 4), while control of careless weed was good to excellent with all treatments. Morningglory control was variable and ranged from 49% to 99.0% regardless of application. The variability in control indicates that there was likely a very non-uniform population of morningglory in the field. Though no yield data could be presented, the results of this study indicate that applications of Targa and Sandea are safe on tomatoes when applied at rates of 12 oz/A or less either combined together or applied alone. More research is needed to determine the effects of these treatments on tomato yields.

Table 3. Herbicide Effects on Crop Injury and Weed Control in Transplanted Tomatoes

Trt #	Chemical	Product Rate / A	Timing	% Injury 2 WAT	% Love Grass 2 WAT	% Careless Weed 2 WAT	% Morning Glory 2 WAT
1	*Untreated*			0	0	0	0
2	*Handweed*			0	99.0	99.0	99.0
3	Broadleaf control + Targa + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	NA	NA	NA	NA
4	Broadleaf control + Targa + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	NA	NA	NA	NA
5	Broadleaf control + Targa + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	NA	NA	NA	NA
6	Broadleaf control + Select + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	NA	NA	NA	NA
7	Broadleaf control + Poast + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED POST	NA	NA	NA	NA
8	Targa + Sandea 75WDG + COC	6.0 OZ 0.67 OZ 1.0% V/V	POST	0	97.0	93.8	95.8
9	Targa + Sandea 75WDG + COC	8.0 OZ 0.67 OZ 1.0% V/V	POST	7.5	99.0	94.8	99.0
10	Targa + Sandea 75WDG + COC	12.0 OZ 0.67 OZ 1.0% V/V	POST	0	96.0	90.0	98.0
11	Sandea 75WDG + COC	0.67 OZ 1.0 V/V	POST	0	36.3	90.0	97.0
12	Dual Magnum 7.62E + Envoke 75WDG + NIS	1.33 PINTS 0.15 OZ 0.025% V/V	PRE POST-DIRECTED	0	96.0	98.0	98.0
			LSD (0.05)	**4.9**	**25.2**	**6.6**	**3.2**

Table 4. Herbicide Effects on Weed Control in Transplanted Tomatoes

Trt #	Chemical	Product Rate / A	Timing	% Love Grass June 7	% Careless Weed June 7	% Morning Glory June 7
1	*Untreated*			0	0	0
2	*Handweed*			99.0	98.0	93.0
3	Broadleaf control + Targa + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	99.0	96.0	49.5
4	Broadleaf control + Targa + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	94.5	92.5	99.0
5	Broadleaf control + Targa + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	98.0	93.7	92.0
6	Broadleaf control + Select + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED POST	99.0	95.0	89.3
7	Broadleaf control + Poast + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED POST	99.0	96.0	74.3
8	Targa + Sandea 75WDG + COC	6.0 OZ 0.67 OZ 1.0% V/V	POST	91.3	92.5	73.3
9	Targa + Sandea 75WDG + COC	8.0 OZ 0.67 OZ 1.0% V/V	POST	96.0	92.5	99.0
10	Targa + Sandea 75WDG + COC	12.0 OZ 0.67 OZ 1.0% V/V	POST	96.0	86.3	98.0
11	Sandea 75WDG + COC	0.67 OZ 1.0 V/V	POST	52.5	95.0	62.0
12	Dual Magnum 7.62E + Envoke 75WDG + NIS	1.33 PINTS 0.15 OZ 0.025% V/V	PRE POST-DIRECTED	93.5	98.0	98.0
			LSD (0.05)	**16.1**	**4.4**	**3.2**

Herbicide Effects on Crop Injury, Weed Control and Yield of Potatoes

Final Report

Objective: To evaluate the efficacy and phytotoxicity of selected herbicide treatments in potatoes (*Solanum tuberosum* var. "Red LaSoda").

Materials and Methods: The trial was conducted land owned by Springlake Potatoes in Springlake on sandy loam soils. The trial site was prepared according to standard grower practices by applying a pre-plant fertilizer, then disking and planting potatoes into 2-row plots. The potato seed pieces were planted in the field on March 28 in plots measuring 6' x 15'. Herbicide treatments were applied using a CO_2-backpack sprayer equipped with a hand-held boom containing four Teejet 8002VS nozzles that sprayed at a rate of 20 GPA at 35 PSI, and immediately watered in with overhead irrigation (1.5"). Application data can be found in Tables 1 and 2. The trial site was irrigated as needed, and plots maintained insect and disease-free by the grower. Potatoes were dug and harvested by hand on August 2. The experimental design was a randomized complete block with 4 replications. All data were subjected to analysis of variance and means were separated using the Least Significant Difference ($\alpha = 0.05$).

Table 1. Application Data for PRE Herbicide Treatments

Location	Springlake	Wind speed / direction	5 – 10 mph /SW
Date	April 18, 2005	Crop	Potatoes
Time of day	10:00 a.m.	Variety	Red LaSoda
Type of application	Broadcast	Crop stage	Seed / Ground crack
Carrier	Water	Air temp. (^oF)	65
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	57
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Partly cloudy
Boom width (")	6.5'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for EPOST Chemigated Herbicide Treatments

Location	Springlake	Wind speed / direction	5 – 10 mph /SE
Date	May 4, 2005	Crop	Potatoes
Time of day	10:00 a.m.	Variety	Red LaSoda
Type of application	Broadcast	Crop stage	2"
Carrier	Water	Air temp. (^oF)	48
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	48
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Overcast
Boom width (")	6.5'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: Crabgrass (< 1"); Wild Mustard (cotyledon)			

Results and Discussion: There was little to no crop injury observed in this trial with any of the herbicide treatments applied during this study (Tables 3 and 4), indicating that all herbicides and their timings of application are consider safe to potatoes. Control of Palmer amaranth (Amaranthus palmeri) was 91% or better for all herbicide treatments at both ratings and was not significant between treatments. However, control of wild mustard (Brassica kaber) was poor to

good with all herbicides applied, except where Prowl H_2O (pendimethalin) was applied, in which case control was 90% (excellent). Percent control of wild mustard later in the season was considered excellent, but may have been a factor of weed maturity and death, rather than herbicide response. Potato yields (Table 4) were not significantly different between herbicide treatments, however, the highest yields were found in plots treated with Define (flufenacet) and V-10146 (active ingredient =

unknown). Potatoes treated with Eptam (EPTC) herbicide averaged 12% higher yields than those left untreated. The results of this research indicate that all herbicides and their methods of application performed well in controlling careless weed and did not negatively influence potato yields.

Table 3. The Effect of Herbicide Treatments on Potatoes

Trt #	Product	Rate / A	Timing	% Crop Injury May 24	% Control Careless Weed May 24	% Control Mustard May 24
1	*Untreated*			0	0	0
2	Prowl 3.3H_2O	1.5 PINTS	PRE	0	92.3	90.0
3	Eptam 7E + Eptam	3.5 PINTS 2.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION CHEMIGATED 14 DAYS LATER	1.3	99.0	88.5
4	Eptam 7E + Eptam	3.5 PINTS 3.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION CHEMIGATED 14 DAYS LATER	5.0	99.0	61.3
5	Eptam 7E	4.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION	0	91.0	92.3
6	V-10146 3.3EC	7.7 OZ	PRE	0	99.0	74.8
7	Spartan 75WDG	3.0 OZ	PRE	3.8	99.0	74.8
8	Define 4SC	19.2 OZ	PRE	0	95.8	88.5
			LSD (0.05)	**5.0**	**6.9**	**21.1**

Table 4. The Effect of Herbicide Treatments on Crop Injury, Weed Control and Yield of Potatoes

Trt #	Product	Rate / A	Timing	% Crop Injury June 29	% Control Careless Weed June 29	% Control Mustard June 29	Total Yield Cwt/A
1	*Untreated*			0	0	0	231.4
2	Prowl 3.3H_2O + Matrix 25DF + NIS	1.5 PINTS 1.5 OZ 0.25% V/V	PRE EPOST	0	97.0	99.0	277.4
3	Eptam 7E + Eptam	3.5 PINTS 2.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION CHEMIGATED 14 DAYS LATER	0	99.0	98.0	260.6
4	Eptam 7E + Eptam	3.5 PINTS 3.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION CHEMIGATED 14 DAYS LATER	0	99.0	97.0	248.5
5	Eptam 7E	4.0 PINTS	CHEMIGATED @ GROUND CRACK FOLLOWING GLYPHOSATE APPLICATION	0	98.0	99.0	272.2
6	V-10146 3.3EC	7.7 OZ	PRE	0	99.0	97.0	288.0
7	Spartan 75WDG	3.0 OZ	PRE	0	99.0	98.0	265.4
8	Define 4SC	19.2 OZ	PRE	0	98.0	99.0	300.2
			LSD (0.05)	0	1.7	2.3	90.7

Effects of Targa Herbicide on Grass Control and Crop Injury in Cabbage

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in transplanted cabbage (*Brassica oleracea* var. *Capitata*, "Mammoth Red Rock").

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Four-week old cabbage plants, previously grown in a greenhouse were transplanted by hand (spacing = 15" in-row and 3.3' between rows) on April 6. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with two flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left undisturbed for spraying and evaluations. On May 31 the entire farm was hit by a hail storm which injured many of the plants within the test area. However, most plants recovered sufficiently to allow for ratings and yield analysis (harvesting). Cabbage heads were harvested by hand (5 harvests) as they matured throughout the test period. All data was subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0 – 5 mph / SW
Date	May 9, 2005	Crop	Cabbage
Time of day	10:30 a.m.	Variety	Mammoth Red Rock
Type of application	Broadcast	Crop stage	10 leaves, 6 – 8"
Carrier	Water	Air temp. (^oF)	82
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	60
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Dry
Nozzle tips	8002 EVS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (2 – 3")			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after treatment (WAT) and showed that there was no significant stunting with quizalofop at any application rate (see Table 2). Control of Lovegrass [*Eragrostis* spp.] was excellent with all herbicides and rates applied, and averaged over 95% for all treatments. Cabbage yields were somewhat variable due to the hailstorm; however there were no significant differences between quizalofop treatments. Yields averaged across quizalofop rates were higher compared to those of sethoxydim and clethodim in this test, and were significantly different from the hand weeded check. The results of this study indicate that quizalofop applications are safe on cabbage when applied at rates of 12 oz/A or less.

Table 2. Herbicide Effects on Crop Injury, Grass Control and Yield of Transplanted Cabbage

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	Total Yield (lbs/plot)	Head Weight (lbs)
Hand weed			0	0	9.9	1.34
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	22.4	1.47
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	1.3	97.0	18.4	1.47
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	1.3	97.0	24.7	1.55
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	2.5	97.0	15.5	1.25
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	2.5	95.8	13.9	1.47
		LSD (0.05)	**3.9**	**3.5**	**9.1**	**0.25**

Effects of Targa Herbicide on Grass Control and Crop Injury in Carrots

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in carrots (*Daucus carota* var. "Chanteney Red Core")

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Carrots were seeded using a single-row Earthway seeder on April 7 into plots measuring 3.33' x 25', with 3 rows of carrots per plot. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied twice using a CO_2-charged backpack sprayer equipped with two flat fan nozzles that delivered 20 GPA at 35 PSI (see Tables 1 and 2). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left for spraying and evaluations. On May 31 the entire test site was hit by a hail storm which injured many of the plants within the test area. However, all plants recovered sufficiently to allow for crop injury and weed control ratings and yield analysis (harvesting). Additionally, during the last week of June the test area received over 10" or rain and the field remained flooded for 4 – 5 days. Carrots were harvested by hand on October 13 by using a 5' subsection from each main plot. The test was conducted as a randomized complete block design with all treatments replicated four times. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0
Date	May 9, 2005	Crop	Carrots
Time of day	10:30 a.m.	Variety	Chanteney Red Core
Type of application	Broadcast	Crop stage	2 – 3 leaves
Carrier	Water	Air temp. (^{o}F)	82
Gas (if not CO_2)	CO_2	Soil temp. (^{o}F)	60
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Dry
Nozzle tips	8002 EVS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (cotyledon), Sandbur (cotyledon)			

Table 2. Application Data for Secomd POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0
Date	June 13, 2005	Crop	Carrots
Time of day	1:30 p.m.	Variety	Chanteney Red Core
Type of application	Broadcast	Crop stage	2 – 3 leaves
Carrier	Water	Air temp. (^{o}F)	92
Gas (if not CO_2)	CO_2	Soil temp. (^{o}F)	70
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (4"), Sandbur (4")			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after treatment (WAT) and showed that there was no significant stunting with quizalofop at any application rate (Table 3). Quizalofop was applied twice in this trial and no injury from any herbicide was observed during the duration of this test. Control of grasses (Lovegrass [*Eragrostis* spp.] and sandbur [*Cenchrus* spp.]) was excellent with all herbicides and rates applied, and averaged over 98% for all treatments. Carrot yields were low, and could have been influenced by the hail storm on May 31, and the 10" of rainfall and flooding that occurred in late June. The lowest yields were found in the untreated plots where weeds competed with the slow growing carrots, and highest yields were found in clethodim or sethoxydim plots. The results of this study indicate that applications of quizalofop were safest on carrots when applied at rates of 6.0 and 8.0 oz/A. Though not significant, there was a trend for decreasing carrot yields as the rate of quizalofop increased from 6.0 oz to 12.0 oz/A. This could be a result of potential phytotoxicity from quizalofop treatments at the 12.0 oz rate and thus more research is needed to determine whether this effect is real.

Table 3. Herbicide Effects on Crop Injury, Grass Control and Yield of Carrots

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	Total Yield (lbs/A)
Hand weed			0	0	9,072
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	36,954
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	33,291
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	98.0	22,009
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	98.0	37,759
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	99.0	39,067
		LSD (0.05)	**0**	**1.8**	**20,937**

Effects of Targa Herbicide on Grass Control and Crop Injury in Celery

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in celery (*Apium graveolens* var. *dulce* "UC52/70R")

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Ten-week old celery plants, previously grown in a greenhouse were transplanted by hand (spacing = 12" in-row and 3.3' between rows) on April 28. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with two flat fan nozzles that delivered 20 GPA at 35 PSI (see Tables 1 and 2). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left for spraying and evaluations. On May 31 the entire test site was hit by a hail storm which injured many of the plants within the test area. However, all plants recovered sufficiently to allow for crop injury and weed control ratings and yield analysis (harvesting). Due to heat stress from continual high temperatures, the celery plants did not grow to quality size; and 10 plants were harvested by hand on August 4 and combined for yield evaluations. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for First POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0 – 5 mph / SW
Date	May 26, 2005	Crop	Celery
Time of day	3:00 p.m.	Variety	UC52/70R
Type of application	Broadcast	Crop stage	4 – 7 leaves
Carrier	Water	Air temp. (^oF)	64
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Moist
Nozzle tips	8002 EVS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Cloudy
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	JCH
Weeds present: Lovegrass (2 – 3")			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after treatment (WAT) and showed that there was significant stunting with quizalofop at the highest (12.0 oz/A) application rate (see Table 2). However, this crop injury was less than 12%. Control of grasses (Lovegrass [*Eragrostis* spp.] and sandbur [*Cenchrus* spp.]) was excellent with all herbicides and rates applied, and averaged over 95% for all treatments. Celery yields were very low, and this response could have been influenced by the hail storm on May 31, or more likely a result of the high temperatures during the test period. Yields of quizalofop (high rate only), and sethoxydim or clethodim were significantly higher from those in the hand weeded check, and the highest yields were found with quizalofop applied at 12.0 oz/A. The lowest yields were found in the untreated plots where weeds competed with the slow growing celery crop. The results of this study indicate that applications of quizalofop are safe on celery when applied at all rates investigated.

Table 2. Herbicide Effects on Crop Injury, Grass Control and Yield of Celery

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	Total Yield (lbs/plot)
Hand weed			0	0	0.73
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	95.8	1.85
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	6.3	97.0	2.87
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	11.3	99.0	4.24
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	1.3	97.0	4.11
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	3.8	97.0	3.71
		LSD (0.05)	**7.4**	**3.8**	**2.93**

Effects of Targa Herbicide on Grass Control and Crop Injury in Onions

Final Report

Objective: To evaluate the efficacy and phytotoxicity of postemergence (POST) applications of Targa (quizalofop) herbicide for grass control and crop injury in transplanted onions (*Allium cepa* var. "Candy").

Materials & Methods: The trial was conducted at the Carolyn Lanier Youth Farm, which is supported by the South Plains Food Bank in Lubbock, Lubbock County. The farm is located on a sandy loam soil with a pH of 6.5 and 0.6% organic matter. The trial site was chisel-plowed and disked prior to initiation of the test. Five-week old onion sets, previously grown in a greenhouse were transplanted by hand (spacing = 6" in-row and 3.3' between rows) on April 7. The entire test site was fertilized, irrigated (drip), and all pests controlled using standard grower practices for the farm. All herbicide treatments were applied using a CO_2-charged backpack sprayer equipped with two flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded to keep broadleaf weeds in check, and grass weeds were left for spraying and evaluations. On May 31 the entire test site was hit by a hail storm which injured most of the plants within the test area. However, all plants recovered sufficiently to allow for crop and weed ratings and yield analysis (harvesting). Onion bulbs were harvested by hand, counted and weighed on July 15. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for POST Treatment

Location	South Plains Food Bank	Wind speed / direction	0 mph
Date	May 9, 2005	Crop	Transplanted onions
Time of day	10:30 a.m.	Variety	Candy
Type of application	Broadcast	Crop stage	5 – 6 leaves, 8 – 10" tall
Carrier	Water	Air temp. (^{o}F)	82
Gas (if not CO_2)	CO_2	Soil temp. (^{o}F)	60
GPA	20	Soil beneath	Moist
PSI	35	Soil surface	Dry
Nozzle tips	8002 EVS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	3'	# Replications	4
Boom height (")	18 – 20"	Sprayed by	RWW
Weeds present: Lovegrass (2 – 3"), Sandbur (2 – 3")			

Results and Discussion: Crop injury related to herbicide treatments was evaluated 3 weeks after treatment (WAT) and showed that there was no sign of crop injury or stunting with quizalofop or any other herbicide treatment (see Table 2). Control of grasses (Lovegrass [*Eragrostis* spp.] and sandbur [*Cenchrus* spp.]) was excellent with all herbicides and rates applied, and averaged 99% for all treatments. Analysis of onion yields showed that there were significantly fewer bulbs in the untreated plots compared to most other sprayed treatments. The highest crop yields were found in plots treated with quizalofop at 12.0 oz/A followed by the two other lower rates. A similar trend was observed when bulb weights were evaluated, though differences were not significant. The results of this study indicate that two applications of quizalofop are safe on transplanted onions when applied at rates of 12 oz/A or less.

Table 2. Herbicide Effects on Crop Injury, Grass Control and Yield of Transplanted Onions

Treatment	Product Rate / A	Timing	% Crop Injury 3 WAT	% Grass Control 3 WAT	No. of Bulbs /plot	Total Yield (lbs/plot)	Ave. Bulb Wt. (oz)
Hand weed			0	0	60.3	14.1	3.81
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	78.3	21.2	4.32
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	79.8	22.2	4.35
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	81.5	24.9	5.02
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	99.0	73.5	17.3	3.79
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	99.0	74.5	19.6	4.17
		LSD (0.05)	**0**	**0**	**17.4**	**7.1**	**1.57**

Evaluation of Selected Herbicide Treatments for Crop Injury in Onions

Final Report

Objective: To evaluate the effect of pre-transplant incorporated (PPI) and/or postemergence (POST) herbicide applications on onion crop injury.

Materials & Methods: The trial was conducted on land at K.F. Thiel's & Sons located in Lubbock during the 2004-growing season. The trial site was plowed and the soil disced and prepared prior to onion transplanting. All standard grower practices to ensure high onion yields were followed during the testing period. All PPI and POST treatments were applied using a CO_2-charged backpack sprayer equipped with either a single nozzle (in-furrow treatments only) or four hollow cone nozzles that delivered 20 GPA at 35 psi. PPI herbicide treatments were applied prior to transplanting. POST treatments were applied on July 3 to corresponding plots. The test site was treated uniformly in regards to insect and disease control and fertility management throughout the season. Peas were harvested on September 4. The experimental design was a RCBD with 3 replications. All data was subjected to ANOVA using SAS statistical procedures and means were separated according to LSD at the 5% level.

Table 1. Application Data for PPI and PRE-applied Herbicides

Location	K.F. Thiel's	Wind speed / direction	25 MPH / S
Date	3/26/04	Crop	Onions
Time of day	2:30 p.m.	Variety	
Type of application	PRE/PPI	Crop stage	
Carrier	Water	Air temp. (^oF)	86
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	70
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Partly cloudy
Boom width (")	6.7'	# Replications	3
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for POST Treatments

Location	K.F. Thiel's	Wind speed / direction	5 – 15 MPH / S
Date	May 12, 2004	Crop	
Time of day	7:30 a.m.	Variety	
Type of application	Broadcast	Crop stage	4 – 5 leaves
Carrier	Water	Air temp. (^oF)	68
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	67
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Moist
Nozzle tips	8002VS	% Relative humidity	High
Nozzle spacing	18"	Sky conditions	Partly cloudy
Boom width (")	6.7'	# Replications	3
Boom Height (")	18"	Spayed by	RWW
Weeds present: Palmer amaranth (2-6"), Lakeweed (4-8")			

Results: Early herbicide injury from PPI treatments was greatest with V-10146. Crop injury in Prowl plus either Caparol or Valor (0.094) was likely the result of crossover injury from one plot of V-10146, which transfer into adjacent plots. Mid-season crop injury continued to be highest in plots treated PRE with V-10146, where most plants were dead. Crop injury from POST applications was significant and 40% or higher where Callisto, Caparol and V-10146 were applied. However, moderate though still significantly different crop injury was seen with POST applications of Raptor, Dinamic and Valor (0.063 + NIS) or Valor (0.094). Safe PPI treatments included Define, Prowl (grower standard), Dual Magnum and Outlook, while safe POST treatments included Goal, Valor (0.063 w/o NIS), Spartan and Starane. More research is needed to determine the potential for those herbicides where safety is good to moderate in onions.

Table 1. The Effect of Herbicide Treatments on Onion Crop Injury

Product	**Rate (lbs ai / A)**	**Timing**	**% Crop Injury May 5**	**% Crop Injury May 21**
Untreated			0	0
Handweed			0	0
Define 4SC	0.6	PPI	5.0	0
Prowl 3.3EC	0.62	PPI	0	0
Dual Magnum 7.62E	0.65	PPI	5.0	3.3
Outlook 6E	0.5	PPI	5.0	0
V-10146 3.3EC	0.2	PPI	60.0	95.0
Prowl 3.3EC + Valor 51WDG	0.62 0.063	PPI POST	0	3.3
Prowl 3.3EC + Valor 51WDG	0.62 0.094	PPI POST	10.0	18.3
Prowl 3.3EC + Valor 51WDG + NIS**	0.62 0.063 + 0.25% v/v	PPI POST	0	21.7
Prowl 3.3EC + Goal 2XL**	0.62 0.25	PPI POST	0	8.3
Prowl 3.3EC + Raptor 1AS**	0.62 0.032	PPI POST	0	33.3
Prowl 3.3EC + Caparol 4L**	0.62 1.0	PPI POST	26.7	41.7
Prowl 3.3EC + Callisto 4SC**	0.62 0.094	PPI POST	0	85.0
Prowl 3.3EC + Dinamic 70WG**	0.62 0.0565	PPI POST	0	25.0
Prowl 3.3EC + Starane 1.5EC	0.62 0.094	PPI POST	0	13.3
Prowl 3.3EC + V-10146 3.3EC6**	0.62 0.1	PPI POST	0	41.7
Prowl 3.3EC + Spartan 75WDG**	0.62 0.075	PPI POST	0	13.3
		LSD (0.05)	**13.4**	**14.7**

Crop Tolerance and Weed Control of Selected Herbicides on Sweet Corn

Final Report

Objective: To evaluate the effects of selected herbicide programs on four sweet corn varieties.

Materials & Methods: The trial was conducted at the Texas A & M University Agricultural Research & Extension Center located in Lubbock during the 2004 growing season. The soil on the site was an Acuff clay loam with an average pH of 7.6 and 1.1% organic matter. The trial site was plowed in the previous fall and the soil disced and prepared the following spring. A pre-plant fertilizer (80 lbs/A nitrogen) was applied prior to discing, listing of furrows and planting. Four varieties of sweet corn were planted on April 26 using a 2-row Monosem Vacuum Planter with rows spaced on 40" centers and each plot contained 4 rows (1 row per variety). Eradicane (PPI) treatments were sprayed and incorporated immediately after application. All treatments were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 20 GPA at 35 psi (see Tables 1 –3). PRE herbicide treatments were applied immediately following planting. POST treatments were applied on June 2 to corresponding plots. Approximatley 3 weeks following the POST applications, fertilizer (60 lbs N/A) was broadcast and cultivated in for all four varieties. The test site was treated uniformly in regards to insect and disease control and fertility management throughout the season. All data was subjected to ANOVA using SAS statistical procedures and means were separated according to the Least Significant Difference at the 5% level.

Table 1. Application Data for PPI-applied Herbicides

Location	Lubbock	Wind speed / direction	10 MPH NE
Date	April 26, 2004	Crop	Sweet corn
Time of day	10:30 a.m.	Variety	All 4
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	71
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	60
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 2. Application Data for PRE Treatments

Location	Lubbock	Wind speed / direction	5 – 10 MPH / SW
Date	April 27, 2004	Crop	Sweet Corn
Time of day	8:00 a.m.	Variety	All 4
Type of application	Broadcast	Crop stage	Seed
Carrier	Water	Air temp. (^oF)	65
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	60
GPA	20	Soil beneath	Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderate
Nozzle spacing	18"	Sky conditions	Clear
Boom width (")	6.7'	# Replications	4
Boom height (")	18"	Sprayed by	RWW
Weeds present: None			

Table 3. Application data for POST treatments

Location	Lubbock	Wind speed / direction	5 – 10 MPH / S
Date	June 2, 2004	Crop	Sweet Corn
Time of day	9:30 a.m.	Variety	All 4
Type of application	Broadcast	Crop stage	8 – 10”
Carrier	Water	Air temp. (^oF)	80
Gas (if not CO_2)	CO_2	Soil temp. (^oF)	74
GPA	20	Soil beneath	Semi-Moist
PSI	30	Soil surface	Dry
Nozzle tips	8002VS	% Relative humidity	Moderate
Nozzle spacing	18”	Sky conditions	Overcast
Boom width (“)	6.7’	# Replications	4
Boom height (“)	18”	Sprayed by	RWW
Weeds present: None			

Results and Discussion: Although four sweet corn varieties were tested in this trial (“Bojangles”, “Honey & Cream”, “Sugar Buns” and “Ambrosia”) data is shown only for Bojangles and Ambrosia due to poor growth performance of the other two varieties (Tables 4 & 5). Poor growth was not related to herbicide function, but rather was a result of growing conditions for those particular varieties at this location. The plant populations for both of the reported sweet corn varieties did not differ significantly when compared between any of the herbicide treatments indicating that no herbicide program reduced population establishment. Percent crop injury was greatest in both varieties though only 10 – 12.5% with PRE applications of V-10146, however, 10% stunting was observed with Eradicane and Guardsman Max with “Bojangles”. This level of crop injury is considered tolerable for sweet corn production. Control of Palmer amaranth (*Amaranthus palmeri*) was 90% or better in plots treated with Eradicane (PPI) + Sandea (POST-DIRECT), Dual Magnum (PRE), Prowl H20 (PRE) + Callisto (POST), and Balance (PRE). While other herbicide treatments did not perform as well, excessive rainfall during the growing season may have caused some chemical leaching, thus influencing herbicide performance during 2004. The number of sweet corn ears harvested per acre did not differ for any of the herbicide treatments regardless of variiety, except where Prowl (PRE) + Aim (POST) was sprayed in the variety “Ambrosia” where ear numbers were significantly higher compared to the untreated control. Finally, sweet corn yields for both varieties did not differ significantly between any of the herbicide treatments except where V-10146 was applied. The active ingredient for this herbicide is unknown at this time however, it is apparent that it would likely not be acceptable for use in sweet corn at this rate and formulation. The results of this trial indicate that the majority of weed control programs tested were acceptable for tolerance to all four sweet corn varieties, however, more research is needed to determine whether the level of weed control can be improved under different growing conditions.

Table 4. Effect of Weed Control Programs in Sweet Corn (var. Ambrosia)

Trt #	Product	Rate / A	Timing	# Plants/A	% Crop Injury 5/26	% Palmer Amaranth Control 7/09	# Ears/A 7/12	Yield lbs/A 7/12
1	*Untreated*			20911	0	0	19604	14115
2	*Handweed ***			22054	0	0	20911	13216
3	Eradicane 6.7E	4.75 PINTS	PPI	20094	2.5	85.0	22708	15177
4	Eradicane 6.7E	5.25 PINTS	PPI	21728	6.3	56.3	22054	14638
5	Eradicane 6.7E	7.33 PINTS	PPI	21891	1.3	80.0	22218	15030
6	Eradicane 6.7E + Sandea 75WDG + NIS	5.25 PINTS 0.67 0Z 0.25% V/V	PPI POST-DIR POST-DIR	23035	0	93.8	22381	15046
7	Dual Magnum	1.5 PINTS	PRE	19767	0	90.0	21401	14850
8	TK-45201 70G	3.0 OZ	PRE	20911	0	78.8	21564	14817
9	Prowl 3.3$H_2$0 + Aim 2EC + NIS	3 PINTS 1.0 OZ 0.25% V/V	PRE POST POST	23688	6.3	76.25	23852	15536
10	Prowl 3.3$H_2$0 Callisto 4SC + COC	3 PINTS 3.0 OZ 1.0% V/V	PRE POST POST	21074	0	95.0	22708	15683
11	Define 4SC	19.2 OZ	PRE	21728		75.0	23198	15781
12	Guardsman Max	3.5 PINTS	PRE	24342	7.5	87.5	22055	13510
13	Callisto 4SC	6.0 OZ	PRE	21074	0	77.5	21728	14899
14	Balance 75WDG	1.25 OZ	PRE	21074	2.5	91.0	20911	13870
15	V-10146	7.7 OZ	PRE	21565	12.5	83.8	19277	11485
			LSD (0.05)	**3507**	**7.7**	**23.4**	**4002**	**2142**

Table 5. Effect of Weed Control Programs in Sweet Corn (var. Bojangles)

Trt #	Product	Rate / A	Timing	# Plants/A	% Crop Injury 5/26	% Palmer Amaranth Control 7/09	# Ears/A 7/09	Yield lbs/A 7/09
1	*Untreated*			22054	0	0	20911	12530
2	*Handweed ** *			22381	0	0	21074	12612
3	Eradicane 6.7E	4.75 PINTS	PPI	21074	1.3	85.0	20421	12661
4	Eradicane 6.7E	5.25 PINTS	PPI	20584	10.0	56.3	20257	12481
5	Eradicane 6.7E	7.33 PINTS	PPI	20748	1.3	80.0	21565	12220
6	Eradicane 6.7E + Sandea 75WDG + NIS	5.25 PINTS 0.67 0Z 0.25% V/V	PPI POST-DIR POST-DIR	22381	0	93.8	21401	13102
7	Dual Magnum	1.5 PINTS	PRE	23688	0	90.0	21891	12579
8	TK-45201 70G	3.0 OZ	PRE	21238	2.5	78.8	20258	12301
9	Prowl 3.3$H_2$0 + Aim 2EC + NIS	3 PINTS 1.0 OZ 0.25% V/V	PRE POST POST	22218	6.3	76.25	22381	12628
10	Prowl 3.3$H_2$0 Callisto 4SC + COC	3 PINTS 3.0 OZ 1.0% V/V	PRE POST POST	22545	0	95.0	22054	13461
11	Define 4SC	19.2 OZ	PRE	23688	2.5	75.0	21074	12841
12	Guardsman Max	3.5 PINTS	PRE	22218	10.0	87.5	21564	12612
13	Callisto 4SC	6.0 OZ	PRE	21238	0	77.5	21401	13037
14	Balance 75WDG	1.25 OZ	PRE	23035	6.3	91.0	22544	12939
15	V-10146	7.7 OZ	PRE	22381	10.0	83.8	17480	8962
			LSD (0.05)	**3372**	**8.6**	**23.4**	**3781**	**2358**

Effects of Targa Herbicide on Crop Injury and Yield in Sunflowers

Final Report

Objective: To evaluate phytotoxicity of postemergence (POST) applications of Targa (quizalofop) for crop injury and yield in sunflowers (*Helianthus annuus* var. "Triumph").

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to initiation of the test. The trial was planted with sunflowers on April 11. The entire test site was fertilized, furrow-irrigated, and all pests controlled using standard grower practices. POST herbicide treatments were applied on June 6 using a CO_2-charged backpack sprayer equipped with four flat fan nozzles that delivered 20 GPA at 35 PSI (see Table 1). All plots were hand weeded several times to remove any broadleaf weeds present in the test area. No grasses were present in the test area; therefore no grass control ratings were recorded. Ten mature sunflower heads were harvested by hand on August 3 and yields were totaled for final analysis. All treatments were replicated four times and data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Application Data for POST Treatments

Location	TAMU Res. & Ext. Center	**Wind speed / direction**	10 – 15 mph / S
Date	June 6, 2005	**Crop**	Sunflower
Time of day	2:00 p.m.	**Variety**	Triumph
Type of application	Broadcast	**Crop stage**	10 – 12"
Carrier	Water	**Air temp. (^{o}F)**	81
Gas (if not CO_2)	CO_2	**Soil temp. (^{o}F)**	70
GPA	20	**Soil beneath**	Moist
PSI	35	**Soil surface**	Dry
Nozzle tips	8002 EVS	**% Relative humidity**	Moderate
Nozzle spacing	18"	**Sky conditions**	Partly cloudy
Boom width (")	6.67'	**# Replications**	4
Boom height (")	18 – 20"	**Sprayed by**	RWW
Weeds present: None			

Results and Discussion: There was no crop injury observed with any treatment in this study when evaluated four weeks after treatment (WAT) for any of the herbicides when compared to the untreated plots (see Table 2). Average yield of ten sunflower heads were significantly different only when comparing untreated (lowest) to sethoxydim treatments (highest). Yields of sunflowers treated with quizalofop were not significantly different compared to any herbicide treatment. Similarly, average head weight of the sunflowers was not significantly different between any herbicide treatments within the study indicating that the significant yield reduction in the untreated plots was likely the cause of some other factor. Results of this study indicate that quizalofop is safe on sunflowers when applied at rates of 12.0 oz/A or less.

Table 2. Treatment Effects on Crop Injury and Yield of Sunflowers

Treatment	Product Rate / A	Timing	% Crop Injury 4 WAT	Total Yield (lbs/plot)	Ave. Head Wt. (lbs)
Hand weed			0	9.2	0.91
Quizalofop + COC	6.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	11.1	1.12
Quizalofop + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	10.5	1.05
Quizalofop + COC	12.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	9.7	0.97
Clethodim + COC	8.0 OZ 1.0% V/V	EPOST AS-NEEDED	0	9.8	0.99
Sethoxydim + COC	2.0 PINTS 1.0% v/v	EPOST AS-NEEDED	0	12.0	1.20
		LSD (0.05)	**0**	**2.6**	**0.26**

Effect of Planting Time Following Sandea Application on Injury to Selected Crops

Final Report

Objective: To evaluate whether planting selected crops at 30 day intervals following Sandea applications will result in phytotoxicity to crops when grown on the Texas High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked, and beds shaped prior to initiation of the test. The entire site was injected with 80 lbs of nitrogen (N) using 80-0-0 fertilizer on March 22. Sandea (halosulfuron) herbicide was applied on April 8 at 0, 0.032 and 0.048 lbs a.i./A to plots measuring 16 rows x 15'. The herbicide was applied using a CO_2-charged backpack sprayer equipped with a 4-nozzle boom that delivered 20 GPA at 35 PSI. All insects and diseases were controlled throughout the season as-needed using the appropriate pesticides. Escaped weeds were removed by hand or sprayed with glyphosate prior to planting the crops throughout the season. The entire site was left undisturbed until just prior to planting when the field was cultivated to prepare the soil beds for planting. All crops were seeded by hand using a single row Earthway seeder, or with a 2-row Monosem vacuum planter at 30 day intervals during the season. Crops were planted individually into one of the 16 rows for each plot during this test and included potatoes, snap beans, dry beans, chili peppers, leaf lettuce, onions, cabbage (kale), carrots, cucumbers, pumpkins, muskmelons (cantaloupes), watermelons, wheat, sorghum, cotton and corn. The trials were conducted as split-plot design with planting date as the main block, and herbicide treatments blocked and randomized with four replications. Percent crop injury ratings were recorded approximately 3 – 4 weeks following planting.

Results and Discussion: Crops which had little (5% or less) to no significant visual injury (generalized stunting of emerged plants) throughout the 180 day test period included potatoes, snap beans, dry beans, cucumber, pumpkins, muskmelons, watermelons and cotton (Table 1). Crop injury in chili peppers was greater than 25% only when the crop was planted at 120 days after Sandea application. Lettuce, onions, kale, carrots, wheat, sorghum and corn showed typical rate responses with increased crop injury as the rate of Sandea increased from 0.032 to 0.048 lbs a.i./A. In general, lettuce, onions and kale were most susceptible to crop injury, especially from 90 to 150 days after application, and crop injury increased as the rate of Sandea increased. Wheat, sorghum and corn had greater injury when planted 90 days after Sandea application when compared to all other timings.

The results of this study demonstrate that vegetable crops such as lettuce, onions, kale, and carrots are susceptible to stunting from Sandea when it is applied 60 to 150 days prior to planting. Agronomic crops that may be used in a rotation sequence with crops where Sandea was applied that showed some sensitivity include wheat and sorghum. In general, it appeared from the data that there likely is some movement of Sandea down the soil profile during a typical growing season, and that this may influence crop stunting and injury when selected vegetable or agronomic crops are planted within 120 – 150 days following application. Although little to no crop injury was observed with all crops planted at 180 days following Sandea application, seasonal changes prohibiting adequate crop growth prohibit the crops from growing further into the soil profile. It is not known if under better growing conditions (such as further south) if significant crop injury would be visible. It is likely however, that crops planted the following spring would have little to no potential for crop injury. This test suggests that the residual nature of Sandea may be temperature and moisture dependent as the greatest injury occurred during the period of higher temperatures, however, temperatures and rainfall during the growing season at the Research Center were typical. More research may be needed in other growing areas to determine whether crop responses are similar to Sandea following applications when planted within 120 – 150 days.

Table 1. Effect of Sandea Rate and Planting Date on Injury to Selected Crops

Crop	Sandea Rate (lbs a.i.)	Planting Time (Days After Spraying Sandea)						
		30	60	90	120	150	180	Average By Crop
			---------------------- % Crop Injury --------------------					
Potatoes	0		0	0	0	0	0	**0**
	0.032		2.5	0	0	0	0	**0.5**
	0.048		3.8	3.8	0	0	0	**1.5**
Snap Beans	0	0	0	0	0	0	0	**0**
	0.032	0	1.3	0	0	0	0	**0.3**
	0.048	0	0	2.5	0	0	0	**0.5**
Dry Beans	0		0	0	0	0	0	**0**
	0.032		0	0	0	0	0	**0**
	0.048		0	0	0	0	0	**0**
Chili Peppers	0		0	0	0	0	0	**0**
	0.032		0	0	6.3	0	0	**1.3**
	0.048		0	0	27.5	0	0	**5.5**
Lettuce	0		NA	0	0	0	0	**0**
	0.032		NA	3.8	35.0	0	0	**7.8**
	0.048		NA	15.0	97.0	12.5	6.3	**26.2**
Onions	0		NA	0	0	0	0	**0**
	0.032		NA	0	77.5	2.5	0	**16.0**
	0.048		NA	0	97.0	10.0	0	**21.4**
Cabbage/Kale	0		NA	0	0	0	0	**0**
	0.032		NA	7.5	23.8	5.0	0	**7.3**
	0.048		NA	22.5	71.3	18.8	0	**22.5**
Carrots	0		NA	NA	0	0	0	**0**
	0.032		NA	NA	5.0	21.3	0	**5.3**
	0.048		NA	NA	20.0	42.5	0	**12.5**
Cucumbers	0		0	0	0	NA	0	**0**
	0.032		0	0	0	NA	0	**0**
	0.048		0	0	0	NA	0	**0**
Pumpkins	0		0	0	0	NA	0	**0**
	0.032		0	0	0	NA	0	**0**
	0.048		0	0	0	NA	0	**0**
Muskmelons	0		NA	0	0	NA	0	**0**
	0.032		NA	0	0	NA	0	**0**
	0.048		NA	0	0	NA	0	**0**
Watermelons	0		0	0	0	NA	0	**0**
	0.032		0	0	0	NA	0	**0**
	0.048		0	0	0	NA	0	**0**
Wheat	0		NA	0	0	0	0	**0**
	0.032		NA	18.8	11.3	0	0	**6.0**
	0.048		NA	43.8	22.5	0	0	**13.3**
Sorghum	0		0	0	0	0	0	**0**
	0.032		6.3	6.3	1.3	0	0	**2.8**
	0.048		13.8	32.5	16.3	0	0	**12.5**
Cotton	0		0	0	0	0	0	**0**
	0.032		0	0	0	0	0	**0**
	0.048		2.5	5.0	5.0	0	0	**2.5**
Corn	0		0	0	0	0	0	**0**
	0.032		0	10.0	0	0	0	**2.0**
	0.048		0	23.8	7.5	0	0	**6.3**
	Average by Planting Date		**0.6**	**4.1**	**10.9**	**2.3**	**0.1**	**3.6**

NA = Data not available (crops either did not emerge or had other types of significant damage).

Effect of Dual Magnum and Ro-Neet Applications on Canna Lily Growth and Nutsedge Control

Final Report

Objective: To evaluate the effects of Dual Magnum 7.62E and/or Ro-Neet 6-E rates on canna lily injury and control of yellow and purple nutsedge.

Method: The trial was conducted at the Texas A & M Agricultural Research & Extension Center greenhouse. Canna rhizomes (variety "Red President") were planted November 12, 2003 in 1-gallon pots filled with a sandy loam soil obtained from a field owned by Agri-Gold, Inc., of Olton. Rhizomes containing at least 2 – 3 reproductive eyes were planted 2" deep along with 3 tubers each of yellow and purple nutsedge, planted 3" deep. Dual Magnum was applied at rates of 2, 4 and 6 pints/A preemergence (PRE) and PRE + early postemergence (EPOST). Ro-Neet (4 and 8 pints/A) was applied to the soil surface and incorporated 3" into the soil (PPI) prior to planting the canna rhizomes and nutsedge tubers. All pots were fertilized and watered as needed. EPOST treatments were applied approximately 2 weeks after emergence (December 24). Each treatment was replicated 5 times. Crop height was measured twice at 5 weeks after planting (WAT) and again at harvest. Percent yellow and purple nutsedge control and foliage and rhizome fresh-weights were recorded at harvest (March 27, 2004). All data was analyzed using ANOVA and means separated according to the least significant difference at the 5% level.

Results and Discussion: Control of yellow nutsedge was 91% or better with all Dual Magnum treatments, and was not significantly different from all other treatments. Purple nutsedge control was generally lower with Dual Magnum and the Ro-Neet treatments, and was considered poor with Dual Magnum applied PRE at 2.0 and 4.0 pints, and Ro-Neet applied PPI at 4.0 pints. The highest rate of Dual Magnum (6.0 pints) or Dual Magnum applied twice at 2.0 or 4.0 pints gave excellent control of purple nutsedge.

Canna lily height was significantly influenced by herbicide rate and timing of the applications. In general, as the rate of a single application of Dual Magnum increased, canna height decreased. However, by harvest time most Dual Magnum treatments were not significantly different from each other, except for those plants treated with 4.0 pints twice. Ro-Neet also caused significant early stunting when applied at 8.0 pints/A, however, by harvest these plants were the tallest. Similar trends occurred with foliar and rhizome fresh-weights. As the rate of Dual Magnum increased, the foliar and rhizome weights decreased, however, the application of Dual Magnum at 2.0 pints applied PRE and EPOST did not significantly reduce rhizome yields. This indicates that this treatment has potential for use in the field for controlling yellow and purple nutsedge.

The best treatment based on the results of this trial for controlling both yellow and purple nutsedge, and considering crop safety to cannas was Dual Magnum applied at 2.0 pints/A both PRE and EPOST (6 weeks later).

Table 1. Effect of Dual Magnum and Ro-Neet on Yellow and Purple Nutsedge Control

Treatment	Rate / A	Timing	% Control Yellow Nutsedge	% Control Purple Nutsedge
Untreated			0.0 b	0.0 d
Dual Magnum	2.0 PINTS	PRE	92.6 a	46.0 c
Dual Magnum	4.0 PINTS	PRE	91.6 a	78.0 b
Dual Magnum	6.0 PINTS	PRE	99.0 a	97.2 ab
Dual Magnum + Dual Magnum	2 PINTS + 2 PINTS	PRE + EPOST	98.2 a	94.6 ab
Dual Magnum + Dual Magnum	4 PINTS + 4 PINTS	PRE + EPOST	99.0 a	99.0 a
Ro-Neet	4 PINTS	PPI	86.6 a	40.0 c
Ro-Neet	8 PINTS	PPI	96.6 a	97.4 ab
Ro-Neet	4 PINTS + PINTS	PPI EPOST	90.8 a	86.0 ab

Table 2. Effect of Dual Magnum and Ro-Neet Treatments on Canna Crop Growth

Treatment	Rate / A	Timing	Height (inches)* 12/19/03	Height (inches) 3/27/04	Foliage Weight (gms/plant)**	Rhizome Weight (gms/plant)
Untreated			14.5 a	21.2 ab	86.4 ab	166.4 a
Dual Magnum	2.0 PINTS	PRE	16.6 a	21.3 ab	111.6 a	158.4 ab
Dual Magnum	4.0 PINTS	PRE	9.0 abc	20.4 ab	75.2 abc	138.4 ab
Dual Magnum	6.0 PINTS	PRE	5.0 bc	18.4 bc	67.2 bc	120.8 abc
Dual Magnum + Dual Magnum	2 PINTS + 2 PINTS	PRE + EPOST	12.3 abc	19.5 abc	83.2 ab	148.4 ab
Dual Magnum + Dual Magnum	4 PINTS + 4 PINTS	PRE + EPOST	3.7 c	15.5 c	40.0 c	80.0 c
Ro-Neet	4 PINTS	PPI	13.4 ab	20.5 ab	97.2 ab	124.8 abc
Ro-Neet	8 PINTS	PPI	3.4 c	22.4 a	111.6 a	113.6 bc
Ro-Neet	4 PINTS + PINTS	PPI EPOST	11.3 abc	21.5 ab	105.6 a	118.8 bc

* Means within columns followed by the same letter are not significantly different at the 5% level.
** Harvested on 3/27/04.

Effects of Fertility Treatments on Crop Growth and Yield in Watermelons and Bell Peppers

Final Report

Objective: To evaluate the growth and yield potential of transplanted watermelons (*Citrullus lanatus* var. "Sugar Baby") and bell peppers (*Capsicum annuum* var. "California Wonder 300") grown under selected fertility treatments.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked, and beds shaped prior to initiation of the test. The entire site was injected with 80 lbs of nitrogen (N) using 80-0-0 fertilizer on April 23 and treated with Sandea (halosulfuron) herbicide applied pre-transplant on May 12. All transplants were grown in a greenhouse located at the research center. Peppers were seeded on March 31 and watermelons on April 13. At seeding, granular humate (Entex Energy) was mixed in the soil media at recommended rates for evaluation. The peppers and watermelons were transplanted on May 18 and 25, respectively. The test site was drip-irrigated, and all pests controlled using standard grower practices. Plots measured 6.67' x 30' with a single row of peppers (14 plants) or watermelons (7 plants) per plot. Treatments were applied by hand by mixing fertilizer with 1.0 liter of water and drenching the area around the root zone. Individual treatments for bell peppers can be seen in Table 1. All data was recorded with visual ratings or measured by counting dead or living plants (bell peppers). All plots were harvested at least twice by hand and yields were adjusted for final analysis. All pests, including weeds were control as-needed using appropriate pesticides or hand weeding. The trials were conducted as randomized complete block designs with four replications. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Table 1. Fertilizer Treatments and Dates of Application Used in Bell Peppers

Nitrogen Rate (lbs N/Acre)	Source	Timing	Bell Pepper Dates of Application
80 + 20 + 20 +	(80-0-0) (45-0-0) (45-0-0)	Preplant 4 WAT 8 WAT	March 22 June 15 July 6
80	(80-0-0)	Preplant	March 22
80 + 60	(80-0-0) Nitamin 30L	Preplant 4 WAT	March 22 June 15
80 + 20 + 20 + 20	(80-0-0) Nitamin 30L Nitamin 30L Nitamin 30L	Preplant 4 WAT 8 WAT 12 WAT	March 22 June 15 July 6 August 3
80 + Humate + 20 + 20 + 20	(80-0-0) Entex Energy (45-0-0) (45-0-0) (45-0-0)	Preplant 1/3 Tsp at seeding 4 WAT 8 WAT 12 WAT	March 22 March 31 June 15 July 6 August 3
80 + Humate (1/3 Tsp) + Humate (1 Tbs) + 20 + 20 + 20	(80-0-0) Entex Energy Entex Energy (45-0-0) (45-0-0) (45-0-0)	Preplant 1/3 Tsp at seeding + 1 Tbs at transplanting 4 WAT 8 WAT 12 WAT	March 22 March 31 May 18 June 15 July 6 August 3

Results and Discussion: Early vigor and growth rankings for peppers (Table 2) were not significantly different between any Fertility Programs (FP) except when comparing FP4 (lowest) to FP5 (highest). A similar trend continued when vigor and growth were ranked on August 19, though FP5 was significantly higher than both FP3 and FP6. Visual rankings were likely influenced by the number of healthy plants found within each FP as higher vigor ranking were generally associated with higher numbers of healthy plants. Total yields of peppers harvested by FP indicated that most programs were not significantly different from each other except when FP5 is compared to FP4. Although not significant, yield/plant was highest in FP4, and this may have been a result of less competition from other plants (lower plant population) within the plot rather than a fertility effect. Overall, better growth and yields would likely have occurred under an improved delivery system where fertilizers were delivered through the drip system rather than drenched in at the base of the plant. Future research should include evaluations under better delivery systems for the treatments under drip irrigation.

Table 2. Effects of Fertility Programs on Crop Vigor, Plant Number and Yield of Bell Peppers

Nitrogen Rate (lbs N/Acre)	Source	Timing	Vigor Rank[#] July 12	Vigor Rank August 19	No. of Healthy Plants	Total Yield (lbs/plot)	Yield per Plant (lbs)
Fertility Program 1 80 + 20 + 20 +	 (80-0-0) (45-0-0) (45-0-0)	 Preplant 4 WAT 8 WAT	3.69	4.00	7.0	25.4	4.19
Fertility Program 2 80	 (80-0-0)	 Preplant	4.00	4.25	7.3	27.9	3.83
Fertility Program 3 80 + 60	 (80-0-0) Nitamin 30L	 Preplant 4 WAT	3.81	3.88	7.0	27.3	3.92
Fertility Program 4 80 + 20 + 20 + 20	 (80-0-0) Nitamin 30L Nitamin 30L Nitamin 30L	 Preplant 4 WAT 8 WAT 12 WAT	3.25	3.25	5.0	20.6	4.22
Fertility Program 5 80 + Humate + 20 + 20 + 20	 (80-0-0) Entex Energy (45-0-0) (45-0-0) (45-0-0)	 Preplant 1/3 Tsp at seeding 4 WAT 8 WAT 12 WAT	4.06	4.75	9.3	30.1	3.31
Fertility Program 6 80 + Humate (1/3 Tsp) + Humate (1 Tbs) + 20 + 20 + 20	 (80-0-0) Entex Energy Entex Energy (45-0-0) (45-0-0) (45-0-0)	 Preplant 1/3 Tsp at seeding + 1 Tbs at transplanting 4 WAT 8 WAT 12 WAT	3.69	3.87	8.0	25.7	3.26
		LSD (0.05)	**0.56**	**0.78**	**2.9**	**8.2**	**1.34**

[#]Vigor growth ranking = 1 (dead), 2 (poor), 3 (fair), 4 (good), 5 (excellent)

In watermelons, early vine growth (Table 3) was not significantly different between FP treatments, though growth was highest in FP5 and least in FP1 (control). Growth was 27.3% higher in FP5 when compared to the control. Plant vigor rankings also were not significantly different between programs, and the highest crop vigor rating was found in FP6. However, high crop vigor ranking did not correlate to higher crop yields in this test. Total watermelon yields/A, and the average weight of each fruit were not significantly different from each other, but yields were highest when plants were sprayed with Max-In Vines or when humate was applied in the transplant soil media. Two applications of Max-In Vines or humate did not improve watermelon yields, and in fact, those FP's had the two lowest yields in this study. More research is needed to better understand the effects of humate and Max-In Vines on watermelon growth and yield in West Texas.

Table 3. Effects of Fertility Programs on Crop Vigor, Plant Number and Yield of Bell Peppers

Nitrogen Rate (lbs N/Acre)	Source	Timing	Dates of Application	Vine Length June 20 (cm)	Vigor Rank July 12	Total Yield (lbs/A)	Yield per Fruit (lbs)
Fertility Program 1							
80 + 20	(80-0-0) (45-0-0)	Preplant 4 WAT	March 22 June 15	68.2	4.50	47,872	7.09
Fertility Program 2							
80 + Max-In Vine	(80-0-0) Agriliance	Preplant Sprayed 6" Runners	March 22 June 15	82.0	3.75	52,348	7.37
Fertility Program 3							
80 + Max-In Vine + Max-In Vine	(80-0-0) Agriliance Agriliance	Preplant Sprayed 6" Runners Sprayed 14 Days later	March 22 June 15 June 28	75.8	4.00	41,825	7.05
Fertility Program 4							
80 + 20	(80-0-0) Nitamin 30L	Preplant 4 WAT	March 22 June 15	74.7	4.25	46,869	6.89
Fertility Program 5							
80 + Humate + 20	(80-0-0) Entex Energy (45-0-0)	Preplant 1/3 Tsp at seeding 4 WAT	March 22 April 22 June 15	93.7	4.12	50,082	7.53
Fertility Program 6							
80 + Humate (1/3 Tsp) + Humate (1 Tbs) + 20	(80-0-0) Entex Energy Entex Energy (45-0-0)	Preplant 1/3 Tsp at seeding + 1 Tbs at transplanting 4 WAT	March 22 April 22 May 25 June 15	84.9	4.62	43,740	7.20
			LSD (0.05)	**29.6**	**1.01**	**12,922**	**1.31**
Vigor growth ranking = 1 (dead), 2 (poor), 3 (fair), 4 (good), 5 (excellent)							

Effects of Nitamin 30L Fertilizer on Crop Growth and Yield in Cantaloupes

Final Report

Objective: To evaluate selected rates and timing of Nitamin 30L applications on crop growth and yield in cantaloupes (*Cucumis melo* var. "Jumbo Hales Best").

Materials & Methods: The trial was conducted at the Texas Tech University Crops Research Farm located in Lubbock (Lubbock County). The trial site was located on an Amarillo clay loam (47% sand, 20% silt, and 33% clay) soil with a pH of 8.1, 0.9% organic matter and CEC of 16.5. The field was chisel-plowed, disked and beds shaped prior test initiation. Prior to planting, soil core samples (6 – 8" depth) were taken from 3 locations in the field and combined for soil nutrient analysis (A & L Plains Agricultural Laboratories, Lubbock, TX). The soil analysis indicated that there was approximately 8.0 lbs NO_3/A in the soil during April 2005. The test area was treated with Prefar 4E herbicide, incorporated to a depth of 3" – 4" several days prior to planting. Plots were also hand weeded as-needed during the season to reduce competition from weeds. The test was planted on June 9 with a 2-row Monosem vacuum planter (only 1 row used for seeding) at a seeding rate of 5" -6" in-row and 16.67' between rows. Each plot contained a single row of cantaloupes and measured 16.67' x 25'. After emergence counts were recorded on June 24, plants were thinned to 10 plants/plot for a final in-row distance of 30". During the growing season the test site was drip-irrigated, and all diseases and insects controlled using standard grower practices. Nitamin 30L was applied by hand into open drenches that were placed 4" to the side and 4" down by the seed row using a CO_2-charged backpack sprayer equipped with an open nozzle at 15 PSI (this gave a delivery rate of 1.0 gallon Nitamin 30L in 56 seconds). Initial Nitamin 30L applications occurred on June 9 (at seeding), and depending on treatments, were followed by split applications on June 30 (2 – 4 leaf stage) and July 11 (just before vine run). For a list of treatments, see Table 1. During the season, crop vigor and greenness ratings were recorded on June 30, July 10 and August 4. Cantaloupes were hand harvested beginning on August 25 and were picked approximately every 3 – 5 days for a total of 7 harvests. The experimental design was a randomized complete block 4 replications. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Results and Discussion: In general, plots where no nitrogen (N) was applied did not show distinct signs of N deficiency, although only 8 lbs of available N were found in soil samples (6 – 8" depth) taken prior to planting. Further soil analysis at the 3' depth later in the season, showed even less N availability (1 – 2 lbs). It is unclear why the non-fertilized cantaloupes did not show significant signs of N deficiency and resultant yield losses in this study.

Though not always significant, several general trends did exist in this trial with the fertilizer treatments. Emergence of cantaloupe seedlings was not significantly influenced by Nitamin 30L or broadcast urea application rates and averaged 54.6 plants/plot prior to thinning (Table 1). By June 30, early plant vigor was not different between treatments with the exception of Trt. 8 (Nitamin 30L @ 80 lbs N, 40 + 20 + 20) when compared to Trt. 1 (broadcast urea @ 80 lbs N), indicating a possible quicker uptake of N with Nitamin 30L compared to urea at that N rate. Average Nitamin 30L vigor ranking (7.7) was 15.5% higher when compared to average vigor with pre-plant broadcast urea (6.5). This effect may have been the result of the N placement within plots, or increased and quicker N uptake with Nitamin 30L, as it was placed closer to the seeding row than broadcast urea. Where urea was broadcast at the 80 lbs N (Trt. 1) there was significantly less leaf greenness observed on July 10 when compared to the other plots, except

Trt. 3 (control, no N applied). Leaf greenness in plots treated with Nitamin 30L averaged 4.87 compared to broadcast urea (4.15), also 15% higher. Crop vigor rated on July 10 showed that Trt. 7 (Nitamin 30L @ 40 lbs N, 20 + 10 + 10) and Trt. 8 had significantly higher vigor compared to Trt. 3 and Trt. 1. By August 4, three weeks prior to the first harvest, crop vigor in the control and Trt. 9 (Nitamin 30L @ 120 lbs N, 60 + 30 + 30) were significantly less when compared to Trt. 2 (pre-plant broadcast urea @ 120 lbs N), Trt. 5 (Nitamin 30L @ 80 lbs N, at seeding) and Trt. 6 (Nitamin 30L @ 120 lbs N, at seeding). Finally, crop vigor ratings from fertilizer treatments applied at seeding were on average 10% higher compared to where split applications where used.

Melons were harvested seven times during the course of the trial and showed several trends with yields between treatments. In general, statistical analysis of the total number of melons harvested/plot (Table 2, Figure 1) followed closely to the total weight of melons by treatment. Significant differences between the number of melons harvested by treatment occurred only the third, fourth and fifth harvests, but not during early or late pickings (Table 1). The number of melons harvested by fertilizer treatment tended to be higher when Nitamin 30L was split-applied at 40 or 80 lbs N compared to when it was applied at seeding (Figure 1). When applied at 120 lbs N, Nitamin 30L (split-applied) caused a 23.7% and 32.3% reduction in melon numbers compared to Nitamin 30L applied at seeding or broadcast urea, respectively. Split applications of Nitamin 30L (40 and 80 lbs N) gave an average 11.7% more fruit/plot compared to Nitamin 30L treatments when applied at seeding. By the end of the harvest period, total number of melons harvested showed no significant differences, but were 38% lower in Trt. 9 compared to highest treatment (Trt. 8, Nitamin 30L @ 80 lbs N, 40 + 20 + 20).

Cumulative yields by fertilizer treatment during the season can be seen in Figure 2. Early yields by weight (Table 3) recorded during the first 2 harvests showed no significant differences between fertilizer treatments, and yield response was highly variable, ranging from 31.5 to 75.7 lbs/plot (August 25) and 48.5 to 83.7 (August 30). However, by the mid-season harvests (September 2 – 8), yield data showed significant differences between treatments, though only Trt. 9 (Nitamin 30L @120 lbs N, 60 + 30 + 30) had consistently lower yields when compared to other treatments. No significant differences were observed between treatments for the two later harvests (September 13 and 16), though yields in Trt. 9 continued to remain somewhat low. In the analysis of the final total weights of cantaloupe, significant differences were found only for melons in fertility Trt. 9, and were likely the result of lower numbers of melons and lower plant vigor ratings as previously discussed. Yields in Trt. 9 (Figure 3) were 41 and 40% lower by comparison to yields in Trt.'s 2 and 8 (the highest yielding treatments), respectively. Yields in plots treated with Trt. 6, Nitamin 30L at 120 lbs N (single application at seeding) were only 3 and 7% lower (not significant) when compared to yields where Nitamin 30L was applied at 40 and 80 lbs N (at seeding), respectively. Regardless of method and timing of Nitamin 30L applications, higher average yields were found in plots fertilized with 80 lbs N, and were 6.6% and 24.4% higher compared to 40 and 120 lbs N, respectively. However, Nitamin 30L (80 lbs N, 40 + 20 + 20) gave the second highest yields in this study (behind 120 lbs N, broadcast urea), and the highest yields for any Nitamin 30L treatment.

Finally, the average weight of melons (Table 4, Figure 4) by treatment was significantly higher only in Trt. 2 when compared to Trt.'s 1 and 9. All other comparisons were non-significant. Melons in Trt.'s 1 and 9 weighed an average 14.2% less when compared to Trt. 2. Melon size, combined with the numbers of melons by treatment was likely an important determining factor in overall yields in this study. In general, the results of this study demonstrate that Nitamin 30L is an effective source of N for cantaloupes and that split applications at 40 and 80 lbs N may improve yields compared to up-front applications at seeding. Nitamin 30L, split-applied at 120 lbs N, was likely phytotoxic to plants. Finally, while broadcast urea (120 lbs N) had the highest yield in this study, Nitamin 30L, split-applied at 80 lbs N had very similar yields, and likely created significant N cost savings in this study. More research is needed to increase our understanding of the benefits of Nitamin 30L in cantaloupe production.

Table 1. Effect of Nitamin 30L Rates and Timings of Application on Cantaloupe Emergence, Vigor and Leaf Greenness

Test #	Treatment	Timing of Applications	Crop Emergence (# plants/plot)	Vigor June 30	Leaf Greenness July 10	Vigor July 10	Vigor August 4	Leaf Greenness August 4
1	*Standard* *45-0-0 (80 lbs)*	Preplant incorporated	53.8	6.0	3.5	7.0	8.3	5.0
2	*Standard* *45-0-0 (120 lbs)*	Preplant incorporated	56.0	7.0	4.8	8.8	9.8	5.0
3	*0*		52.0	7.0	4.0	7.0	7.3	4.3
4	*Nitamin 40 lbs*	At seeding (4” down and to the side)	55.8	7.5	4.8	8.0	8.0	4.9
5	*Nitamin 80 lbs*	At seeding (4” down and to the side)	54.8	7.8	5.0	8.3	9.5	4.9
6	*Nitamin 120 lbs*	At seeding (4” down and to the side)	51.3	7.0	4.8	8.0	9.9	5.0
7	*Split Application* *20 +* *10 +* *10*	At seeding + 2 – 4 leaf stage + Just before vine-run (4” down and to the side)	55.5	7.8	4.8	9.0	9.0	5.0
8	*Split Application* *40 +* *20 +* *20*	At seeding + 2 – 4 leaf stage + Just before vine-run (4” down and to the side)	61.3	8.3	5.0	9.3	8.9	5.0
9	*Split Application* *60 +* *30 +* *30*	At seeding + 2 – 4 leaf stage + Just before vine-run (4” down and to the side)	51.0	7.8	4.8	8.0	7.0	4.9
		LSD (0.05)	**12.3**	**1.9**	**1.0**	**1.8**	**2.2**	**0.5**
		Mean	**54.6**	**7.3**	**4.6**	**8.1**	**8.6**	**4.8**

Vigor Ranking = 1 (dead), 3 (poor), 5 (fair), 7 (good), and 10 (excellent growth).

Leaf Greenness Ranking = 1 (100% leaf chlorosis), 3 (50% leaf chlorosis), 5 (0% leaf chlorosis or all leaves are dark green in color)

Table 2. Effect of Nitamin 30L Rates and Timings of Application on Numbers of Melons at Harvest

Test #	Treatment	Timing of Applications	August 25	August 30	September 2	September 5	September 8	September 13	September 16	Total No. of Melons
			---------- No. Melons/plot ----------							
1	*Standard 45-0-0 (80 lbs)*	Preplant incorporated	11.8	12.5	4.3	8.0	7.0	13.8	4.0	61.3
2	*Standard 45-0-0 (120 lbs)*	Preplant incorporated	16.8	16.8	8.0	3.5	4.3	12.3	5.3	66.8
3	*0*		17.3	14.8	4.3	7.3	6.3	8.0	6.0	63.8
4	*Nitamin 40 lbs*	At seeding (4" down and to the side)	14.0	13.0	8.0	6.0	4.5	11.0	3.8	57.8
5	*Nitamin 80 lbs*	At seeding (4" down and to the side)	11.8	18.5	9.0	7.0	2.5	8.8	7.0	64.5
6	*Nitamin 120 lbs*	At seeding (4" down and to the side)	8.0	16.3	8.5	5.3	4.3	13.8	3.3	59.3
7	*Split Application 20 + 10 + 10*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	20.0	15.3	8.0	3.8	2.3	12.0	4.5	65.8
8	*Split Application 40 + 20 + 20*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	19.0	12.5	8.3	10.3	4.5	11.3	7.0	72.8
9	*Split Application 60 + 30 + 30*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	12.5	12.0	4.0	2.3	3.0	7.0	4.5	45.3
		LSD (0.05)	**11.5**	**8.7**	**4.3**	**5.0**	**4.5**	**7.5**	**5.3**	**28.0**
		Mean	**14.6**	**14.6**	**6.9**	**5.9**	**4.3**	**10.9**	**5.0**	**61.9**

Figure 1. Comparison of Application Methods for Nitrogen in Cantaloupes (Fruit No.)

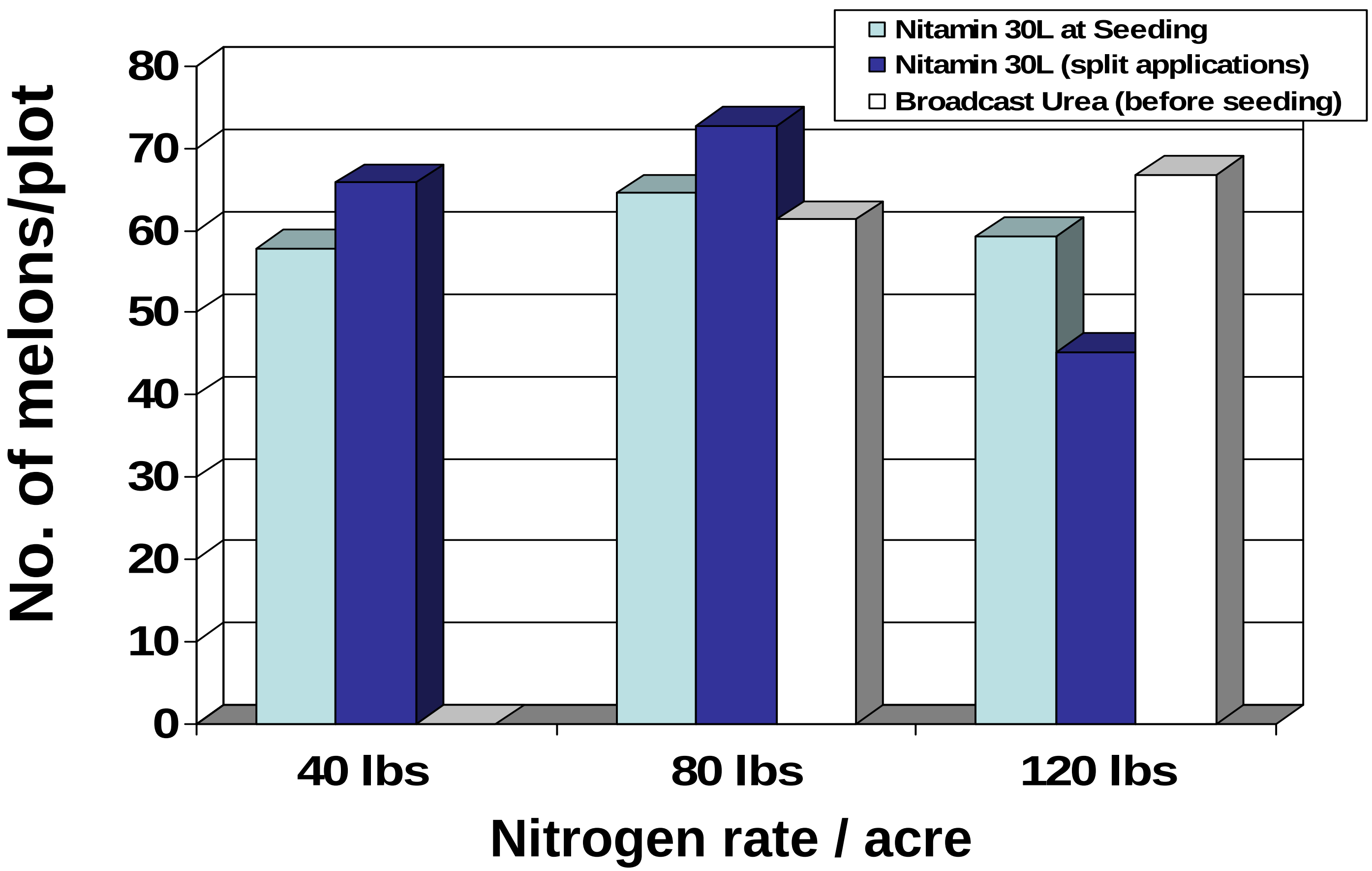


Table 3. Effect of Nitamin 30L Rates and Timings of Application on Weight of Melons at Harvest

Test #	Treatment	Timing of Applications	August 25	August 30	September 2	September 5	September 8	September 13	September 16	Total Weight
			---------- Lbs/plot ----------							
1	*Standard 45-0-0 (80 lbs)*	Preplant incorporated	45.7	55.4	20.2	33.1	32.6	51.4	14.3	252.6
2	*Standard 45-0-0 (120 lbs)*	Preplant incorporated	69.5	83.7	39.0	16.3	21.6	53.1	20.5	303.6
3	*0*		58.5	60.9	18.5	29.1	37.1	30.2	23.3	257.5
4	*Nitamin 40 lbs*	At seeding (4" down and to the side)	53.9	52.9	36.3	23.0	20.9	45.3	15.6	248.0
5	*Nitamin 80 lbs*	At seeding (4" down and to the side)	40.6	80.5	38.8	29.5	14.4	33.3	24.1	261.2
6	*Nitamin 120 lbs*	At seeding (4" down and to the side)	31.6	71.8	37.5	21.3	17.1	51.0	11.8	242.1
7	*Split Application 20 + 10 + 10*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	75.7	70.7	32.9	16.9	9.5	51.8	16.0	273.4
8	*Split Application 40 + 20 + 20*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	72.9	59.9	34.4	42.3	20.6	40.9	26.1	297.0
9	*Split Application 60 + 30 + 30*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	44.9	48.5	18.1	8.0	14.0	27.6	15.9	179.9
		LSD (0.05)	**51.7**	**40.9**	**18.0**	**20.8**	**22.6**	**30.5**	**18.7**	**123.2**
		Mean	**54.8**	**64.9**	**30.6**	**24.4**	**20.8**	**42.7**	**18.6**	**257.3**

Figure 2. Cumulative Yields by Fertility Treatment

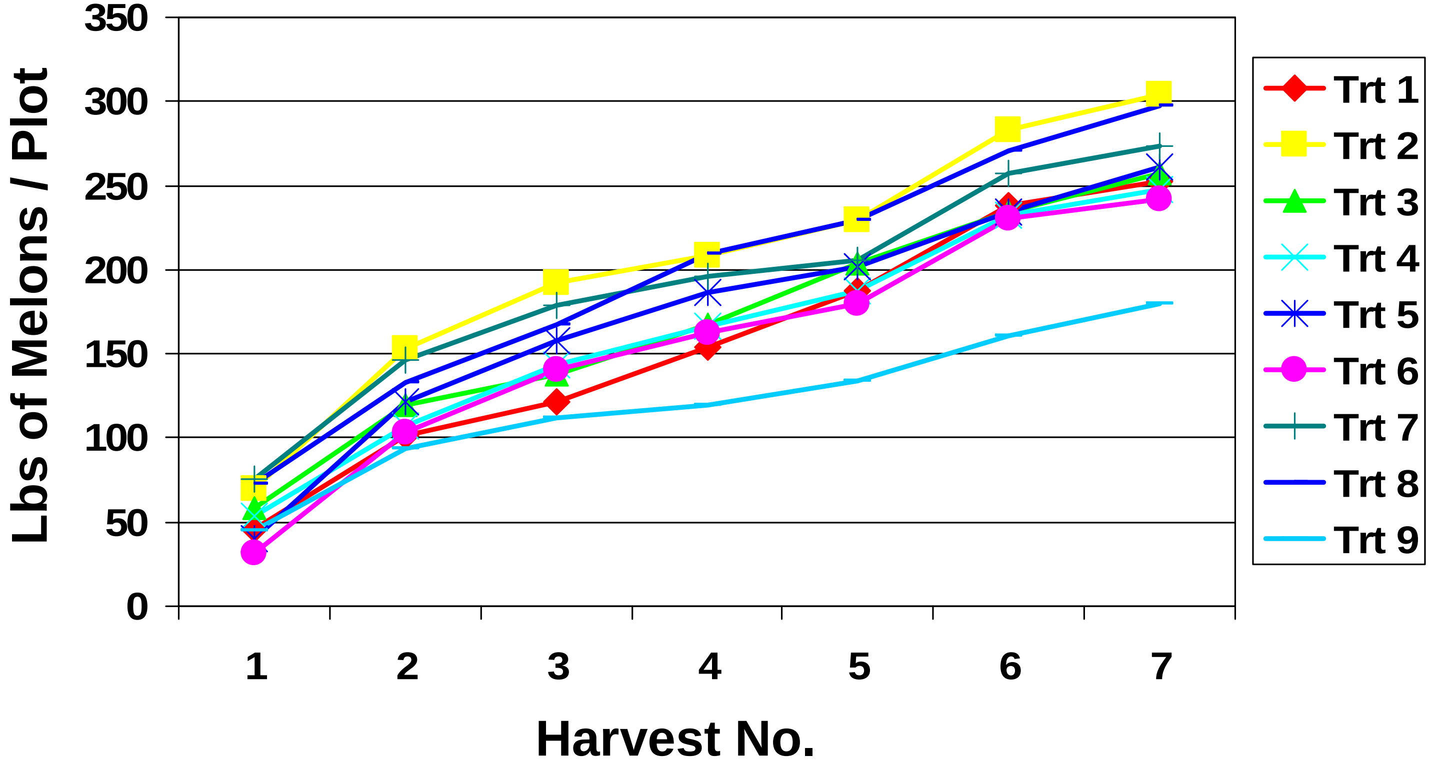


Figure 3. Comparison of Application Methods for Nitrogen in Cantaloupes (Total Weight)

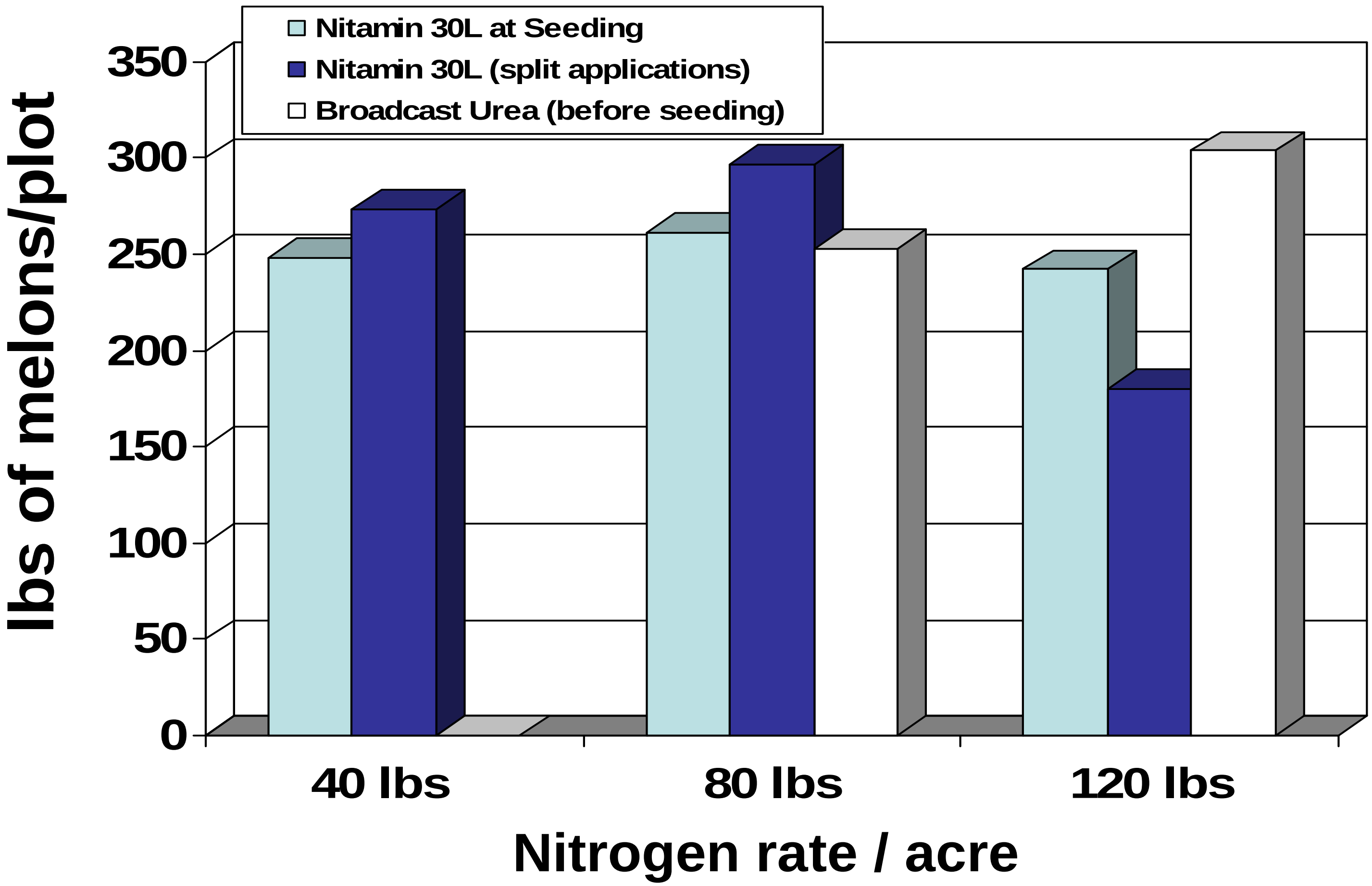
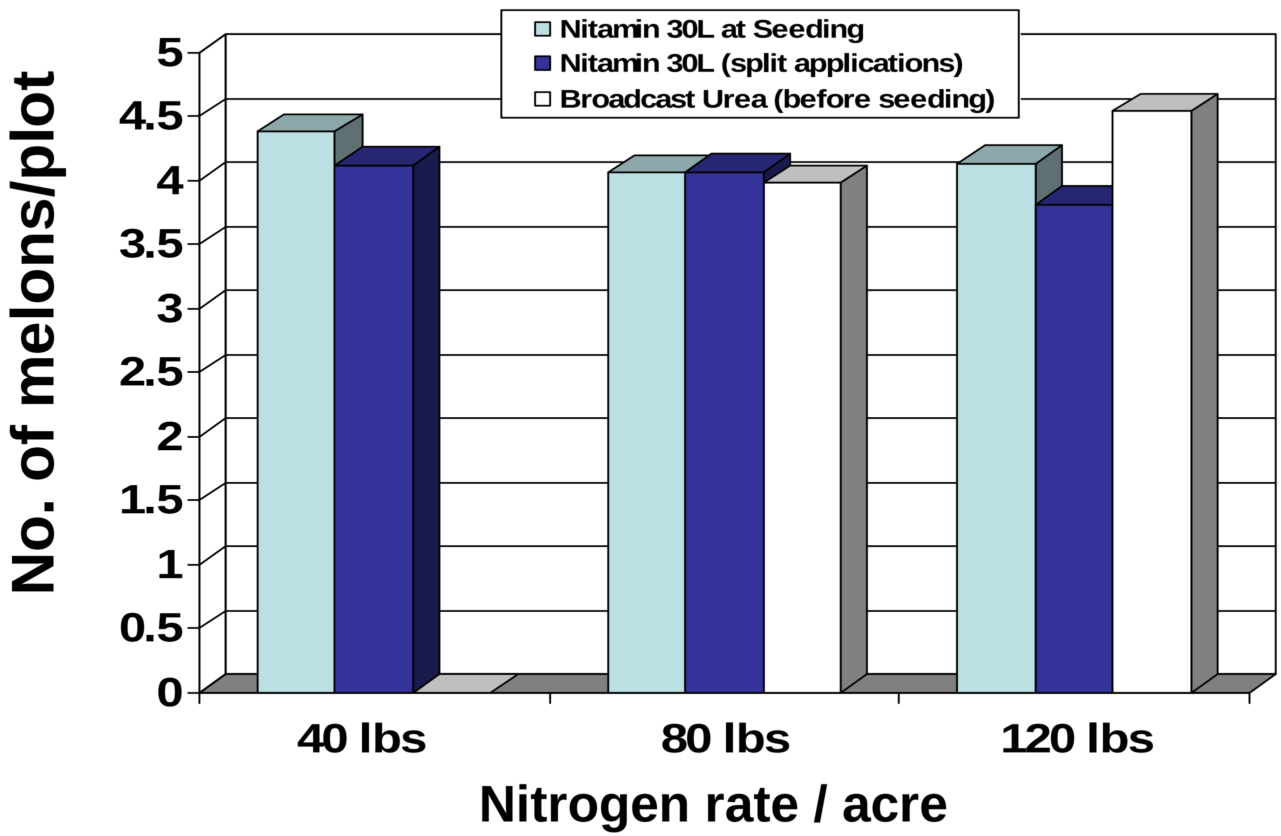


Table 4. Effect of Nitamin 30L Rates and Timings of Application on Average Melon Weight

Test #	Treatment	Timing of Applications	Average Fruit Weight
			---------- Lbs/Melon --------
1	*Standard* *45-0-0 (80 lbs)*	Preplant incorporated	3.98
2	*Standard* *45-0-0 (120 lbs)*	Preplant incorporated	4.54
3	*0*		4.02
4	*Nitamin 40 lbs*	At seeding (4" down and to the side)	4.38
5	*Nitamin 80 lbs*	At seeding (4" down and to the side)	4.06
6	*Nitamin 120 lbs*	At seeding (4" down and to the side)	4.13
7	*Split Application* *20 +* *10 +* *10*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	4.12
8	*Split Application* *40 +* *20 +* *20*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	4.07
9	*Split Application* *60 +* *30 +* *30*	At seeding + 2 – 4 leaf stage + Just before vine-run (4" down and to the side)	3.81
		LSD (0.05)	**0.51**
		Mean	**4.12**

Figure 4. Comparison of Application Methods for Nitrogen in Cantaloupes (Fruit Size)



Effects of Nitamin 30L Fertilizer on Crop Growth and Yield in Texas-Grown Watermelons

Final Report

Objective: To evaluate rates and timing of Nitamin 30L applications on crop growth and yield in watermelons (C*itrullus lanatus* var. "Sugar Baby").

Materials & Methods: The trial was conducted at the Texas Tech University Crops Research Farm located in Lubbock (Lubbock County). The trial site was located on an Amarillo clay loam (47% sand, 20% silt, and 33% clay) soil with a pH of 8.1, 0.9% organic matter and CEC of 16.5. The field was chisel-plowed, disked and beds shaped prior test initiation. Prior to transplanting, soil core samples (6 – 8" depth) were taken from 3 locations in the field and combined for soil nutrient analysis (A & L Plains Agricultural Laboratories, Lubbock, TX). The soil analysis indicated that there was approximately 8.0 lbs NO_3/A in the soil during April 2005. The test area was treated with Prefar 4E herbicide, incorporated to a depth of 3" – 4" several days prior to planting. Plots were hand weeded as-needed during the season to reduce competition from any weeds present. The plots were transplanted with 3-week old watermelon seedlings on June 9, with plants spaced at 3' in-row and 16.67' between rows. Each plot contained a single row of watermelons and measured 16.67' x 25'. During the growing season the test site was drip-irrigated, and all diseases and insects controlled using standard grower practices. Nitamin 30L was applied by hand into open drenches that were placed 4" to the side and 4" down by the seed row using a CO_2-charged backpack sprayer equipped with an open nozzle at 15 PSI (this gave a delivery rate of 1.0 gallon Nitamin 30L in 56 seconds). Initial Nitamin 30L applications occurred on June 9 (at transplanting), and depending on the treatment, were followed by a second application on June 27 (just before vine-run). During the season, plant length (June 28) and crop vigor (July 10, August 4) were recorded. In August, there was poor control of powdery mildew in the test site (vines were beginning to die), and jackrabbits were found to be feeding on the watermelons; therefore, the test was hand-harvested once on August 9. Watermelons were separated in to mature and immature melons, with numbers and weights recorded. The experimental design was a randomized complete block with 4 replications, and all data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Results and Discussion: Crop growth and yield in control (untreated) plots were good to excellent and generally considered inconsistent with typical fertility trials, and it is unknown why this occurred in this particular trial. However, trends did occur. Watermelon vine growth in plots treated with Fertility Program 7 (FP7) was significantly higher than where broadcast urea (FP's 1 & 2) was applied pre-plant or where Nitamin 30L was applied in FP4 (Table 1). Average vine length in broadcast urea treatments was 20.0% and 19.3% less when compared to where Nitamin 30L was applied at transplanting or in split applications, respectively. This may indicate that the N available in Nitamin 30L was more available in amounts sufficient to allow for increased growth in transplanted watermelons than broadcast urea during early growth. Similarly, average crop vigor on July 10 was 19.3% and 17.7% higher with Nitamin 30L applications when compared to broadcast urea, however, by August 4 crop vigor in Nitamin treatments remained only 7.6% higher. The number of marketable melons harvested from individual FP's was not significant when compared amongst any of the treatments (Table 2), and this occurred also for the number of immature melons harvested, total number of melons, total weight and weight of marketable melons. A review of the data showed that no visible trends occurred with the data, except where total weight of melons was averaged across fertilizer application methods (Figure 1). With total weights/plot, Nitamin 30L yields (averaged across application methods) increased an average 7.5% and 10.5% with at-transplant and split-applied treatments compared to broadcast urea. This corresponded with early vine growth and crop vigor ratings and continued with the marketable yields (Figure 1). Though non-significant, the results of this study indicate that Nitamin 30L had an advantage over broadcast urea by increasing both total and marketable yields in watermelons grown in West Texas, and that split-applied Nitamin 30L performed slightly better than at-transplant treatments.

Table 1. Effect of Nitamin 30L Rates and Timings of Application on Watermelon Plant Length and Crop Vigor

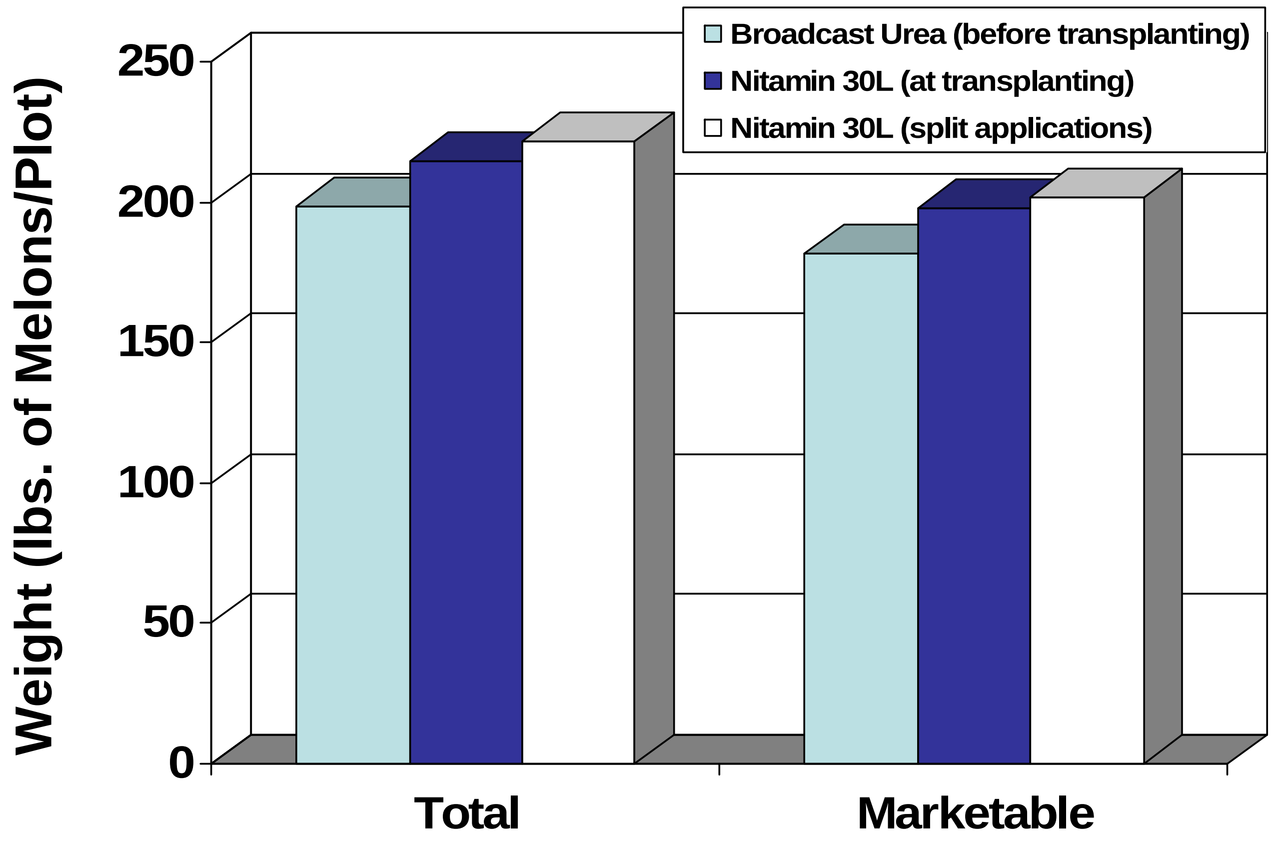
Fertility Program	Treatment	Timing of Applications	Plant Length (cm) June 28	Crop Vigor July 10	Crop Vigor August 4
1	*Standard 45-0-0 (80 lbs)*	Preplant incorporated	86.45	6.75	8.00
2	*Standard 45-0-0 (120 lbs)*	Preplant incorporated	76.23	7.25	9.25
3	*0*		104.78	9.00	9.50
4	*Nitamin 40 lbs*	At transplanting (4" down and to the side)	89.28	8.50	8.75
5	*Nitamin 80 lbs*	At transplanting (4" down and to the side)	106.58	8.25	9.75
6	*Nitamin 120 lbs*	At transplanting (4" down and to the side)	108.98	9.25	9.50
7	*Split Application 20 + 20*	At transplanting + Just before vine-run (4" down and to the side)	115.40	8.75	9.75
8	*Split Application 40 + 40*	At transplanting + Just before vine-run (4" down and to the side)	90.43	7.75	9.25
9	*Split Application 60 + 60*	At transplanting + Just before vine-run (4" down and to the side)	96.45	8.75	9.00
		LSD (0.05)	**25.12**	**1.92**	**1.24**
		Mean	**97.17**	**8.25**	**9.19**

Vigor Ranking = 1 (dead), 3 (poor), 5 (fair), 7 (good), and 10 (excellent growth).

Fertility Program	Treatment	Timing of Applications	No. Marketable Melons per plot August 9	No. Immature Melons per plot	Total No. of Melons per plot	Total Weight of Melons (lbs/plot)	Weight of Marketable Melons (lbs/plot)	Average Melon Size (lbs)
1	*Standard 45-0-0 (80 lbs)*	Preplant incorporated	17.25	4.25	21.50	198.28	184.95	10.97
2	*Standard 45-0-0 (120 lbs)*	Preplant incorporated	19.75	8.25	28.00	198.78	178.13	9.30
3	*0*		20.25	4.75	25.00	228.68	210.15	10.30
4	*Nitamin 40 lbs*	At transplanting (4" down and to the side)	19.75	5.25	25.00	207.73	193.53	10.13
5	*Nitamin 80 lbs*	At transplanting (4" down and to the side)	18.75	8.00	26.75	216.68	192.65	10.30
6	*Nitamin 120 lbs*	At transplanting (4" down and to the side)	18.50	3.75	22.25	218.13	206.93	11.05
7	*Split Application 20 + 20*	At transplanting + Just before vine-run (4" down and to the side)	16.75	6.5	23.25	206.6	187.15	10.90
8	*Split Application 40 + 40*	At transplanting + Just before vine-run (4" down and to the side)	17.00	10.0	27.00	215.10	190.73	11.23
9	*Split Application 60 + 60*	At transplanting + Just before vine-run (4" down and to the side)	20.25	5.5	25.75	243.70	227.95	11.25
		LSD (0.05)	**6.99**	**6.37**	**8.72**	**80.88**	**81.48**	**1.91**
		Mean	**18.69**	**6.25**	**24.94**	**214.85**	**196.91**	**10.60**

Table 2. Effect of Nitamin 30L Rates and Timings of Application on Watermelon Yield

Figure 1. Comparison of Nitrogen Application Methods on Watermelon Yields



Transplanted Watermelon Production with Colored Plastic Mulches on the Texas High Plains

Final Report

Objective: To evaluate the effects of selected colored plastic mulches on transplanted watermelon (*Citrullus lanatus*) vigor, yield and quality when grown under conditions on the Texas High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to test initiation. The entire test site was fertilized (80 lbs N, injected with 80-0-0 on April 23, and Sandea herbicide was applied pre-transplant (0.7oz/acre) on May 9. Following herbicide application, the plastic mulch treatments (Table 1) were laid using a tractor mounted single-row plastic layer. In some cases, soil was thrown on the edges of the mulches to prevent wind from going beneath and ripping the plastic mulch away from the soil. Three-week old watermelon seedlings (var. = Sugar Baby), grown previously in the greenhouse were transplanted (spacing = 30" in-row and 80" between rows) by hand on May 25. Holes were cut through the plastic mulches using a hand trowel and then soil placed around the base of the transplant to prevent wind damage. The test site was drip-irrigated, and all diseases and insects controlled using standard grower practices. The areas between plots were hand weeded as-needed to remove competitive weeds in the test area. Watermelons were harvested three times by hand (July 25, August 6 and September 5). Individual yields from each of the 3 harvests were totaled for final analysis. Individual plots measured 6.67' x 30' and contained 14 plants/plot, and were replicated 4 times in a randomized complete block design. All data were subjected to analysis of variance and means separated using the Least Significant Difference at the 0.05 level.

Results and Discussion: All plastic mulches in this study withstood the windy conditions (20 – 30 mph winds) associated with the Texas High Plains in the spring and there was no visible tearing. Soil temperatures (Table 2) measured at a 3" depth on June 6 were highest during the morning with blue, red and yellow mulches, and lowest with bareground control. In the mid-afternoon, blue, red and yellow mulches continued to have the highest temperatures, while white on black and the two silver mulches had lower average temperatures than the bareground control. A similar trend continued with soil temperatures recorded on June 16. Crop growth rates (measured as vine length) showed that significantly more growth (generally twice the rate) occurred where plastic mulches were used when compared to the bareground control and the fastest rates of growth were recorded with the blue, red and yellow mulches. Fruit number and watermelon yields per plot recorded during the first harvest (Table 3) showed that all plastic mulches gave significantly higher yields when compared to the bareground control, except where grown on red plastic (though yields were still 27% higher). Highest yields were recorded when plants were grown on white on black mulch, as well as both silver mulch types. By the second harvest, yields were greatest in the bareground and red plastic mulch (an indication that plants in these plots had compensated for the lower earlier yields), and yields generally lower with the white on black and silver (non-metallic) mulches. Yields recorded during the third harvest were more variable and were not significantly different between individual mulch treatments. Total yields combined from all 3 harvests showed that there were no significant differences between mulch treatments, or when compared to the bareground control. However, because early yields were significantly greater with the use of plastic mulches, the results of this study indicate that using plastic mulches in watermelon production can increase first-harvest yields (and thus potentially more profits). While greater watermelon plant growth was observed with red, blue and yellow mulches, these did not result in the highest early yields. Continued research is needed to further evaluate the effects of colored plastic mulches on watermelons and other crops grown on the Texas High Plains.

Table 1. Types of Plastic Mulch Treatments Tested

Trt. #	Color	Source
1	Bare ground	
2	Black	Local source
3	Blue	Pliant Corporation / Ampacet
4	Red	Pliant Corporation / Ampacet
5	Yellow	Pliant Corporation / Ampacet
6	White on black	Pliant Corporation / Ampacet
7	Silver (metallic) with 8" black strip	Pliant Corporation / Ampacet
8	Silver (non-metallic)	Harris Seed Co.

Table 2. Effects of Plastic Mulch Color on Soil Temperatures, Vine Length and Crop Growth Rate in Watermelons

Trt. #	Color	Soil Temperature (°F in the morning)	Soil Temperature(°F in the afternoon)	Soil Temperatures (°F)	Vine Length (cm)	Growth Rate/Day (cm)	Vine Length (cm)	Growth Rate/Day (cm)
		June 6		June 16	June 8 to June 15		June 15 to June 23	
1	Bare ground	67.5	81.0	90.3	36.2	2.0	96.6	7.5
2	Black	72.3	80.3	91.3	74.9	5.2	179.7	13.1
3	Blue	73.5	86.0	96.3	98.1	7.5	196.4	12.3
4	Red	74.0	86.0	95.8	87.1	6.6	200.6	14.2
5	Yellow	74.3	85.8	97.3	98.0	7.3	204.5	13.3
6	White on black	70.8	76.8	88.5	67.7	5.0	171.9	13.0
7	Silver (metallic) with 8" black strip	70.8	78.3	90.5	78.5	6.0	173.7	11.9
8	Silver (non-metallic)	71.0	79.5	89.0	75.6	5.7	175.8	12.5
	LSD (0.05)	**2.2**	**2.9**	**3.2**	**15.1**	**1.6**	**24.5**	**2.8**

Table 3. Effects of plastic mulch color on fruit numbers and weights of watermelons

Trt. #	Color	Fruit #/plot	Weight lbs/plot	Fruit #/plot	Weight lbs/plot	Fruit #/plot	Weight lbs/plot	Total Fruit #	Total Weight / plot (lbs)
		July 25		August 6		September 5		Combined Harvests	
1	Bare ground	8.0	57.8	15.3	133.2	11.5	115.5	34.8	306.5
2	Black	12.3	91.9	8.8	76.8	14.3	129.7	35.3	298.4
3	Blue	10.3	85.4	11.5	92.7	12.5	125.7	34.3	303.8
4	Red	10.0	79.3	13.0	104.7	13.3	120.0	36.3	304.1
5	Yellow	11.5	93.5	12.0	96.2	12.0	110.8	35.5	300.6
6	White on black	13.5	104.6	9.3	62.1	15.0	143.8	37.8	310.5
7	Silver (metallic) with 8” black strip	13.8	102.5	12.3	94.9	13.5	131.6	39.5	329.1
8	Silver (non-metallic)	12.5	103.6	9.8	76.3	14.3	142.7	36.5	322.6
	LSD (0.05)	**2.9**	**25.9**	**4.6**	**36.8**	**4.5**	**44.8**	**6.1**	**64.6**

Yield and Quality Evaluation for Selected Tomato Varieties Grown on the Texas High Plains (2004)

Final Report

Objective: To evaluate the yield and quality of selected tomato (*Lycopersicon lycopersicum*) varieties for heat and wind tolerance when grown on the Texas High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to test initiation. Prefar 4E herbicide was applied pre-transplant (5.0 qts/A) on April 29, and six-week old tomatoes, previously grown in a greenhouse, were transplanted (spacing = 48” in-row and 80” between rows) by hand on April 29. Tomato plants were caged and wrapped with row covers (0.9 oz point bonded) cloth until plants completely filled the inside of the cage. The entire test site was fertilized (80 lbs N, injected with 80-0-0 in late March), drip-irrigated (daily as-needed), and all diseases and insects controlled using standard grower practices. Plots were hand weeded as-needed to remove competitive weeds in the test area. Tomatoes were harvested by hand and harvested weekly until mid-August. Individual yields were totaled for final analysis. All varieties were replicated four times (1 plant/replication) and yield/quality averages are presented in Table 1.

Results and Discussion: Tomato yields averaged over 30 lbs/plot with varieties Carnival, Sun Chief, Florida 91 and Sunbeam (Table 1), while the lowest yields were found with Sanibel, Box Car Willie, Sunmaster, and Brandywine (13.0 lbs or less/plant). Average fruit weight with Sun Chief was highest (6.5 oz/fruit) followed by Sunbeam and Carnival. Blossom end rot (BER) was measured during the season and found to be highest in Mountain Pride and Spitfire, and less than 1.5% in all other varieties. Cracking was widespread throughout the trial and was found in all varieties. The highest amount of fruit cracking was found in Sun Chief and Sunbeam (greater than 26%) and lowest in Sun Leaper, Florida 91 and Heatwave II (less than 6%). Finally, curly top virus (CTV) was present in many of the varieties evaluated and generally had an impact on tomato yields and quality. There was a general trend observed for CTV severity, in that as the CTV ranking increased in severity, tomato yields decreased. More research is needed to determine which varieties have better resistance to CTV as well as heat tolerance, both variables which have significant influences on tomato growth and quality on the Texas High Plains.

Table 1. Tomato Variety Trial: 2004 (Ranked from highest yielding variety to lowest)

Variety	Type	Source	Description	Yield (lbs/plant)	No. Fruit / plant	Average Fruit Weight (oz)	BER (%)	Crack (%)	Vigor 7/7	Plant Height (in.) 7/7	Curly Top Ranking 7/7
Carnival	Determinate	Tomato Growers	70 days	37.9	114.0	5.3	0.6	15.7	5.0	42.7	1.3
Sun Chief	Determinate	Stokes Seeds	67 days	35.9	88.7	6.5	0.03	30.0	4.7	37.7	1.7
Florida 91	Determinate	Tomato Growers	72 days, heat tolerant	32.3	111.7	4.6	1.4	7.3	5.0	44.0	1.3
Sunbeam	Determinate	Tomato Growers	70 days, compact	32.0	84.0	6.1	0.5	26.7	4.8	36.0	1.7
Sun Chaser	Determinate	Tomato Growers	72 days, heat tolerant	23.0	90.3	4.1	0.7	11.8	5.0	43.3	1.0
Spitfire	Determinate	Stokes Seeds	68 days, crack tolerant	22.3	87.0	4.0	6.6	9.6	4.7	39.0	1.7
Sun Leaper	Determinate	Territorial Seed	82 days, heat tolerant	20.4	83.7	3.2	1.5	3.6	4.0	31.7	2.7
Heatwave	Determinate	Tomato Growers	68 days, heat tolerant	20.2	72.0	4.4	0	14.1	4.2	34.0	2.7
Heatwave II	Determinate	Burpee	68 days, heat tolerance	19.9	85.7	3.8	0.9	5.9	4.7	36.0	2.0
Mountain Pride	Determinate	Tomato Growers	77 days	17.3	80.7	3.4	11.8	17.4	4.0	36.3	3.0
Taxi	Determinate	Johnny's Selected	64 days, lemon yellow	16.1	100.0	2.4	0	18.5	3.2	28.0	2.3
Sanibel	Determinate	Tomato Growers	75 days	12.8	62.3	2.5	0.5	20.9	4.0	30.7	2.7
Box Car Willie	Indeterminate	Tomato Growers	80 days	9.5	42.3	2.4	0	2.2	4.0	40.3	2.3
Sunmaster	Determinate	Tomato Growers	72 days, heat tolerant	5.8	30.7	1.9	0.5	11.1	2.0	28.0	3.0
Brandywine	Indeterminate		Heirloom Variety	0.2	1.3	2.2	0	0	3.0	52.3	4.3

Curly Top Virus Severity Ranking - 1 = none; 2 = mild; 3 = moderate; 4 = moderately severe; 5 = severe.

Note: The trial was conducted at the Lubbock Research & Extension Center. Tomatoes were transplanted from greenhouse to field on April 29 into cages wrapped with a protective cloth material that allowed 85% light infiltration. This was removed in mid-June. Fertilizer applied as 80 lbs N/A preplant plus 25 lbs N applied broadcast in early July. All plants sprayed for insects and diseases as needed. Field was furrow irrigated for crop establishment until late June when drip irrigation was used.

Yield and Quality Evaluation for Selected Tomato Varieties Grown on the Texas High Plains

Final Report

Objective: To evaluate the yield and quality of selected tomato (*Lycopersicon lycopersicum*) varieties for heat and wind tolerance when grown on the Texas High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to test initiation. Sandea herbicide was applied pre-transplant (0.024 lb ai) on May 9, and six-week old tomatoes, previously grown in a greenhouse, were transplanted (spacing = 48" in-row and 80" between rows) by hand on May 10. Tomato plants were caged and wrapped with row covers (0.9 oz point bonded) cloth until plants completely filled the inside of the cage. The entire test site was fertilized (80 lbs N, injected with 80-0-0 on April 23), drip-irrigated (daily as-needed), and all diseases and insects controlled using standard grower practices. Plots were hand weeded as-needed to remove competitive weeds in the test area. Tomatoes were harvested by hand beginning on July 6 and harvested weekly until September 26, for a total of 13 harvests. Individual yields were totaled for final analysis. All varieties were replicated four times (1 plant/replication) and yield/quality averages are presented in Table 1.

Results and Discussion: Days to first harvest (date when the first ripe tomatoes were picked) can be found in Table 1. Spitfire, Solar Set, Sun Chief and Sunstart matured earliest and had several ripe tomatoes by 57 days after transplanting (DAT). The majority of varieties (56.3%) had ripe tomatoes beginning 63 DAT, while three varieties (Sunmaster, Solar Fire and Santiago) did not have ripe tomatoes until 73 DAT. Peak harvesting (when average highest yields were picked from the plants) began on August 18 for Sunbeam and Heatwave II and these were followed 6 days later by Carnival and Best Boy. Fifty percent of the varieties had peak harvests beginning August 31, while later peak harvesting occurred for Sun Leaper, Sun Chaser, Sunmaster, and Solar Fire.

Curly top and spotted wilt viruses, as well as high winds are particularly damaging to tomato plants on the High Plains, and can significantly decrease yields and results in severely stunted plants. Plant survival was recorded near the end of the season (Table 2), and in this study, Celebrity failed to have any plants survive, therefore no yield data is available for that variety. Sunmaster, Sun Chief and Santiago had 50% of the plants die during the season, while all others had 75% or more survive. Plant height recorded 36 DAT showed that Sunstart had the shortest plants while Sun Leaper had the tallest. Total vine-ripe yield/plant was highest in Sun Leaper, followed closely by BHN 444 and Spitfire. Total yields were lowest with Sunstart and Santiago. Average fruit numbers/plant were greater than 100/plant with Sun Leaper, Spitfire, Sun Chaser and Heatwave II, and less than 60/plant with Sun Chief, Sunstart and Santiago. Fruit size was greatest (6.6 oz/fruit) with Sunstart and smallest (4.7 oz) with Sun Chaser and Heatwave II. Tomato fruit cracking was greatest during the early part of the harvest and lessened as fruit load became more consistent. Fruit cracking was greatest (greater than 49%) in Sun Chief, Carnival and Sunbeam, and least (15.2 – 22.3%) in Florida 91, Spitfire and Solar Fire. Blossom end rot was generally low with all varieties grown in this test, though it was highest in Santiago and Sun Leaper (greater than 6%). The least amount of blossom end rot was found with Best Boy and Sun Chief (1.5% each). More research is needed to determine whether the current list or new varieties are best suited for tomato production on the High Plains. Varieties that are considered to be both heat and wind tolerant should be evaluated.

Table 1. Evaluation of Days to and Peak Harvests for Determinate Tomato Varieties Grown on the Texas High Plains

Variety	Catalog Description	Source	Days to 1st Harvest After Transplanting	Date for Peak Yields to Begin
Sun Leaper	Determinate, 82 days, heat tolerant	Territorial Seed Co.	63	September 7
BHN 444	Determinate, 75 days	Tomato Grower's	63	August 31
Spitfire	Medium determinate, 68 days, crack tolerant	Willhite	57	August 31
Sun Chaser	Determinate, 72 days, heat tolerant, 8 oz fruit	Tomato Growers	63	September 7
Sunmaster	Determinate, 74 days, heat tolerance, 8 oz fruit	Willhite	73	September 7
Bush Celebrity	Compact determinate, 67 days (15" plants, unstaked)	Willhite	63	August 31
Solar Fire	Compact determinate, heat tolerant, 72 days	Harris Seeds	73	September 7
Sunbeam	Compact determinate, 70 days, 10 – 12 oz fruit	Tomato Growers	63	August 18
Heatwave II	68 days, Determinate, 6 – 7 oz furit	Burpee	63	August 18
Solar Set	Determinate, heat tolerant, 70 days, 8 – 9 oz fruit	Tomato Growers	57	August 31
Carnival	Determinate, 70 days	Willhite	63	August 24
Best Boy	Determinate, 70 days, 8 oz fruit	Burpee	63	August 24
Florida 91	Determinate, 72 days, heat tolerant, 10 oz fruit	Tomato Growers	63	August 31
Sun Chief	Determinate, 67 days, 8 oz fruit	Stokes Seeds	57	August 31
Sunstart	62 days, 8.5 oz fruit	Stokes Seeds	57	August 31
Santiago	*Past local standard*	Not available	73	August 31
Celebrity	Determinant, 70 days	Willhite	All Plants Died	Not Available

Table 2. Tomato Growth and Yield Comparrsion for Determinate Varieties Grown on the Texas High Plains

Variety	% Plants Surviving Season	Plant Height (cm) June 15	Yield/plant (lbs)	Ave. No. of Fruit per Plant	Average Fruit Weight (oz)	% Cracking	% Blossom End Rot
Sun Leaper	75	84.0	37.2	115.7	5.1	29.6	6.7
BHN 444	100	68.8	35.3	89.8	6.3	36.5	2.0
Spitfire	100	82.5	34.5	113.5	4.9	21.5	3.9
Sun Chaser	100	74.0	32.0	108.0	4.7	30.1	3.0
Sunmaster	50	74.5	31.7	90.0	5.6	30.7	4.2
Bush Celebrity	100	63.5	31.4	89.3	5.6	44.1	3.3
Solar Fire	100	65.5	31.2	91.0	5.5	22.3	4.1
Sunbeam	100	78.3	29.5	84.8	5.6	49.4	4.1
Heatwave II	100	76.3	29.4	100.4	4.7	42.1	4.2
Solar Set	75	65.5	28.1	87.7	5.1	27.5	2.6
Carnival	75	77.0	28.0	92.7	4.8	50.2	2.8
Best Boy	100	81.0	27.6	85.3	5.2	43.7	1.5
Florida 91	100	76.8	27.1	80.8	5.4	15.2	2.5
Sun Chief	50	75.8	20.7	59.0	5.6	50.6	1.5
Sunstart	100	54.8	19.5	47.3	6.6	41.6	5.9
Santiago	50	76.0	19.4	52.6	5.9	40.6	9.5
Celebrity	0	64.0	NA	NA	NA	NA	NA

Response of Planting Time on Snap Bean Varieties Grown on the Texas High Plains

Final Report

Objective: To evaluate twenty-four snap bean (*Phaseolus vulgaris*) varieties for growth and yield parameters when produced on the Texas High Plains, and to determine potential candidates for canning.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked, and beds shaped prior to initiation of the test. The entire site was injected with 80 lbs of nitrogen (N) using 80-0-0 fertilizer on March 22. Twenty-four varieties were seeded on May 18 (early) or June 16 (mid-season) using fifty seeds of each variety and planting into 2-row 18' plots using a 2-row cone planter that spaced the seeds at 4.3" in-row at a depth of 1.5". Distance between rows of beans for each plot was 40". Dual Magnum 7.62E was applied preemergence following planting at a rate of 0.65 lbs a.i./A. Escaped weeds were removed by hand throughout the season as-needed and insects and diseases were controlled as-needed using the appropriate pesticides. The varieties were determined ready for harvest when 10 freshly picked bean seeds (lined up end to end) measured 110 mm (personal communication, Allen Canning Company). Varieties were harvested by randomly selecting 5 plants from each plot and separating the bean pods from the stems and leaves. Harvested bean pods were divided into size categories (small, medium and large), and each category was weighed individually. Stems and leaves were also weighed for by variety. Visual observations and other data were recorded periodically as-needed during crop growth. Harvesting began July 26 and ended on August 8 (early) and August 20 and ended on August 30 (mid-season). The trial was conducted as a randomized complete block design, replicated four times. All data were subjected to analysis of variance and means separated using Fischer's Protected LSD at the 0.05 level.

Results and Discussion (Early Season Planting): Varieties evaluated included 18 round-, 4 flat- and 1 small-round bean pod types (Table 1). The earliest maturing variety was Hayden at 69 days followed by HMX4954, Brio, Ulysses and Diplomat. The latest maturing variety was PLS 75, which matured in 82 days. Crop emergence was poor to excellent depending on variety. The greatest emergence (> 40 plants/18' row) was found with Brio, Labrador, Diplomat and Hayden and accounted for approximately 80% emergence of seed planted. Poor emergence was found with BBL 156, Ambra and Herrera, which accounted for 54% or less emerged plants. Crop vigor ranged from a value of 3.5 (average to good) for PLS 583 to 4.9 (excellent) for Ulysses. By July 10, half of the varieties were estimated to have 50% flowering while only 16.7% had less than 50% or no flowers present in the plots. Bean pod maturity measured on July 10 was greatest with Herrera, Tapia, Ulysses and PLS 118 (three of four are flat pod types). The greatest immaturity for bean pods was found with Labrador, PLS 583 and Titan (all round pod types). General location of bean pod sets (Table 2), important for processors, was found to be highest within the canopy for PLS 118, Tapia, Ebro and Ulysses, while lowest with PLS 583, Labrador and Dart. Standability (an estimation of the ability of the plant to hold the weight of the yield without leaning over) was highest with Labrador, Ambra and Hayden, and lowest with 15330724, KSI 196 and Tapia. The average yield per plant was greatest with Ambra and Hayden, and lowest with Dart, KSI 196 and Igloo. Yield ratios (the fresh weight of bean pods divided by stems + leaves) were greatest with Hayden, Ambra and Diplomat while lowest with KSI 196, Igloo and Labrador. Higher yields per plot were found with varieties Hayden, Brio and Diplomat, while low yields occurred with Dart, KSI 196 and Igloo. The marketable beans percentage (total of medium + large pod sizes) was used to indicate which varieties had a larger percentage of beans that would be suitable for canning. Hayden, PLS 583 and Diplomat had the highest percentages, while PLS 75, Tapia and Igloo had the lowest. Finally, a Desirable Characteristics Value (DCV), a measure of the best potential candidates for further evaluation on the High Plains was determined by adding all the data variables and ranking varieties from highest to lowest. The top ten candidates in descending order included Hayden, Brio, Diplomat, Ulysses, PLS 583, Labrador, 15330724, 15330733, 08120695 and SB4282 (all round pod types).

Results and Discussion (Mid-Season Planting): Varieties evaluated included 18 round-, 4 flat- and 1 small-round bean pod types (same varieties as planted in early test, see Table 3). The earliest maturing varieties for the mid-season planting were HMX4954, Ulysses and Herrera at 66 days followed by Dart and Tapia. The latest maturing varieties included PLS 1741 and BBL 156, which matured in 75 days. Crop emergence was poor to excellent depending on variety. The greatest emergence (> 43 plants/18' row) was found with Brio, followed by Labrador, Ebro and PLS 75 and accounted for approximately 74% emergence of seed planted. Poor emergence was found with BBL 156, PLS 583 and Herrera, which accounted for 44% or less emerged plants. Crop vigor ranged from a value of 2.0 (fair) for Hayden to 4.8 (excellent) for Ebro. By July 30, the majority of the varieties were estimated to have 50% flowering while only Labrador and Titan had no flowers present. Bean pod maturity measured on August 3 was greatest with Ambra, Ebro and Herrera (two of the three are flat pod types). The greatest immaturity for bean pods on that date was found with PLS 1741. The general location of set bean pods (Table 4), important for processors, was found to be highest within the canopy for Ebro, Tapia, Diplomat and 15330724, while lowest with PLS 118, Labrador, Hayden and PLS 75. Standability (an estimation of the ability of the plant to hold the weight of the yield without leaning over) was not evaluated in the mid-season planting, but was highest with Labrador, Ambra and Hayden, and lowest with 15330724, KSI 196 and Tapia in the early planting. Average yield/plant was greatest with BBL 156, 15330724 and Ambra, and lowest with Sahara, KSI 196 and Igloo. Yield ratios (the fresh weight of bean pods divided by stems + leaves) were highest with KSI 196 and Tapia, while lowest with BBL 156 and 15330724. Higher yields per plot were found with varieties 15330724, Brio and Titan, while low yields occurred with Sahara, PLS 118 and KSI 196. The marketable beans percentage (total of medium + large pod sizes) was used to indicate which varieties had a larger percentage of beans that would be suitable for canning. All varieties were 75% or greater except PLS 75, Igloo, 15330724, KSI 196 and PLS 118. Finally, a Desirable Characteristics Value (DCV), a measure of the best potential candidates for further evaluation on the High Plains was determined by adding all the data variables and ranking varieties from highest to lowest. The top ten candidates in descending order included Brio, Ulysses, Tapia, 15330724, Ebro, Labrador, Dart, Diplomat, Sahara, and PLS 1741.

Conclusions: The average results for DCV (Desirable Characteristics Value) can be seen in Table 5. The results of this test indicate that several varieties were more favorable for yield and other DCV's for processing snap beans grown on the Texas High Plains. The top 5 varieties that performed well during both planting time included Brio, Ulysses, Diplomat, 15330724 and Labrador. Varieties which had poor to fair performances during both plantings include PLS 75 (small round variety), Igloo, PLS 118, BBL 156 and Herrera. Several varieties including Hayden, PLS 583 and 15330733 performed well during the early-season planting, but when planted at mid-season, failed to continue good yield characteristics. In the same respect, Tapia, Dart and Ebro performed somewhat poorly during the early planting, but had much better results in the mid-season planting. Therefore, the results of this study suggest that some varieties are better adapted for earlier plantings, while others may require mid- to perhaps late-season conditions to improve yield and quality. Varieties that performed well regardless of planting time included Brio, Ulysses, Diplomat, 15330724 and Labrador, and may have more potential for use in processing planting under a wider range of temperatures. Temperatures (Table 6) during the growing season at the Texas Agricultural Research & Extension Center in Lubbock were considered to be somewhat average and not excessively hot for the season. More research is needed to further evaluate these and other varieties when grown under grower conditions in the field for the Texas High Plains, as well as under possibly higher temperatures to determine whether more of the varieties are suitable for processing.

Table 1. Snap Bean Variety Response to the Number of Days to Harvest, and Crop Height, Vigor and Flowering Response When Planted During the Early Season (May 18) on the Texas High Plains

Variety	**Source**	**Pod Type**	**Days to Harvest**	**Emergence (18' row)**	**Crop Vigor[1] July 10**	**Flowers[2] July 10**	**Bean Pod Maturity[3] July 10**
Ambra	Harris Moran	Round	76	25.3	4.1	1.0	1.3
Dart	Harris Moran	Round	79	29.5	3.6	0.3	1.1
HMX4954	Harris Moran	Round	72	32.0	3.8	1.0	1.4
Sahara	Harris Moran	Round	76	37.0	4.1	1.0	1.6
KSI 196	Kimberly Seed	Round	78	36.5	4.5	0.8	1.1
Igloo	Pure Line Seed	Round	78	29.5	4.1	0	0.9
PLS 118	Pure Line Seed	Flat	76	36.0	4.8	1.0	2.1
PLS 1741	Pure Line Seed	Round	75	38.0	3.8	0.5	0.8
PLS 583	Pure Line Seed	Round	76	29.8	3.5	0	0.5
PLS 75	Pure Line Seed	Small Round	82	36.0	4.3	0.8	1.1
Ebro	Seminis	Flat	75	38.0	4.4	1.0	2.0
Tapia	Seminis	Flat	75	33.3	4.6	1.0	2.6
Titan	Seminis	Round	76	30.0	4.0	0.3	0.7
08120695	Seminis	Round	76	34.3	4.3	0	0.9
15330724	Seminis	Round	79	30.8	4.8	1.0	1.3
15330733	Seminis	Round	76	30.8	4.5	1.0	1.3
Brio	Seminis	Round	72	43.0	4.8	1.0	1.7
Labrador	Seminis	Round	74	41.8	4.1	0	0.3
Ulysses	Seminis	Round	72	36.5	4.9	1.0	2.2
BBL 156	Syngenta	Round	75	20.0	3.6	0.8	0.9
Diplomat	Syngenta	Round	72	40.0	4.9	1.0	1.3
Hayden	Syngenta	Round	69	40.0	4.1	0.8	1.4
Herrera	Syngenta	Flat	74	26.8	4.4	1.0	2.7
SB4282	Syngenta	Round	74	31.5	4.6	0.5	1.4
	LSD (0.05)			**8.0**	**1.2**	**0.4**	**0.7**

[1] Crop vigor: 1 = poor; 2 = fair; 3 = average; 4 = good; 5 = excellent (based on visual appearance)
[2] Flowers: 0 = no flowers present; 1 = flowers present (within plots)
[3] Bean pod maturity: 0 = no flowers; 1 = flowers only; 2 = pin-size beans; 3 = 1 – 2" beans; 4 = 2 – 4" beans; 5 = greater than 4" beans.

Table 2. Snap Bean Variety Response to Crop Vigor, Flowering, Pod Maturity, Standability, Yield, Percent Marketable Pods, and Estimated Desirable Characteristics When Planted During the Early (May 18) on the Texas High Plains

Variety	Bean Pod Set Height[1] July 10	Stand-ability[2] July 30	Yield / Plant[3] (oz)	Yield Ratio[4]	Estimated Yield (lbs) / 18' row[5]	% Marketable Beans[6]	Desirable Characteristics Value[7]	Desirable Characteristics Ranking
Ambra	2.4	4.1	7.4	0.96	11.6	50.6	95.9	16
Dart	1.5	3.9	2.2	0.43	4.1	43.9	85.3	20
HMX4954	2.3	4.3	4.8	0.91	9.6	60.3	109.4	11
Sahara	2.1	4.0	4.7	0.95	11.0	44.6	98.5	13
KSI 196	2.2	3.4	2.3	0.27	5.6	46.4	96.4	15
Igloo	2.5	3.9	2.3	0.35	5.9	30.0	72.7	23
PLS 118	3.0	4.1	3.6	0.44	6.6	34.8	87.7	19
PLS 1741	2.0	3.6	3.9	0.41	8.1	56.6	108.8	12
PLS 583	1.1	4.0	4.0	0.44	7.5	77.8	120.6	5
PLS 75	2.5	4.0	2.7	0.42	6.3	21.1	71.8	24
Ebro	2.9	3.6	3.3	0.46	8.5	38.4	92.1	18
Tapia	3.0	3.5	4.1	0.48	9.9	27.3	77.3	22
Titan	1.9	4.0	5.1	0.57	10.4	47.5	93.4	17
08120695	1.8	3.9	3.5	0.50	7.6	65.1	113.4	9
15330724	2.6	3.3	4.8	0.67	10.0	67.1	115.1	7
15330733	2.6	3.9	5.8	0.88	11.5	64.6	114.1	8
Brio	2.6	3.9	6.1	0.86	16.8	73.9	136.2	2
Labrador	1.3	4.3	2.6	0.37	6.4	61.1	115.6	6
Ulysses	2.9	4.0	6.4	0.79	14.9	71.8	128.3	4
BBL 156	2.1	3.8	5.3	0.90	6.7	49.0	85.5	21
Diplomat	2.8	3.9	5.0	0.96	12.4	77.0	135.6	3
Hayden	2.4	4.1	7.3	1.03	18.4	78.6	138.3	1
Herrera	2.5	3.9	3.8	0.78	6.5	54.2	97.4	14
SB4282	2.4	3.8	5.2	0.49	10.9	61.9	110.4	10
LSD (0.05)	**0.7**	**0.6**	**2.2**	**0.28**	**5.8**	**19.7**		

[1] Bean pod set height (within bean canopy): 1 = low; 2 = medium; 3 = high.
[2] Standability: 1 = all plants fallen; 2 = 75% plants fallen; 3 = 50% plants fallen; 4 = 25% plants fallen; 5 = no plants falling over.
[3] The weight (oz.) of all hand-picked bean pods (small + medium + large) averaged over 5 plants.
[4] Yield ratio = the weight of all bean pods divided by the weight of the stems + leaves (a value of 1.0 means that the weight of the bean pods is equal to the weight of the stems + leaves).
[5] Estimated total yield of based on 5 hand-picked plants multiplied by the number of emerged plants in 18' of row.
[6] Percentage is based on the numbers of large + medium beans divided by the total number of beans/plant.
[7] Desirable Characteristics Value (DCV) = no. of beans emerged (max. = 50) + crop vigor (max = 5) + flowers (max. = 1) + bean pod set height (max. = 3) + standability (max. = 5) + yield (oz)/plant (max. = 7.4) + yield ratio (max = 1.03) + % large and small beans (max. = 100). Total maximum value = 172.5. DCV used to determine varieties that have highest potential value for processing.

Table 3. Snap Bean Variety Response to the Number of Days to Harvest, and Crop Height, Vigor and Flowering Response When Planted During the Mid-Season (June 16) on the Texas High Plains

Variety	Source	Pod Type	Days to Harvest	Emergence (18' row)	Flowers[1] July 30	Crop Vigor[2] August 3	Bean Pod Maturity[3] August 3
Ambra	Harris Moran	Round	68	23.0	1.0	4.0	2.1
Dart	Harris Moran	Round	67	30.5	0.8	4.0	1.9
HMX4954	Harris Moran	Round	66	24.5	0.8	2.6	1.6
Sahara	Harris Moran	Round	72	35.3	1.0	4.3	1.9
KSI 196	Kimberly Seed	Round	69	32.8	0.5	4.5	1.1
Igloo	Pure Line Seed	Round	72	29.7	0.3	3.3	1.0
PLS 118	Pure Line Seed	Flat	69	26.0	0.5	4.1	1.6
PLS 1741	Pure Line Seed	Round	75	28.7	0	2.6	0.3
PLS 583	Pure Line Seed	Round	68	19.8	0.8	3.2	1.0
PLS 75	Pure Line Seed	Small Round	76	36.8	0.3	3.3	1.0
Ebro	Seminis	Flat	68	38.8	1.0	4.8	2.0
Tapia	Seminis	Flat	67	36.3	1.0	5.0	1.6
Titan	Seminis	Round	72	26.5	0	3.8	1.3
08120695	Seminis	Round	72	27.0	0.3	3.8	1.1
15330724	Seminis	Round	70	31.3	0.8	4.5	1.0
15330733	Seminis	Round	70	28.5	0.8	3.3	1.6
Brio	Seminis	Round	68	43.8	0.8	4.3	1.4
Labrador	Seminis	Round	72	38.8	0	4.4	0.9
Ulysses	Seminis	Round	66	34.8	0.8	4.3	1.8
BBL 156	Syngenta	Round	75	15.5	0.5	2.9	1.5
Diplomat	Syngenta	Round	69	31.5	1.0	3.9	1.4
Hayden	Syngenta	Round	68	30.5	0.3	2.0	0.9
Herrera	Syngenta	Flat	66	22.2	1.0	2.5	2.1
SB4282	Syngenta	Round	70	24.5	0.3	2.5	1.1
	LSD (0.05)			**10.6**	**0.5**	**1.3**	**0.9**

[1] Flowers: 0 = no flowers present; 1 = flowers present (within plots)
[2] Crop vigor: 1 = poor; 2 = fair; 3 = average; 4 = good; 5 = excellent (based on visual appearance)
[3] Bean pod maturity: 0 = no flowers; 1 = flowers only; 2 = pin-size beans; 3 = 1 – 2" beans; 4 = 2 – 4" beans; 5 = greater than 4" beans.

Table 4. Snap Bean Variety Response to Crop Vigor, Flowering, Pod Maturity, Standability, Yield, Percent Marketable Pods, and Estimated Desirable Characteristics When Planted During the Mid-Season (June 16) on the Texas High Plains

Variety	Bean Pod Set Height[1] Aug. 3	Stand-ability[2] July 30	Yield / Plant[3] (oz)	Yield Ratio[4]	Estimated Yield (lbs) / 18' row[5]	% Marketable Beans[6]	Desirable Characteristics Value[7]	Desirable Characteristics Ranking
Ambra	2.5	NA	8.0	1.1	11.5	78.0	117.6	16
Dart	2.5	‘	6.4	1.8	11.3	81.3	127.3	7
HMX4954	2.4	‘	6.5	1.2	11.6	80.8	118.8	13
Sahara	2.6	‘	2.8	1.1	5.8	77.8	124.9	9
KSI 196	2.5	‘	3.7	2.8	7.0	68.0	114.8	19
Igloo	2.3	‘	4.1	1.5	8.6	61.8	103.0	23
PLS 118	0.5	‘	4.3	1.9	6.2	69.3	106.6	21
PLS 1741	2.5	‘	5.8	1.3	10.3	82.5	123.4	10
PLS 583	2.5	‘	6.0	1.6	7.4	80.5	114.4	20
PLS 75	1.8	‘	4.4	1.2	9.2	27.3	75.1	24
Ebro	3.0	‘	5.9	1.5	13.9	76.3	131.3	5
Tapia	2.9	‘	4.0	2.2	8.7	83.8	135.2	3
Titan	2.6	‘	7.6	1.3	14.5	80.3	122.1	11
08120695	2.3	‘	4.2	1.4	9.5	78.8	117.8	15
15330724	2.9	‘	9.7	1.0	18.5	81.5	131.7	4
15330733	2.1	‘	4.6	1.1	8.3	64.3	104.7	22
Brio	2.6	‘	5.4	1.3	14.6	81.8	140.0	1
Labrador	1.6	‘	4.5	1.6	10.5	78.3	129.4	6
Ulysses	2.6	‘	5.7	1.4	11.4	86.5	136.1	2
BBL 156	2.3	‘	12.4	0.8	13.9	86.3	120.7	12
Diplomat	2.9	‘	6.6	1.4	10.3	78.3	125.6	8
Hayden	1.8	‘	5.7	1.9	8.0	75.0	117.2	18
Herrera	2.6	‘	6.6	1.3	12.4	81.3	117.3	17
SB4282	2.5	‘	6.5	1.3	10.3	80.3	117.9	14
LSD (0.05)	**0.9**	**NA**	**3.7**	**0.7**	**8.2**	**15.5**		

[1] Bean pod set height (within bean canopy): 1 = low; 2 = medium; 3 = high.
[2] Standability: 1 = all plants fallen; 2 = 75% plants fallen; 3 = 50% plants fallen; 4 = 25% plants fallen; 5 = no plants falling over.
[3] The weight (oz.) of all hand-picked bean pods (small + medium + large) averaged over 5 plants.
[4] Yield ratio = the weight of all bean pods divided by the weight of the stems + leaves (a value of 1.0 means that the weight of the bean pods is equal to the weight of the stems + leaves).
[5] Estimated total yield of based on 5 hand-picked plants multiplied by the number of emerged plants in 18' of row.
[6] Percentage is based on the numbers of large + medium beans divided by the total number of beans/plant.
[7] Desirable Characteristics Value (DCV) = no. of beans emerged (max. = 50) + crop vigor (max = 5) + flowers (max. = 1) + bean pod set height (max. = 3) + standability (max. = 5) + yield (oz)/plant (max. = 7.4) + yield ratio (max = 1.03) + % large and small beans (max. = 100). Total maximum value = 172.5. DCV used to determine varieties that have highest potential value for processing.

Table 5. Comparison of the Average DCV Rankings for the Snap Bean Plantings

Variety	Source	Pod Type	Early Planting Ranking	Mid-Season Planting Ranking	Average Ranking
Ambra	Harris Moran	Round	16	16	16
Dart	Harris Moran	Round	20	7	13.5
HMX4954	Harris Moran	Round	11	13	12
Sahara	Harris Moran	Round	13	9	11
KSI 196	Kimberly Seed	Round	15	19	17
Igloo	Pure Line Seed	Round	23	23	23
PLS 118	Pure Line Seed	Flat	19	21	20
PLS 1741	Pure Line Seed	Round	12	10	11
PLS 583	Pure Line Seed	Round	5	20	12.5
PLS 75	Pure Line Seed	Small Round	24	24	24
Ebro	Seminis	Flat	18	5	11.5
Tapia	Seminis	Flat	22	3	12.5
Titan	Seminis	Round	17	11	14
08120695	Seminis	Round	9	15	12
15330724	Seminis	Round	7	4	5.5
15330733	Seminis	Round	8	22	15
Brio	Seminis	Round	2	1	1.5
Labrador	Seminis	Round	6	6	6
Ulysses	Seminis	Round	4	2	3
BBL 156	Syngenta	Round	21	12	16.5
Diplomat	Syngenta	Round	3	8	5.5
Hayden	Syngenta	Round	1	18	9.5
Herrera	Syngenta	Flat	14	17	15.5
SB4282	Syngenta	Round	10	14	12

Table 6. Maximum High Temperatures during Snap Bean Variety

Day of Week	May	June	July	August
1	70.1	80.7	97.1	89.7
2	45.8	90.5	93.6	91.2
3	45.3	86.2	102.2	91.0
4	50.5	90.3	91.8	90.5
5	73.2	87.1	88.5	78.7
6	77.4	87.4	90.7	85.1
7	83.6	92.2	88.6	87.8
8	84.3	95.8	89.2	85.8
9	88.8	92.7	90.6	87.2
10	92.9	83.6	89.8	87.5
11	90.9	88.7	92.3	89.2
12	86.2	93.0	91.1	88.7
13	91.4	97.7	93.3	84.2
14	79.1	88.9	95.2	71.0
15	64.1	---	88.2	73.5
16	74.4	99.1	91.2	83.8
17	89.8	93.4	91.6	88.1
18	91.0	102.9	91.0	90.7
19	92.6	96.3	92.8	88.4
20	94.3	93.2	93.8	87.2
21	95.7	92.3	90.3	85.3
22	98.1	93.3	92.9	89.1
23	101.6	93.3	---	91.7
24	94.2	92.4	93.8	91.3
25	84.5	90.1	95.1	92.1
26	70.5	---	81.0	94.2
27	75.4	94.2	69.6	90.8
28	71.2	96.4	80.8	82.6
29	78.7	96.2	84.3	84.8
30	81.4	71.5	90.2	87.6
31	79.6		90.8	89.4

Evaluation of Watermelon Varieties for Yield and Quality on the Texas High Plains

Final Report

Objective: To evaluate the yield and quality of selected watermelon (*Citrullus lanatus*) varieties when grown on the Texas High Plains. This trial is one of five locations for the Statewide Watermelon Variety Trial coordinated by Dr. Juan Anciso and Dr. Frank Dainello (Texas Cooperative Extension).

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center located in Lubbock (Lubbock County). The trial site was located on an Acuff clay loam soil with a pH of 7.6 and 0.9% organic matter. The field was chisel-plowed, disked and beds shaped prior to test initiation. The entire test site was fertilized (80 lbs N, injected with 80-0-0 on April 23 and Strategy herbicide was applied pre-transplant (4.0 pints/Acre) on May 5 (note: herbicide was accidentally incorporated and this delayed optimal plant growth by about two weeks). Three-week old watermelon seedlings, previously grown in a greenhouse were transplanted (spacing = 30" in-row and 80" between rows) by hand on May 23. The test site was drip-irrigated, and all diseases and insects controlled using standard grower practices. Plots were hand weeded as-needed to remove competitive weeds in the test area. Watermelons were harvested by hand beginning on August 8 and harvested again on August 18, for a total of 2 harvests. Individual yields were totaled for final analysis. All varieties were replicated four times (5 plants/replication) and yield and size distribution are presented in Table 1.

Results and Discussion: Marketable yields are presented in Table 1, with the highest yield at the top and in descending order for each watermelon type (diploid or triploid [seedless]). The highest yields/acre from diploid varieties were harvested from plots planted with WX 260, followed by Summer Flavor 800 and Ole. WX 260 and WX 257 varieties had the highest percentage (18%) of fruit weighing 30 lbs or more. Yields of WX 272 were low due to the fact that this particular variety is considered to be a small melon with the majority of fruit weighing an average of 10 – 15 lbs or less. Royal Sweet, considered to be one of the standard diploids failed to produce significant yields and this may have been a factor of weak transplant vigor that was seen with this variety in this test.

Triploid marketable yields ranged from 35,000 to 65,000 lbs/acre when grown under the conditions at the Lubbock Research & Extension Center. Highest yields were found in plots planted to Super Seedless #7167 followed by RWT 8145 and Apollo. The lowest yields were found in plots planted with Tri-X 313 (a standard triploid), Sugar Shack and RWT 8181. In general, triploid watermelons average fruit weighed between 10 – 25 lbs/fruit in this test. Fruit culls due to blossom end rot, or other disease factors, and fruit weighing less than 5 lbs was highest in varieties Summervill, WX 29, and Sugar Time. Research evaluating diploid and triploid watermelons for the High Plains and throughout Texas will continue during the 2006 growing season.

Table 1. 2005 Statewide Watermelon Trial Results-Lubbock, TX

Entry	Total Mkt Yld (lbs/A)	Harvested fruit (% fruit size (lbs/fruit) grade)						
		> 30	25-30	20-25	15-20	10-15	5-9	%culls
Diploids								
WX 260	68,550	18.6	16.6	29.4	18.0	15.8	---	4.8
Summer Flavor 800	64,913	4.9	12.9	29.2	28.7	12.9	---	10.2
Ole	60,821	14.6	16.2	26.6	22.5	16.1	---	4.2
WX 257	56,079	18.5	17.7	24.3	22.1	9.7	---	5.3
ACX 2800	54,684	4.6	18.9	32.2	13.5	26.2	---	4.6
WX 264	54,236	9.0	49.2	13.3	11.5	8.3	---	8.7
RWM 8169	46,819	13.3	26.0	10.7	38.1	5.6	---	6.4
Jamboree	44,641	9.7	21.9	29.9	5.6	24.4	---	8.3
WX 272*	36,852	---	---	---	---	79.8	20.2	---
Royal Sweet	18,177	---	16.7	29.4	16.7	---	---	12.5
Triploids								
Super Seedless #7167	65,962	---	---	12.8	45.5	30.9	---	10.9
RWT 8145	65,937	---	---	15.7	59.1	19.1	---	4.7
Apollo	63,131	---	16.7	29.1	23.8	24.4	---	6.1
WX 270	62,750	---	---	13.4	60.0	20.4	---	6.3
Sweet Delight	57,957	---	1.9	25.6	33.6	25.5	---	13.7
SVR 8339	55,275	---	19.4	13.1	27.8	27.1	---	12.7
Summer Sweet #5244	54,431	---	---	16.2	50.3	18.1	---	15.4
RWT 8166	53,832	---	---	4.1	35.8	46.7	---	9.6
Summervill	53,271	---	---	7.2	39.7	33.3	---	19.8
Sweet Slice	51,051	---	---	14.1	45.8	29.6	---	10.6
Tri-X Carousel	49,903	---	---	13.3	46.7	36.7	---	3.3
WX-29	48,887	---	1.8	20.6	20.3	28.9	---	21.1
ACR 2572	48,662	---	---	25.6	57.8	7.3	---	9.3
5003	48,351	---	---	20.9	49.5	19.9	---	9.8
Tri-X Palomar	48,226	---	---	4.8	51.6	30.6	---	10.8
Sugar Time	46,656	---	---	7.1	32.7	37.2	---	23.1
ACX 601	43,367	---	2.3	36.5	29.1	22.0	---	10.5
Tri-X 313	40,576	---	---	21.7	30.4	32.1	---	13.4
Sugar Shack	39,229	---	---	24.2	32.9	33.1	---	9.9
RWT 8181	35,289	3.1	---	20.8	50.0	26.1	---	---

Note: Marketable yields are based on each variety planted in the entire field.

***WX 272 is selected to be a small-seeded melon.**

Final Report: Results of Personal-sized Watermelon Varieties Grown from Transplants on the Texas High Plains (2005)

Variety	Characteristics	Source	Days to 1st harvest**	Yield (lbs/acre)	Ave. Fruit Wt. (lbs)	Average Brix
Melitopolski	Round, green striped with white, creamy flesh, seeded, thick rind	Heirloom Seeds	85	64241	8.38	9.8
Tiger Baby	Round to oval, green striped, and red flesh, small brown seeds, thick rind	Stokes Seeds	81	59920	6.78	11.2
Baby Doll	Green striped with creamy yellow flesh, small brown seeds, thick rind	Snow Seed Organic	87	59610	10.83	9.6
Yellow Bird	Round, striped with dark yellow flesh, thick rind, seedless	D.Palmer Seeds	81	58110	10.34	10.7
Valdoria	Round, black, thick rind, with red flesh, and mostly seedless	Sunseeds	81	55967	7.13	8.0
Gypsy F1	Round to oval, dark striped, thick rind with red flesh, seedless	Harris Moran	81	54574	10.36	10.9
Yellow Jubilee	Oval with thin, yellow rind, red flesh, and medium-sized seed	New Dimension	79	53807	6.02	10.7
Orchid Sweet	Round, green striped with medium thick rind, yellow fluorescent flesh, seedless	Territorial Seed Co.	85	52033	8.30	11.2
Mickeylee	Light green, no stripes, medium thick rind, red flesh with medium-sized seed	Hollar	80	50208	6.14	10.0
Jade Star	Black, round, with thin rind and red flesh, small seeds	Territorial Seed Co.	81	47802	8.69	11.0
Vanessa	Black, round with thick rind and red flesh, seedless	Sunseeds	87	45956	6.89	10.5
Cream of Saskatchewan	Round, green striped with thin rind, and white creamy flesh, medium-sized seed	Fedco	88	43295	6.92	9.6
Jubilee	Oval, green striped with medium thick rind, red flesh with medium-sized seed	New Dimension	83	41826	8.38	11.2
Blacktail Mountain	Round, black with medium thick rind, dark red flesh and moderate-sized seed	Turtle Tree	77	41407	8.23	10.8
Bobbie	Round to oval, green striped with thick rind, red flesh, seedless	Sunseeds	81	40241	7.61	12.1
Early Moonbeam (black)	Oval, green striped, with medium thick rind, light yellow flesh and many seeds	Turtle Tree	75	35892	5.50	8.8
New Queen	Oval, with thin green stripes, thin rind, orange flesh with medium to large seed	Territorial Seed Co.	81	31688	4.70	10.2
Sun Ray	Round, green striped, with thick rind and yellow fluorescent flesh, seedless	Stoke Seeds	76	30393	8.10	9.0
Mini Yellow	Round, black with medium thick rind, and yellow seedless flesh	D. Palmer Seeds	82	29239	6.17	11.1
LSD (0.05)				**16009**	**1.05**	**1.6**

Evaluation of MilStop for Powdery Mildew Control in Cantaloupes

Final Report

Objective: To determine the efficacy of MilStop (potassium bicarbonate) for control of powdery mildew (*Sphaerotheca fuliginea*) in cantaloupes grown on the Texas High Plains.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center in Lubbock during the 2004 growing season. Cantaloupe (Var. "Jumbo Hale") was seeded on May 24 into plots measuring 10' x 25' and followed immediately with an application of Strategy herbicide. All plots were treated equally in regards to pest and fertility management. When favorable conditions existed for powdery mildew growth (July 21), fungicide applications were initiated and continued weekly or bi-weekly (see Table below) as determined by treatment timing. Fungicides were applied using a CO_2-charged backpack sprayer equipped with four hollow cone nozzles that delivered 30 GPA at 35 psi. Powdery mildew response to the fungicide treatments was rated as the percent green leaf tissue (% GLT) visible in each plot. Cantaloupes were hand-harvested four times during the study period. The trial was conducted as a randomized complete block design and treatments were replicated 5 times. Powdery mildew infestation during the 2004 season was considered to be severe.

Results and Discussion: Initial ratings on August 9 indicated significant increases (compared to untreated plots) in % GLT by all fungicide treatments except MilStop applied at 5.0 lb/A. This response continued through August 16, however, % GLT declined for all MilStop treatments faster than where MilStop was alternated with Nova or where Bravo was applied alone. MilStop was observed to cause some phytotoxicity (necrotic lesions) to cantaloupe leaves, and this was rate responsive (see photos on page 2). This may explain the lower (but non-significant) % GLT observed in the MilStop 5 lb/A weekly rate compared to the 2.5 lb weekly rate during the early rating. Yields were not significantly increased by the MilStop treatments when applied weekly or bi-weekly, regardless of rate. However, yields were significantly increased when MilStop was alternated with Nova or when Bravo was applied alone. Another indicator that phytotoxicity from MilStop may have occurred in this test can be seen with the average 8% and 10% decreases in yield when comparing weekly to bi-weekly applications of MilStop at the 2.5 and 5.0 rates, respectively. The results of this test demonstrate that MilStop does aid in suppression of powdery mildew, but that it may not be best as a stand-alone product. Its performance is enhanced when alternated with another fungicide. In organic agriculture, however, MilStop may be a good choice to delay the onset of powdery mildew infestations. More research is needed though to evaluate the potential for phytotoxicity observed on the cantaloupe leaves in this study.

Table 1. Effect of MilStop Biofungicide on Control of Powdery Mildew in Cantaloupes

Treatment	**Rate**	**% Green**	**% Green**	**% Green**	**No. Melons / A**	**Yield (lbs / A)**
		August 9	August 16	August 23	Total Yield	Total Yield
Untreated		39.0 d	17.0 d	3.2 c	5436.3 b	15657 b
MilStop (Weekly)	2.5 lbs	77.0 ab	49.0 b	11.2 ab	4774.2 b	13490 b
MilStop (Bi-Weekly)	2.5 lbs	60.0 bc	29.0 c	3.4 c	5122.7 b	14634 b
MilStop (Weekly)	5.0 lbs	55.0 cd	31.0 c	6.4 bc	4949.4 b	14433 b
MilStop (Bi-Weekly)	5.0 lbs	62.0 bc	29.0 c	3.4 c	5500.2 b	16000 b
Milstop alternated with Nova (Weekly applications))	5.0 lbs 4.0 oz	87.0 a	76.0 a	7.0 bc	5784.8 ab	19871 a
Bravo (Weekly)	32.0 oz	87.0 a	74.0 a	17.6 a	6934.8 a	21329 a

BioYield and RootShield Growth Comparison for Watermelon Transplants

Final Report

Objective: To determine whether BioYield® Concentrate (*Bacillus amyloliquefaciens* GB 99 plus *Bacillus subtilis* GB 122, manufactured by Gustafson) and RootShield Granules (*Trichoderma harzianum* Strain T-22, manufactured by BioWorks) biological products can improve foliar and root growth of watermelons used for transplant production in Texas.

Materials & Methods: The trial was conducted at the Texas A & M University Research & Extension Center greenhouse in Lubbock during the fall of 2004. Prior to seeding, BioYield (2.0 and 4.0 lbs/yd^3) and RootShield (1.0 and 1.5 lbs/yd^3) granular products were thoroughly blended into sterile media (Ball Growing On Mix), which was then placed into two 72-celled flats per treatment. Care was taken to keep all products and rates separate to avoid contamination. Watermelons (Var. "Jubilee II") were seeded into the flats on September 21. All plants were watered and fertilized regularly to promote crop growth. The greenhouse environment was maintained at approximately 75/63 ^{o}F day/night temperatures under normal sunlight conditions. Watermelon transplant plugs were evaluated for foliar fresh weight and root growth on November 5 (45 days after seeding). The trial was conducted as an RCBD with 20 randomly selected samples removed from the two flats for evaluation.

Results and Discussion: Regardless of rate, BioYield treatments significantly decreased foliar fresh weight and root growth when compared to the untreated or RootShield-treated transplants (Table 1). BioYield was either phytotoxic or somewhat pathogenic to the watermelon roots, and therefore caution should be observed when using this product in watermelon transplant production. RootShield did not increase watermelon foliar fresh weights at either rate, however, root ratings showed a significant increase in root growth compared to the untreated and BioYield treatments (Table 1). Similar root growth ratings indicate that the high rate of RootShield is not required when it is used solely for root growth enhancement. The high rate may be necessary when root disease control is required. These results indicate that BioYield is not a good choice for growth enhancement in watermelon transplants, but RootShield may increase root growth significantly (when compared to non-treated plants), and therefore may improve transplant performance in the field. More testing is needed to determine whether increased crop growth and yields occur from RootShield and other biologically-treated transplants grown under field conditions.

Table 1. The effects of BioYield and RootShield treatments on the growth of watermelons grown for transplant production

Treatment	Rate / cubic yard of soil mix	Foliage Fresh Weight (gms/plant) [1]	Root Growth Rating [2]
Untreated		3.58 a	2.28 b
BioYield	2.0 lbs	1.80 b	1.10 c
BioYield	4.0 lbs	0.47 c	0 d
RootShield	1.0 lb	3.65 a	3.02 a
RootShield	1.5 lbs	3.69 a	2.96 a

[1] Means followed by the same letter are not significantly different at the 0.05% level.

[2] Root rating (based on visual presence of root growth on surface of individual plug): 0 = none; 1 = 25%; 2 = 50%; 3 = 75%; 4 = 100%.