2013 Vegetable Trial Report

January 2014

MP-164.4

Department of Horticulture and Landscape Architecture
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

The Department of Horticulture and Landscape Architecture, cooperating departments and experimental farms conducted a series of experiments on field vegetable production. Data were recorded on a majority of aspects of each study, and can include crop culture, crop responses and yield data. This report presents those data, thus providing up-to-date information on field research completed in Oklahoma during 2013.

Small differences should not be overemphasized. Least significant differences (LSD) values are shown at the bottom of columns or are given as Duncan's letter groupings in most tables. Unless two values in a column differ by at least the LSD shown, or by the Duncan's grouping, little confidence can be placed in the superiority of one treatment over another.

When trade names are used, no endorsement of that product or criticism of similar products not named is intended.

Contributors

Lynn Brandenberger, lynn.brandenberger@okstate.edu, Brian Kahn, brian.kahn@okstate.edu, Danielle Williams, danielle.r.williams@okstate.edu, Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater

Josh Massey, josh.massey@okstate.edu, Lynda Carrier, lynda.carrier@okstate.edu, Department of Field and Research Service Unit, Cimarron Valley Research Station, Perkins

Rodney Farris Rodney.farris@okstate.edu, Robert Havener, Robert Adams
Department of Field and Research Service Unit, Vegetable Research Station, Bixby

John Damicone, john.damicone@okstate.edu, Tyler Pierson
Department of Entomology and Plant Pathology, Oklahoma State University, Stillwater

Jim Shrefler, jim.shrefler@okstate.edu, Merritt Taylor, merritt.taylor@okstate.edu, Oklahoma Cooperative Extension Service, Department of Horticulture and Landscape Architecture.

Editors

Lynn Brandenberger and Danielle Williams
Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater

Cover Design

Gayle Hiner
Agriculture Communications Services, Oklahoma State University, Stillwater

Seed Sources

Abbott & Cobb
P.O. Box 307
Feasterville, PA 19053
www.acseed.com

Harris Seeds
355 Paul Rd.
P.O. Box 24966
Rochester, NY 14624-0966
www.harrisseeds.com

Seminis Vegetable Seeds
6224 Whittondale Drive
Tallahassee, Fl. 32312-1571
www.seminis.com

BHNseed
P.O. Box 3267
Immokalee, Fl 34143
www.bhnseed.com

Johnny's Selected Seeds
955 Benton Avenue
Winslow, ME 04901
www.johnnyseeds.com

Stokes
P.O. Box 548
Buffalo, NY 14240-0548
www.stokeseeds.com

Crookham Co.
P.O. Box 520
Caldwell, ID 83606-0520
www.crookham.com

Otis S. Twilley Seed Co., Inc.
P.O. Box 4000
Hodges, SC 29653
www.twilleyseed.com

Syngenta Seeds, Inc. (Rogers)
P.O. Box 4188
Boise, ID 83711-4188
www.syngenta.com

Illinois Foundation Seed
1178 CR 900 N
Tolono, IL 61880
www.ifsi.com

Seedway
99 Industrial Rd.
Elizabethtown, PA 17022
www.seedway.com

The following have provided funding for the support of research in 2013

- Allen Canning
- BASF
- Bayer CropScience
- IL Foundation Seed
- Seedway
- Syngenta Inc
- Valent Inc
- Oklahoma Department of Agriculture, Food, and Forestry (ODAFF)

Table of Contents

Crop Culture

Summer 2013 Bell Pepper Variety Trial, Perkins, OK

Oklahoma State University Cimarron Valley Research Station

Brian Kahn and Danielle Williams

Introduction and Objectives: Bell peppers ranked #7 in value of production out of 19 principal vegetables in the U.S. in 2010. This high-value crop is grown in Oklahoma primarily for local markets. Objectives of this trial were to evaluate 17 varieties intended for production of green, blocky fruit for yield and overall quality.

Materials and Methods: Seeds were sown in a greenhouse on March 12 using flats with 200 inverted pyramid cells per flat. Raised beds without plastic mulch but with a buried drip irrigation line down the middle of each bed were created at the Cimarron Valley Research Station. Beds were on 6-foot centers. The experimental area was sprayed with pendimethalin herbicide at the rate of 0.475 lb of active ingredient per acre.

Transplants were set in the field on May 7. Plots were 6 feet long. Each plot consisted of 2 rows per bed, with 6 plants of a given variety on one side of the drip line and 6 plants of another variety on the other side. In-row spacing was 14 inches. Varieties were replicated 3 times in a randomized block design. Each plant received ≈1/2 cup water at transplanting. Dead transplants were replaced through May 16. Plots were top-dressed with urea to supply N at 50 lbs/acre on June 2. Fertigation via the drip system began on June 13. Insect control consisted of four applications of insecticide during the season. Plots were harvested once per week beginning on July 11 and ending on August 29 (total of 8 picks).

Results and Summary: Results are shown on the following page. An unexplained problem with the growing medium caused transplant production to be uneven, so meaningful data on crop earliness could not be obtained. Blossom-end rot was most prevalent early in the trial. Bacterial leaf spot often is a problem under our conditions, but it was not a factor in this trial. Data were taken on sunburned fruit, but the trial average was only 8% and varieties showed little variation in this defect.

There was enough plot-to-plot variation that statistical differences did not occur for marketable fruit yield. No one variety stood out as poor. However, 'Islamorada' may have had problems setting; it definitely was delayed in fruit production. Three varieties had over 30% of their total fruit with blossom-end rot (BER): 'Bayonet', 'Cutlass', and 'Summer Sweet #8610'. 'Aristotle' and 'King Arthur' had some fruits that turned red while still too small to be marketable, though both were at or below average for total cull production. There now are several cultivars with better yield and fruit appearance than the older standard 'King Arthur'; it often had non-uniform fruit shapes. The varieties that ripened yellow ('Early Sunsation' and 'Summer Sweet #8610') or orange ('Milena') usually had lighter green immature fruit than varieties that ripened red. 'Early Sunsation' was the better of the two yellows. 'Milena' showed an ability to produce orange fruit in the field and might have done even better under protected cultivation.

‘Milena’ also had the smallest fruit size in the trial. ‘Karisma’ stood out for large, attractive fruit with few culls. ‘Socrates’ was numerically first in total yield. It was numerically second in marketable yield despite also being above average in cull production (some fruit were small and misshapen). ‘Vanguard’, and ‘Excursion II’ also did well overall, although they were statistically similar to several other varieties in most categories.

Producers should consider data from several years before selecting varieties, and always test a new variety on a small acreage at first.

Acknowledgments: The authors thank Lynn Brandenberger, Lynda Carrier, and Josh Massey for assistance with field operations.

Table 1. Bell Pepper Variety Trial Perkins, 2013[z]

Variety[y]	Seed Source	Yields (ctn/A)[x]			Avg. mkt. fruit wt. (oz.)	Marketable no. (thou/A)	% of mkt. fruit w/4lobes	% of total fruit with BER[w]
		Marketable	Culls	Total				
Karisma	Seedway	354	56	410	4.0	42.8	28.5	11.1
Socrates	Seminis	318	158	475	3.6	42.0	41.7	16.0
Vanguard	Seedway	314	108	422	3.7	41.1	34.5	16.7
Excursion II	Abbott&Cobb	276	113	389	3.5	38.3	25.8	9.6
Aristotle	Seedway	263	119	382	3.6	35.5	23.5	18.1
Cutlass	Syngenta	260	178	438	3.5	35.9	33.8	30.9
Intruder	Syngenta	258	91	349	3.8	31.9	46.1	13.3
Early Sunsation	Seedway	255	151	407	3.4	36.3	39.7	7.7
Milena	Seedway	242	120	362	2.9	39.5	35.0	18.8
Archimedes	Seminis	240	93	333	3.3	34.7	40.3	24.4
Red Knight	Seedway	239	122	360	3.4	33.1	55.9	18.0
Tomcat	Syngenta	213	119	333	3.5	29.0	16.8	18.6
Hunter	Syngenta	211	112	323	3.5	29.0	37.5	19.5
Summer Sweet 8610	Abbott&Cobb	192	143	334	3.5	27.0	28.2	33.6
Bayonet	Syngenta	187	125	312	3.7	23.8	33.6	33.3
King Arthur	Seedway	184	111	295	3.2	26.2	25.8	11.1
Islamorada	Seedway	170	106	276	3.7	22.6	60.1	23.4
	Mean	246	119	365	3.5	33.4	35.7	19.1
	$LSD_{0.05}$	NS	56	NS	0.4	NS	14.5	11.0

[Z]Transplanted 7 May 2013. Plot size: 6’x6’(6 plants per plot), 3 replications. Harvested in 8 picks 11 July-29 August.
[Y]Ripe fruit color was red for all varieties except Early Sunsation and Summer Sweet 8610 (yellow) and Milena (orange).
[X]One carton (ctn)=30 lbs.
[W]BER= Blossom-end rot

Table of Contents

Carrot Seedling Emergence Trial, Edmond, OK

Lynn Brandenberger, Danielle Williams, and Ray Ridlen

Oklahoma State University
Cooperating with Phocas Farms, Edmond, OK

Introduction: Carrot is considered to be one of the more nutritious root crops because it contains high levels of vitamin A and is a good source of dietary fiber. During the past few decades carrot breeders have done a great job of not only increasing the levels of vitamin A, but have also selected for sweeter roots. They have accomplished this by selecting for increased sugars and reduced terpenoids which are the compounds that can cause that classic bitterness that those of us over 50 can remember in the carrots we ate as youngsters. Carrots are adaptable to different growing conditions, but they are a cool season crop and can have some real problems with stand establishment during the hot months of July and August. The objectives of this trial were to determine differences between cultivars for establishment during late summer and if successful stands were established to observe them for yield potential and quality.

Methods and Materials: Two plantings of different carrot cultivars were carried out in July and August to determine the possibility of early plantings aimed at early fall markets. Nine different carrot cultivars were selected for a fresh market carrot trial. Cultivars included in the trial were 'Bolero', 'Laguna', 'Maverick', 'Mokum', 'Napoli', 'Nectar', 'Nelson', 'Sugar Snax 54', and 'Yaya'. All cultivars were direct seeded using a Jung "Clean Seeder" hand push planter on 7/23/13 and 8/15/13 inside a high tunnel with one layer of plastic film and permanent raised beds. Raised beds were approximately 45" wide, 90' in length, and 12" high. Seed was planted 0.25" deep in rows on five inch row centers with approximately 8 seeds per row foot with a total of nine rows per raised bed. Plots consisted of one row 25' long and the trials were replicated three times in a randomized block design. Plant emergence counts were made on 8/15/13 and 9/11/13 for the first and second plantings, respectively.

Results and Discussion: Emergence of carrot seedlings did not vary for either day that data was recorded (Table 1, Figure 1). On 8/15/13 emergence ranged from 1.1 ('Laguna' and 'Mokum') to 3.4 seedlings per foot ('Maverick' and 'Sugar Snax 54'). Emergence of carrot seedlings on 9/11/13 ranged from 0.5 for 'Yaya' to 8.8 for 'Bolero'.

Conclusions: Although no differences were observed for either planting date there are a few things that can be learned from the trials. First, it was obvious from the first planting that soil temperature was likely the factor that affected seedling emergence. Second, even though no statistical differences were observed for the second planting 'Bolero' did have a full stand. The authors would conclude that future work should include soil-shading studies to reduce soil temperatures targeted at early fall carrots and the continued trialing of carrot cultivars.

Acknowledgements: The authors want to thank Steve and Lisa Hill and Hilda Cobb of Phocas Farm for support, maintenance, and care of this trial.

Table 1. 2013 Carrot stand count trial, Phocas Farm, Edmond, OK, Stand counts

Cultivars	8/15/13	9/11/13

	Number of plants/row foot	Number of plants/row foot
Bolero	2.7 a[z]	8.8 a
Laguna	1.1 a	3.1 a
Maverick	3.4 a	2.7 a
Mokum	1.1 a	0.8 a
Napoli	2.3 a	2.0 a
Nectar	1.4 a	1.8 a
Nelson	1.4 a	1.0 a
Sugar Snax 54	3.4 a	2.0 a
Yaya	1.2 a	0.5 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Figure 1. Carrot Stand Count Trial, Phocas Farm Edmond, OK


First Planting 8/15/13


Second Planting 9/11/13

Table of Contents

Spring Sweet Corn Variety Trial, Bixby, OK

Oklahoma State University Vegetable Research Station
Brian Kahn, Danielle Williams, Robert Havener, and Robert Adams

Introduction and Objectives: High quality sweet corn is a very popular vegetable in Oklahoma. Small scale production can be sold directly on the farm or at roadside stands, farmer's markets and local stores. Large scale production requires a considerable investment in harvesting equipment and packing facilities. Corn earworm is a serious insect pest, and sweet corn production should not be attempted without an adequate insecticide spray program during the silking to harvest stages.

The genetics of sweetness in corn have become increasingly complicated. For many years, varieties could be classified as either normal sweet (su_1), sugary-enhanced (se), or supersweet (sh_2). Now varieties with genetic combinations have been introduced to the market. Check with your seed company representative before planting a new variety to learn about isolation requirements.

Objectives of this trial were to evaluate 19 white varieties for yield, earliness, and overall quality. Varieties were grouped as se or sh_2 for isolation purposes.

Materials and Methods: Plots were fertilized with 50 lbs. N/acre, harrowed, and then direct seeded on April 25. Plots were 20 ft long with 3 feet between rows and 2 rows per plot. Varieties were replicated 3 times in a randomized block design. Plots were sprayed with S-metolachlor herbicide on April 25, at the rate of ¾ pint/acre. Plots were rated for seedling vigor on May 14. Overall early vigor was good. Final thinning to 20 plants per row was completed on May 23 for the sh_2 trial and on May 28 for the se trial. The entire study was top-dressed with urea to supply 75 lbs. N/acre on May 23 and 75 lbs. N/acre on June 13. Insecticide applications began just before silking and continued throughout the harvest period. Supplemental water was applied with overhead irrigation. Each variety was harvested one time at its peak maturity.

Results and Summary: Results are shown on the following page. The irrigation system did not have adequate capacity to prevent drought stress. As a result, yields were reduced and we were unable to collect representative data from four se entries: 'Argent R/M', 'CSEWF11-504', 'Silver Duchess', and 'WH-0809'. Corn earworm control was relatively good, although most ears had some damage.

se group: Most variables showed no significant differences. Based on these results and a 2009 study, 'Shasta', 'Whiteout', and 'Mattapoisett' are recommended for grower trial in Oklahoma, and 'Silver King' should be trialed again. The original 'Argent' was our standard of comparison for white se corns, and 'Argent R/M' did not receive a representative trial in 2013; thus 'Argent' is still recommended as well.

sh_2 group: There was a range of over 100 sacks/A in marketable yields, but variability was such that statistical differences in yield could not be shown. 'WSS 0987' is a GMO (genetically engineered for earworm resistance) and had less earworm damage than all other entries. 'WSS 0987' is recommended for grower trial in Oklahoma. All the other cultivars except 'ACcelerator' should be trialed again. The two experimental lines from Crookham were comparable to each other. For the Illinois Foundation Seed cultivars, 'XTH 3272' seemed to have an edge over 'XTH 3473'. The performance of 'Devotion' may not have been representative due to some high drought-related cull yields. Despite this, plants in one of the three replications of ‘Devotion’ had the numerically highest marketable yield (weight) in the sh_2 trial.

Producers should consider data from several years before selecting varieties, and always test a new variety on a small acreage at first.

Table 1. Spring 2013 Sweet Corn Variety Trial, Bixby[z] .

Variety	Company/ Source	Vigor rating[y]	Market yield (sacks/A)[x]	Yield (tons/A) Market	Yield (tons/A) Culls	Days to harvest	In-shuck rating[w]	Shucked rating[w]	Avg ear dia. (inches)	Avg ear length (inches)	Corn earworm damage[v]
Group: se											
Shasta	Seedway	2.8	139	2.3	0.7	74	3.5	3.2	1.7	6.9	3.5
Whiteout	Seedway	3.0	131	1.8	0.6	71	3.0	3.2	1.6	7.1	3.5
Mattapoisett	Seedway	3.5	105	1.8	1.4	81	3.7	3.5	1.8	7.4	3.5
Silver King	Syngenta	3.3	90	1.5	1.4	81	3.8	3.5	1.7	6.7	3.8
	Mean	3.2	116	1.8	1.0	77	3.5	3.3	1.7	7.0	3.6
	LSD 0.05	NS	NS	NS	NS	--	0.4	NS	NS	NS	NS
Group: sh2											
WSS 0987	Syngenta	4.0	174	2.3	0.6	77	3.5	3.7	1.7	6.8	1.8
Ice Queen	Seedway	4.5	158	2.8	0.8	74	3.0	2.8	1.6	7.4	4.3
Munition	Seedway	3.0	146	1.8	0.7	81	3.7	3.8	1.5	7.2	4.5
XTH 3272	IL Foundation	3.0	141	2.3	0.6	71	3.0	3.5	1.8	7.4	3.7
CSAWF10 433	Crookham	3.2	139	2.4	0.7	74	2.8	3.3	1.6	7.0	3.3
CSAWF10 432	Crookham	3.0	133	2.3	0.7	74	3.0	3.2	1.6	7.2	3.2
SS 7401	A&C	3.0	121	2.0	0.3	74	2.5	3.2	1.6	7.5	4.3
Devotion	Seedway	3.5	117	2.3	1.2	81	3.2	3.3	1.8	7.9	3.7
Traveler	Seedway	3.7	96	1.6	0.6	77	4.5	3.5	1.6	7.4	4.0
XTH 3473	IL Foundation	3.0	94	1.5	0.5	71	3.8	3.0	1.6	7.2	3.5
ACcelerator	A&C	2.8	72	1.1	0.6	77	4.5	3.5	1.7	7.1	3.7
	Mean	3.3	126	2.0	0.6	76	3.4	3.4	1.6	7.3	3.6
	LSD 0.05	0.4	NS	NS	NS	--	0.6	NS	0.1	0.4	0.8

[z]Seeded April 25, 2013; Plot size: 1.8m x 6.0m (2 rows/plot, 3 plots each variety, plots thinned to 20 plants/row.) Harvested 7/5/13 to 7/15/13. All entries had white kernels.
[y]Vigor rating: 1=will not make stand, 5=thick stand and good vigor.
[x]One sack = 60 ears.
[w]Appearance rating: 1=best, 5=poorest.
[v]Rating: 1=no damage, 2=earworm damage <½" from tip, 3=earworm damage <1" from tip, 4=earworm damage <1½" from tip, 5=earworm damage >1½" from tip. Earworm control: Warrior II, Sevin XLR, and Pounce were alternated and applied a total of 6 times between silking & harvest to entire planting.

Table of Contents

Leaf Lettuce Variety Trial, Perkins, OK

Oklahoma State University Cimarron Valley Research Station
Lynn Brandenberger and Danielle Williams
Oklahoma State University

Introduction: Americans are eating healthier which includes consumption of fresh salad vegetables such as leaf lettuce. Consumption of leaf lettuce has been increasing during the past few years due to their unique flavors and somewhat higher nutrient content compared to head lettuces. Leaf lettuces have traditionally been grown in Oklahoma by fresh market farms because of problems with growing head lettuces to full maturity in our short growing seasons. The objectives of this trial were to observe leaf lettuce cultivars for quality and yield during the fall growing season.

Methods and Materials: Leaf lettuce cultivars were direct seeded on 8/07 in 128 cell Speedling flats using Metro Professional Growing mix and then placed in the greenhouse for germination and growth. Seedlings were fertilized in the greenhouse using 20-20-20 water soluble fertilizer at a rate of 100 ppm in the irrigation water. Transplants were hardened off in an outdoor shaded area 3 days prior to transplanting on 9/12. Plants were transplanted on 9/12 into free standing raised beds which were formed using a plastic mulch layer to form the beds and lay drip irrigation tape, but no plastic mulch was used. Each plot had double rows 12 inches apart with plants spaced 24 inches apart within the rows. Plant spacing was staggered between rows to provide a 12 x 24 inch space for each plant with a 12 plant total for the two row 12' long plots. Plots were fertilized preplant with 25 lbs. of nitrogen, 50 lbs. of P_2O_5, and 25 lbs. of K_2O per acre. Additional fertilizer was applied through the drip system using 20-20-20 water soluble fertilizer for an additional 78 lbs. of nitrogen, P_2O_5, and K_2O per acre. Crop water needs were provided on an as needed basis through the drip irrigation system (majority of days plots were irrigated 1+ times a day). Weeds were primarily controlled through hand hoeing although one application of Poast (sethoxydim) was made for control of grassy weed species. Plots were harvested by cutting off whole plants at their base on 10/11 and 10/15 with number of bolting plants, number of plants, and overall yield in pounds being recorded.

Results and Discussion: Bolting (flowering) was observed in a majority of cultivars in the trial (Table 1). 'Bergmann's Green' and 'Two Star' were the only two cultivars in the trial that had less than 10% bolting recording 5.7 and 8.3%, respectively. Also 'Simpson Black Seeded' had 11.7% bolting, this compares to the next lowest bolters "Green Bay' and 'Green Grand Rapids' which recorded 19.3 and 20% bolting, respectively. All other cultivars had greater than 30% bolting.

Average weight of harvested plants varied from 0.5 to 1.4 lbs. per plant (Table 1). 'Tropicana' (1.4 lbs.) produced the largest plants followed by 'Green Star' (1.3 lbs.), 'Simpson Black Seeded' (1.3 lbs.), and 'Bergmann's Green' (1.2 lbs.).
Average yield was highest for 'Tropicana', 'Simpson Black Seeded', 'Green Star', and 'Bergmann's Green' (Table 1). These cultivars had recorded yields per acre of 19,158,

18,223, 16,617, and 15,851 lbs. per acre respectively. Other cultivars in the trial ranged in yield from 6,392 to 13,976 lbs. per acre.

Conclusions: Taking into account bolting, plant size, and yield 'Simpsons Black Seeded', 'Bergmann's Green', and 'Two Star' compared well to other cultivars in the study. Although bolting was an issue in the trial, during transplant production there may have been light pollution from adjacent greenhouses and transplants were water stressed at times, all which could contribute to the levels of bolting observed. In conclusion the authors would state that lettuce established by transplants in the fall season shows promise and was a relatively short term crop considering that the crop was ready for harvest 30 to 34 days after transplanting.

Acknowledgements: The authors would like to thank personnel at the Cimarron Valley research station for their assistance in completing this trial. They would also like to thank Dan Swartz for harvest assistance.

Table 1. 2013 Fall leaf lettuce trial at Perkins, OK. Bolting, average plant weight, and yield.

Cultivar	Bolting %	Average plant weight lbs.	Average yield lbs./acre[y]
Green Grand Rapids	20.0	0.6 de[z]	8,954 cd
Bergmann's Green	5.7	1.2 abc	15,851 ab
Tropicana	38.0	1.4 a	19,158 a
Two Star	8.3	0.9 bcd	13,976 abc
Vulcan	57.7	0.9 cd	12,357 bc
Green Bay	19.3	0.7 de	8,954 cd
Green Star	30.7	1.3 ab	16,617 ab
Waldmann's Dark Green	41.7	0.5 e	6,392 d
Simpson Black Seeded	11.7	1.3 abc	18,223 ab

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

[y] Average yield lbs./acre was calculated using a row spacing of 3 feet between rows.

Figure 1. Fall 2013 Leaf Lettuce Trial, Perkins, OK

Green Grand Rapids

Bergmann's Green

Tropicana

Two Star

Vulcan

Green Bay

Green Star

Waldmann's Dark Green

Simpson Black Seeded

Table of Contents

National Collaborators Sweet Potato Trial, Albert, OK

Lynn Brandenberger and Danielle Williams
Oklahoma State University
Cooperating with Hydro Sweet Potato Inc.

Introduction: Sweet potato (*Ipomoea batatas*) is in the morning glory family and although it is grown as an annual root crop, it is actually a perennial. This crop is thought to have originated in Central and South America and does well in hot climates. Sweet potato supplies high levels of Beta carotene and vitamin C especially the orange cultivars and has lots of carbohydrates and fiber (Peirce, 1987). Performance of different cultivars varies by location, therefore the need to trial different cultivars for their adaption to local and state conditions. The objectives of this trial were to determine the performance and quality of different sweet potato cultivars in the south west Oklahoma area.

Methods and Materials: Sweet potato slip production was begun in the greenhouse at Oklahoma State University on April 5, 2013. Growing containers were plastic and measured 15.5" long by 7" wide by 6.125" deep. Growing media was a peat-lite mix (Redimix Professional). Roots were arranged horizontally in each container and then covered with 3-4 inches of peat-lite mix. Plots were transplanted in free standing raised beds using the greenhouse grown slips on 6/12/13. The eight cultivars in the trial included 'L 05-111', 'L07-175', 'L06-052', 'L07-146', 'NC07-364', 'Covington', 'O'Henry', and 'Beauregard B94-14'. Plots were single rows 20 feet long with 3 feet between row centers. Spacing between transplants in the row was one foot. Crop water and fertility needs were provided with the same program that the commercial field utilized and included overhead irrigation from a pivot system and several fertilizer applications. Weed control was managed with a preplant application of Valor (flumioxazin) and hand hoeing. The trial was harvested on 10/23/13 using a one-row tractor mounted digger. Sweet potatoes for each plot were graded into U.S. # 1's, jumbos, canners, and culls, with each grade being weighed and recorded. Root ratings were recorded at harvest for one plot of each cultivar in the trial and are listed in Table 2. Ratings ranged from skin color and texture to flesh color, etc.

Results and Discussion: The highest yields for U.S. # 1's were recorded for 'L07-146', 'O'Henry', 'Beauregard 94-14', and 'L05-111' which had yields of 429.5, 415.8, 382.5, and 369.0 bushels/acre, respectively, (Table 1). Percent of U.S. # 1's was highest for 'NC07-364' which recorded 62.3%. 'L05-111' and 'Beauregard 94-14' had the highest yield for canners with 131.5 and 110.3 bushels/acre, respectively. Yield of jumbos was highest for 'L07-146', 'O'Henry', and 'Beauregard 94-14' these cultivars had yields of 848.3, 609.8, and 586.3 bushels/acre of jumbos, respectively. Total marketable yields were 1,361.0, 1,106.8, 1,079.3, and 1,000.3 bushels/acre for 'L07-146', 'O'Henry', 'Beauregard 94-14', and 'L05-111', respectively, the highest marketable yields in the trial. Cull yields were highest for 'Beauregard' and 'Covington' which recorded 52.5 and 39.5 bushels/acre, respectively.

Conclusions: Although the trial started relatively late (June 12) several cultivars performed well. Overall the advanced breeding line 'L07-146' was the highest yielder in the trial followed by ‘O’Henry’, ‘Beauregard 94-14’, and the advance line ‘L05-111’. These should be considered for future trials within the state.

Acknowledgements: The authors would like to thank Hydro Sweet Potato Inc. for help and support in completing this trial, specifically Jonathan Robbins for arranging field support and field space for the study. The authors also want to thank Dan Swart for assistance during harvest.

References: Peirce, 1987, Wiley, NY, Vegetables characteristics, production, and marketing.

Table 1. 2013 National Collaborators Sweet Potato Trial. Albert, OK. Harvest data.

Source	Cultivar	U.S. # 1’s	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1’s
		--------------------------Bushels per acre--------------------------					-----%-----
LSU	L05-111	369.0 ab[z]	131.5 a	499.8 bc	1000.3 b	35.0 abc	36.0 bc
LSU	L07-175	96.0 c	11.3 d	264.0 de	371.0 e	12.3 c	27.3 c
LSU	L06-052	248.5 b	77.5 bc	365.3 cd	691.3 cd	22.3 bc	36.8 bc
LSU	L07-146	429.5 a	83.0 bc	848.3 a	1361.0 a	24.0 bc	32.0 bc
NCSU	NC07-364	309.8 ab	56.0 c	138.8 e	505.0 de	16.5 bc	62.3 a
NCSU	Covington	371.5 ab	83.5 bc	411.8 bcd	866.5 bc	39.5 ab	43.5 b
LSU	O’Henry	415.8 a	81.0 bc	609.8 b	1106.8 b	31.3 abc	37.0 bc
NCSU	Beauregard 94-14	382.5 ab	110.3 ab	586.3 b	1079.3 b	52.5 a	35.5 bc

[z]Numbers in a column followed by the same letter exhibited no significant differences based on Duncan’s Multiple Range Test where P=0.05.
US #1's - Roots 2" to 3 1/2" diameter, length of 3" to 9", must be well shaped and free of defects.
Canners - Roots 1" to 2" diameter, 2" to 7" in length.
Jumbos - Roots that exceed the diameter, length and weight requirements of the above two grades, but are of marketable quality.
Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight
Culls - Roots must be 1" or larger in diameter and so misshapen or unattractive that they could not fit as marketable roots in any of the above three grades.

Table 2. 2013 National Collaborators Sweet Potato Trial. Albert, OK. Root ratings.

Cultivar	Skin color[z]	Skin texture	Shape	Length diameter	Shape uniformity	Flesh color	Eyes	Season	Lenticels	Overall
L05-111	Tan	8	4	9/3.3	7	0	7	E	7	8
L07-175	Rose	5	3	8/3.5	3	3	4	L	3	3
L06-052	Tan	7	5	7.5/3.5	3	3	6	M	6	6
L07-146	Rose	7	3	8.5/3.0	7	3	7	E	5	8
NC07-364	Rose	5	3	8/3.5	6	4	5	L	5	6
Covington	Rose	4	3	7/3.5	2	3	3	L	2	3
O'Henry	White	8	3	9/3.0	7	0	7	E	7	8
Beauregard 94-14	Rose	5	7	7/3.0	5	3	5	M	5	5

[z]Root ratings were as follows:
Skin colors: White, cream, tan, copper, orange, rose, and purple.
Skin textures: 1=very rough, 3= moderately rough, 5=moderately smooth, 7=smooth, 9=very smooth.
Flesh color: 0=white, 1=cream, 2=yellow, 3=orange, 4=deep orange.
Eyes: 1=very deep, 3=deep, 5=moderate, 7=shallow, 9=very shallow.
Lenticels: 1=very prominent, 3=prominent, 5=moderate, 7=few, 9=none.
Shape: 1=round, 2=round-elliptic, 3=elliptic, 4=long elliptic, 5=ovoid, 6=blocky, 7=irregular, 8=asymmetric.
Shape uniformity: 1=very poor, 3=poor, 5=moderate, 7=good, 9=excellent.
Season: E=early, M=midseason, L=late.
L/D: Length to diameter ratio.
Overall appearance: 1=very poor, 3=poor, 5=moderate, 7=good, 9=excellent.

Figure 1. National Collaberators Sweet Potato Trial Albert, OK

Potatoes being dug

A plot just prior to digging

Table of Contents

Grower Sweet Potato Trial, Edmond, OK

Phocas Farms
Lynn Brandenberger, Danielle Williams, and Ray Ridlen
Oklahoma State University

Introduction: Sweet potato (*Ipomoea batatas*) is in the morning glory family and although it is grown as an annual root crop, it is actually a perennial. This crop is thought to have originated in Central and South America and does well in hot climates. Sweet potato provides high levels of Beta carotene and vitamin C especially the orange cultivars and has lots of carbohydrates and fiber (Peirce, 1987). Performance of different cultivars varies by location, therefore the need to trial different cultivars for their adaption to local and state conditions. The objectives of this trial were to determine the yield and quality of different sweet potato cultivars in the central Oklahoma area.

Methods and Materials: Sweet potato slip production was begun in the greenhouse at Oklahoma State University on April 5, 2013. Growing containers were plastic and measured 15.5” long by 7” wide by 6.125” deep. Growing media was a peat-lite mix (Redimix Professional). Roots were arranged horizontally in each container and then covered with 3-4 inches of peat-lite mix. Plots were transplanted using the greenhouse grown slips on 6/21/13. The five cultivars in the trial included ‘Beauregard B-63’, ‘Beauregard 94-14’, ‘Covington’, ‘Bonita’, and ‘O’Henry’. Plots consisted of 20 feet of row with rows on 6 feet row centers. Spacing between transplants in the row was one foot between transplants. Plots were irrigated using drip irrigation which was installed just prior to transplanting. Crop fertility needs were provided by the addition of 3-4 inches of compost just prior to planting. Weed control was managed with hand hoeing. The trial was harvested on 10/18 using a one-row tractor mounted digger. Sweet potatoes from each plot were graded into U.S. # 1’s, jumbos, canners, and culls, with each grade being weighed and recorded.

Results and Discussion: Yields of U.S. # 1’s ranged from a low of 157 bushels/acre for ‘Beauregard 94-14’ to a high of 371 and 356 bushels/acre, respectively, for ‘Covington’ and ‘O’Henry’ (Table 1). ‘Beauregard B63’ and ‘Bonita’ yielded approximately 250 bushels/acre of U.S. # 1’s. Production of canners did not vary and ranged from 85 to 127 bushels/acre. Jumbo yields generally were less than canners and ranged from a low of 31 to a high of 112 bushels/acre. Total marketable yields ranged from 314 to 557 bushels per acre. Although marketable yield did not vary ‘O’Henry’ recorded the highest yield with 557 bushels/acre. There was little variation in cull yields which ranged from 11 to 25 bushels/acre. Percent of U.S. # 1’s was highest for ‘Covington’ which recorded 76% compared to ‘Beauregard 94-14’ which was lowest for percent U.S. # 1’s at 50%.

Conclusions: After consideration of the trial results the authors would conclude that ‘Covington’ and ‘O’Henry’ were the most productive cultivars in the trial with total marketable yields of 494 and 557 bushels/acre, respectively. Both had the highest yields of U.S. # 1’s and the highest percentages for this size class also. These two cultivars can provide the farmer with either an orange (‘Covington’) or a white fleshed (‘O’Henry’) option for fresh market sweet potatoes in the central Oklahoma area.

Acknowledgements: The authors want to thank Steve and Lisa Hill and Hilda Cobb of Phocas Farm for support, maintenance, and care of this trial. We would also like to thank Micah Anderson of the Oklahoma Department of Agriculture, Food, and Forestry for his involvement in the trial.

References: Vegetables characteristics, production, and marketing; Lincoln C. Peirce, John Wiley and Sons, 1987

Table 1. Phocas Farm 2013 sweet potato variety trial, Edmund, OK.

Source	Cultivar	U.S. # 1's	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1's
		--------Bushels per acre--------					-----%-----
		Orange fleshed					
LSU	Beauregard B63	252 ab[z]	85 a	57 a	394 a	11 a	63 abc
NCSU	Beauregard 94-14	157 b	89 a	67 a	314 a	17 a	50 c
NCSU	Covington	371 a	92 a	31 a	494 a	21 a	76 a
		White fleshed					
LSU	Bonita	254 ab	127 a	33 a	414 a	25 a	61 bc
LSU	O'Henry	356 a	90 a	112 a	557 a	23 a	65 ab

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.
US #1's - Roots 2" to 3 1/2" diameter, length of 3" to 9", must be well shaped and free of defects.
Canners - Roots 1" to 2" diameter, 2" to 7" in length.
Jumbos - Roots that exceed the diameter, length and weight requirements of the above two grades, but are of marketable quality.
Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).
Culls - Roots must be 1" or larger in diameter and so misshapen or unattractive that they could not fit as marketable roots in any of the above three grades.

Table of Contents

Sweet Potato Trial, Perkins, OK

Oklahoma State University Cimarron Valley Research Station
Lynn Brandenberger and Danielle Williams
Oklahoma State University

Introduction: Sweet potato (*Ipomoea batatas*) is in the morning glory family and although it is grown as an annual root crop, it is actually a perennial. This crop is thought to have originated in Central and South America and does well in hot climates. Sweet potato supplies high levels of Beta carotene and vitamin C especially the orange cultivars and has lots of carbohydrates and fiber (Peirce, 1987). Performance of different cultivars varies by location, therefore the need to trial different cultivars for their adaption to local and state conditions. The objectives of this trial were to determine the performance and quality of different sweet potato cultivars in the central Oklahoma area.

Methods and Materials: Sweet potato slip production was begun in the greenhouse at Oklahoma State University on April 5, 2013. Growing containers were plastic and measured 15.5" long by 7" wide by 6.125" deep. Growing media was a peat-lite mix (Redimix Professional). Roots were arranged horizontally in each container and then covered with 3-4 inches of peat-lite mix. Plots were transplanted using the greenhouse grown slips on 7/03/13. The nine cultivars in the trial included 'Bonita', 'L07-146', 'Covington', 'L07-175', 'Beauregard B94-14', 'Beauregard B63', 'L06-052', 'NC07-364', and L05-111'. Plots were single rows 20 feet long with 20 feet row centers. Spacing between transplants in the row was one foot. Plots were grown on free-standing raised beds created using a plastic mulch layer that also installed the drip irrigation line during bed formation, but no plastic mulch was used. Crop fertility needs were provided by water soluble fertilizer applied through the drip system and one urea application for a total of 115 lbs. of nitrogen, 58 lbs. of P_2O_5, and 115 lbs. of K_2O per acre. Weed control was managed with a preplant application of Valor (flumioxazin) and hand hoeing. The trial was harvested on 10/16 using a one-row tractor mounted digger. Sweet potatoes for each plot were graded into U.S. # 1's, jumbos, canners, and culls, with each grade being weighed and recorded.

Results and Discussion: U.S. # 1's ranged from 33 to 84 bushels per acre while canners ranged from 18 to 46 bushels per acre (Table 1), but neither varied significantly between the breeding lines or cultivars in the trial. Percent U.S. # 1's did not vary between treatments, but ranged from 45 to 60%. Canners ranged from 18 (NC 07-364) to 46 (L 07-146) bushels per acre. Yield of Jumbos ranged from 5 to 33 bushels per acre with 'L 07-175' and 'Beauregard 94-14' recording the highest yields of 30 and 33 bushels per acre, respectively. Total yields were highest for 'L 07-175' and 'L 07-146' which had overall yields of 145 and 129 bushels per acre, respectively. Cull yields did not vary, but ranged from 4 to 14 bushels per acre.

Conclusions: Overall the highest yielding cultivar in the trial was 'L 07-175'. Production for both U.S. # 1's and Jumbos for this cultivar was consistent with its total marketable yield. Yields in this trial were very low compared to yields in other trials. Factors that contributed to this included the use of a very wide spacing (20 feet wide row spacing) and late planting of the trial. Things that did work well in this trial included the drip irrigation system and weed control. These provided well for the water and weed control needs of the trial.

Acknowledgements: The authors want to thank Cimarron Valley Experiment Station personnel for support, maintenance, and care of this trial and Dan Swart for assistance in harvesting the trial.

Table 1. Cimarron Experiment station 2013 sweet potato variety trial, Perkins, OK.

Source	Cultivar	U.S. # 1's	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1's
		----------------------------Bushels per acre			--------------------------		-----%-----
LSU	Bonita	40 a	27 a	6 bc	72 b	10 a	50 a
LSU	L07-146	70 a	46 a	14 abc	129 a	14 a	54 a
NCSU	Covington	67 a	29 a	22 abc	118 ab	7 a	55 a
LSU	L07-175	84 a	31 a	30 a	145 a	14 a	58 a
NCSU	Beauregard 94-14	48 a	29 a	33 a	110 ab	6 a	45 a
LSU	Beauregard B63	63 a	35 a	24 abc	122 ab	8 a	49 a
LSU	L06-052	51 a	30 a	25 ab	107 ab	10 a	52 a
NCSU	NC07-364	55 a	18 a	18 abc	91 ab	4 a	60 a
LSU	L05-111	33 a	30 a	5 c	67 b	12 a	48 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.
US #1's - Roots 2" to 3 1/2" diameter, length of 3" to 9", must be well shaped and free of defects.
Canners - Roots 1" to 2" diameter, 2" to 7" in length.
Jumbos - Roots that exceed the diameter, length and weight requirements of the above two grades, but are of marketable quality.
Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).
Culls - Roots must be 1" or larger in diameter and so misshapen or unattractive that they could not fit as marketable roots in any of the above three grades.

Table of Contents

Tomato Trial for Heat-set Capabilities, Blaine County, OK

Lynn Brandenberger, Danielle Williams, Brian Kahn, and Lorne Geisler
Oklahoma State University Cooperating with Don's Produce

Introduction and Objectives: Oklahomans want locally grown fresh produce and tomato is one of those produce items that are a "must have" item for consumers within the state. Tomatoes have been produced in Oklahoma since people began gardening here. Within the vegetable crop group, tomatoes require high levels of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually stops completely during the hotter periods of June and July. In 2011 and 2012, farmers had difficulty growing tomatoes for market due to the intense hot weather that was experienced. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties with heat-set capabilities and use plasticulture to manage soil temperature and moisture levels to determine if gains can be made in tomato yield during the hot months of summer.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. Tomatoes were direct seeded in flats on 3/16/13 into a peat lite mix and were transplanted into the field site near Omega on 5/23/13. The study was organized in the field as a randomize block design with three replications. Plots were nine feet long (length of row) and six feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of 1.5 feet between plants. Plot areas utilized black plastic mulch and drip irrigation for all plots. Water and fertility needs of the study were met following the normal production practices for the farm. There were 10 harvests of the trial between 9/22/13 and 10/22/13. Data recorded at harvest included total number of fruit, total harvest weight, and weight of cull fruit. Early harvest yield was based upon the yield of the first three harvests.

Results: No significant differences were observed between cultivars in the trial (Table 1). Overall marketable yield ranged from 350 lbs. ('Charger') to 4,840 ('Solar Fire') and 4,329 ('Tribeca') lbs. per acre. Early yields ranged from 108 lbs. per acre for 'Charger' to 1,344 and 1,371 lbs. per acre for 'BHN-964' and 'Top Gun', respectively. Yield of cull fruit was highest for 'Solar Fire', 'Top Gun', and 'Charger' which had 5,055, 2,070, and 2,044 lbs. per acre, respectively. Average fruit weights ranged from 0.26 to 0.35 lbs. per fruit. 'Volante' had an average fruit weight of 0.35 lbs. while 'Florida 91' and 'Solar Fire' both had an average fruit weight of 0.34 lbs. per fruit.

Conclusions: Although yields in this trial were somewhat lower than would be anticipated there were multiple hail storms that the trial site endured along with high winds and significant rainfall events. The authors would conclude that considering the weather events that occurred it was remarkable that the two highest yielding cultivars had yields over 4,000 lbs. to nearly 5,000 lbs. per acre. Problems that resulted in culling included wind-burn of foliage-fruit, hail damage, and cracking of fruit.

Acknowledgements: The authors wish to thank Don Blehm for his work and support in completing this year's trial. The authors also want to thank Oklahoma Department of Agriculture, Food, and Forestry for support of this study.

Table 1. 2013 Heat-set tomato trial, Don's Produce, Blaine County, OK., Harvest data.

		Marketable yield/acre		**Cull yield/acre**	**Average fruit weight**
Cultivar	**Seed source**	**Overall (lbs.)**	**Early (lbs.)**	**(lbs.)**	**(lbs.)**
Bella Rosa	Twilley	2,017 a	887 a	1,909 a	0.32 a
BHN-964	BHN Seed	2,823 a	1,344 a	1,156 a	0.29 a
Charger	Seedway	350 a	108 a	2,044 a	0.26 a
Florida 91	Seedway	2,716 a	1,022 a	1,855 a	0.34 a
Rocky Top	Seedway	1,667 a	672 a	1,721 a	0.29 a
Solar Fire	Harris	4,840 a	1,183 a	5,055 a	0.34 a
Sunkeeper	Seedway	860 a	215 a	1,506 a	0.30 a
Tasti-Lee	Twilley	2,339 a	995 a	1,398 a	0.32 a
Top Gun	Twilley	2,689 a	1,371 a	2,070 a	0.28 a
Tribeca	Seedway	4,329 a	887 a	699 a	0.32 a
Tribute	Seedway	1,855 a	834 a	1,721 a	0.28 a
Volante	Seedway	3,576 a	1,049 a	1,882 a	0.35 a

^{z} Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Figure 1. Heat-set tomato trial, Don's Produce, Blaine County, OK.

Tomato plots on 7/25/2013

Table of Contents

Tomato Trial for Heat-set Capabilities, Tulsa County, OK

Lynn Brandenberger, Danielle Williams, Brian Kahn, and Kenda Woodburn
Oklahoma State University Cooperating with Our Farm

Introduction and Objectives: Oklahomans want locally grown fresh produce and tomato is one of the produce items that are a “must have” item for consumers within the state. Tomatoes have been produced in Oklahoma since people began gardening here. Within the vegetable crop group, tomatoes require high levels of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually stops completely during the hotter periods of June and July. In 2011 and 2012, farmers had difficulty growing tomatoes for market due to the intensely hot weather that was experienced. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties for heat-set capabilities and use plasticulture to manage soil temperature and moisture levels to determine if gains can be made in tomato yield during the hot months of summer.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. Tomatoes were direct seeded in flats on 3/16/13 into a peat lite mix and were transplanted at the field site near Tulsa on 4/25/13. The study was organized in the field as a randomized block design with three replications. Plots were 15 feet long (length of row) and seven feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of 2.5 feet between plants. Plot areas utilized permaculture (8-10 inches of organic mulch covering the soil surface) combined with natural rainfall for plot maintenance. Fertility and pest control needs of the study were met following the normal production practices for the farm which utilizes natural methods. There were 21 harvests of the trial between 7/06/13 and 10/17/13. Data recorded at harvest included total number of fruit, total harvest weight, and weight of cull fruit. Early harvest yield was based upon the yield of the first three harvests.

Results: No significant differences were observed for yield or fruit size data in the trial (Table 1). Overall marketable yield ranged from a low of 1,157 to a high of 2,289 lbs. of fruit per acre. The four highest yielding cultivars for marketable yield included ‘Tribeca’, ‘Charger’, ‘Solar Fire’, and ‘Tribute’ which had yields of 2,289, 2,144, 2,134, and 2,115 lbs. of marketable fruit per acre, respectively. Early yields were highest for ‘Charger’ (290 lbs. per acre), ‘Tasti-Lee’ (237 lbs. per acre), and ‘Volante’ (208 lbs. per acre). Yield of culls ranged from a low of 339 lbs. per acre for ‘Sunkeeper’ to a high of 784 lbs. per acre for ‘BHN-964’. Average fruit weight ranged from 0.12 to 0.19 lbs. per fruit.

Conclusions: Although yields were lower than anticipated there were several factors that may have negatively affected yield. First, the area of the farm where the trial was carried out had recently initiated the use of permaculture mulch (bark). It is likely that soil nitrogen was not available to the crop due to the initial breakdown of the bark mulch used on the site. The positive aspect of using the mulch was that soil moisture throughout the growing season was maintained at optimum levels and soil temperature was cooler.

Acknowledgements: The authors wish to thank Rex and Marie Koelsch for their work and support in completing this year's trial. The authors also want to thank Oklahoma Department of Agriculture, Food, and Forestry for support of this study.

Table 1. 2013 Heat-set tomato trial, Our Farm, Tulsa County, OK., Harvest data.

		Marketable yield/acre		Cull yield/acre	Average fruit weight
Cultivar	**Seed source**	**Overall (lbs.)**	**Early (lbs.)**	**(lbs.)**	**(lbs.)**
Bella Rosa	Twilley	2,067 a	145 a	557 a	0.16 a
BHN-964	BHN Seed	1,334 a	24 a	784 a	0.13 a
Charger	Seedway	2,144 a	290 a	586 a	0.19 a
Florida 91	Seedway	1,176 a	97 a	402 a	0.16 a
Rocky Top	Seedway	1,691 a	107 a	542 a	0.15 a
Solar Fire	Harris	2,134 a	111 a	687 a	0.16 a
Sunkeeper	Seedway	1,157 a	48 a	339 a	0.17 a
Tasti-Lee	Twilley	1,753 a	237 a	421 a	0.16 a
Top Gun	Twilley	1,462 a	145 a	566 a	0.15 a
Tribeca	Seedway	2,289 a	198 a	716 a	0.12 a
Tribute	Seedway	2,115 a	48 a	557 a	0.16 a
Volante	Seedway	1,922 a	208 a	721 a	0.14 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table of Contents

Tomato Trial for Heat-set Capabilities, Tulsa County, OK

Lynn Brandenberger, Danielle Williams, Brian Kahn, and Kenda Woodburn
Oklahoma State University Cooperating with Southwood Urban Farm, Jenks, OK

Introduction and Objectives: Oklahomans want locally grown fresh produce and tomato is one of the produce items that are a "must have" item for consumers within the state. Tomatoes have been produced in Oklahoma since people began gardening here. Within the vegetable crop group, tomatoes require high levels of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually stops completely during the hotter periods of June and July. In 2011 and 2012, farmers had difficulty growing tomatoes for market due to the intensely hot weather that was experienced. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties for heat-set capabilities and use plasticulture to manage soil temperature and moisture levels to determine if gains can be made in tomato yield during the hot months of summer.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. Tomatoes were direct seeded in flats on 3/16/13 into a peat lite mix and were transplanted at the field site near Tulsa on 4/25/13. The study was organized in the field as a randomized block design with three replications. Plots were 15 feet long (length of row) and four feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of 2.5 feet between plants. Plot areas utilized drip irrigation and black plastic mulch with transplants planted through the plastic. Fertility needs of the study were met following the normal production practices for the farm. There were 10 harvests of the trial between 7/01/13 and 8/16/13. Data recorded at harvest included total number of fruit, total harvest weight, and weight of cull fruit. Early harvest yield was based upon the yield of the first three harvests.

Results: No differences were recorded for marketable yield (Table 1). 'Sunkeeper', 'Solar Fire', and 'Bella Rosa' recorded the highest yields of marketable fruit with 39,219, 35,688, and 34,337 lbs. per acre. Early yield varied significantly with 'Bella Rosa' (11,454 lbs. per acre) and 'BHN-1064' (9,227 lbs. per acre) having the highest early yields. Yield of cull fruit was highest for 'Sunkeeper' which produced 14,595 lbs. per acre of culls. 'Tasti-Lee' and 'Volante' had the lowest yield of cull fruit with 3,848 and 4,286 lbs. per acre of culls, respectively. Average fruit weight did not vary between cultivars in the trial, but ranged from 0.66 to 0.80 lbs. per fruit.

Conclusions: Overall marketable yield did not vary between the six cultivars included in the trial, but did range from nearly 28,000 to over 39,000 lbs. of tomatoes per acre which is at the upper end of expected yield in Oklahoma. Early yields were highest for 'Bella Rosa' and 'BHN-1064' whose early yields were excellent. Based upon the results the authors would encourage on-farm trialing of 'Sunkeeper', 'Solar Fire', and 'Bella Rosa' in the Tulsa County area.

Acknowledgements: The authors wish to thank Kyle Dismukes and staff at Southwood Urban Farm for their work and support in completing this year's trial. The authors also want to thank Oklahoma Department of Agriculture, Food, and Forestry for support of this study.

Table 1. 2013 Heat-set tomato trial, Southwood Urban Farm, Tulsa County, OK., Harvest data.

Cultivar	Seed source	Marketable yield/acre Overall (lbs.)	Marketable yield/acre Early (lbs.)	Cull yield/acre (lbs.)	Average fruit weight (lbs.)
Bella Rosa	Twilley	34,337 a	11,454 a	5,883 bc	0.75 a
BHN-1064	BHN Seed	30,037 a	9,227 ab	5,905 bc	0.80 a
Solar Fire	Harris	35,688 a	3,025 c	8,671 b	0.72 a
Sunkeeper	Seedway	39,219 a	6,745 b	14,595 a	0.66 a
Tasti-Lee	Twilley	27,782 a	3,582 c	3,848 c	0.81 a
Volante	Seedway	24,563 a	2,894 c	4,286 c	0.70 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Figure1. 2013 Heat-set tomato trial, Southwood Urban Farm, Tulsa County, OK.

Table of Contents

Tomato Trial for Heat-set Capabilities, Payne County, OK

Lynn Brandenberger, Danielle Williams, Brian Kahn, and Keith Reed
Oklahoma State University Cooperating with Whitmore Farms

Introduction and Objectives: Oklahomans want locally grown fresh produce and tomato is one of those produce items that are a “must have” item for consumers within the state. Tomatoes have been produced in Oklahoma since people began gardening here. Within the vegetable crop group, tomatoes require high levels of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually stops completely during the hotter periods of June and July. In 2011 and 2012, farmers had difficulty growing tomatoes for market due to the intense hot weather that was experienced. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties with heat-set capabilities and use plasticulture to manage soil temperature and moisture levels to determine if gains can be made in tomato yield during the hot months of summer.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. Tomatoes were direct seeded in flats on 3/16/13 into a peat lite mix and were transplanted into the field site near Coyle on 5/15/13. The study was organized in the field as a randomize block design with three replications. Plots were nine feet long (length of row) and 7.5 feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of 1.5 feet between plants. Plot areas utilized black plastic mulch and drip irrigation for all plots. Water and fertility needs of the study were met following the normal production practices for the farm. There were seven harvests of the trial between 7/23/13 and 8/16/13. Data recorded at harvest included total number of fruit, total harvest weight, and weight of cull fruit. Early harvest yield was based upon the yield of the first three harvests.

Results: Overall marketable yield varied significantly between cultivars in the trial (Table 1). Yields of marketable tomatoes ranged from a low of 2,474 lbs. per acre for ‘Rocky Top’ to highs of 12,046 and 11,293 lbs. per acre for ‘Tribeca’ and ‘Charger’, respectively. Early yields (first three harvests) were highest for ‘Charger’ and ‘Tribeca’ which had early yields of 4,302 and 3,227 lbs. per acre during the first three harvests. Cull yields were highest for ‘Charger’ and ‘Tribute’ which had cull yields of 3,065 and 2,312 lbs. per acre, respectively. Average fruit weight ranged from a low of 0.22 lbs. to a high of 0.34 lbs. per fruit. ‘Volante’ had the highest average fruit weight of 0.34 lbs. while ‘BHN-964’ and ‘Charger’ were next highest with 0.30 and 0.29 lbs. per fruit, respectively.

Conclusions: Although overall and early yields were generally lower than in 2012 the trial in general did well considering the late start because of late freezes. Marketable yields for ‘Tribeca’ and ‘Charger’ were above 11,000 lbs. which compared well with the previous year’s trial. Cull yields were somewhat higher likely due to blossom end rot early in the season. Based on the results the authors would recommend that ‘Tribeca’, ‘Charger’, ‘Solar Fire’, and ‘Bella Rosa’ be given consideration for future trials and for trial plantings by growers.

Acknowledgements: The authors wish to thank Wayne and Connie Whitmore for their work and support in completing this year’s trial. The authors also want to thank Oklahoma Department of Agriculture, Food, and Forestry for support of this study.

Table 1. 2013 Heat-set tomato trial, Whitmore farm, Coyle, OK., Harvest data.

		Marketable yield/acre		Cull yield/acre	Average fruit weight
Cultivar	**Seed source**	**Overall (lbs.)**	**Early (lbs.)**	**(lbs.)**	**(lbs.)**
Bella Rosa	Twilley	6,615 c	2,366 bc	2,151 abc	0.25 ab
BHN-964	BHN Seed	4,195 c	1,721 bc	699 cd	0.30 ab
Charger	Seedway	11,293 ab	4,302 a	3,065 a	0.29 ab
Florida 91	Seedway	2,958 c	1,183 c	1,344 bcd	0.23 b
Rocky Top	Seedway	2,474 c	1,344 c	484 d	0.26 ab
Solar Fire	Harris	7,260 bc	1,506 bc	1,344 bcd	0.23 b
Sunkeeper	Seedway	4,033 c	1,344 c	645 cd	0.26 ab
Tasti-Lee	Twilley	5,109 c	1,721 bc	968 bcd	0.22 b
Top Gun	Twilley	4,356 c	1,506 bc	1,506 bcd	0.27 ab
Tribeca	Seedway	12,046 a	3,227 ab	1,560 bcd	0.23 b
Tribute	Seedway	5,216 c	2,044 bc	2,312 ab	0.25 ab
Volante	Seedway	4,248 c	2,420 bc	538 d	0.34 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan’s Multiple Range Test where P=0.05.

Table of Contents

Tomato Trial for Heat-set Capabilities, Noble County, OK

Lynn Brandenberger, Danielle Williams, Chad Webb, and Brian Kahn
Oklahoma State University
Cooperating with Otoe-Missouria and Ponca Tribes

Introduction and Objectives: Oklahomans want locally grown fresh produce and tomato is one of those produce items that are a “must have” item for consumers within the state. Tomatoes have been produced in Oklahoma since people began gardening here. Within the vegetable crop group, tomatoes require high levels of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually stops completely during the hotter periods of June and July. In 2011 and 2012, farmers had difficulty growing tomatoes for market due to the intense hot weather that was experienced. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties with heat-set capabilities and use plasticulture to manage soil temperature and moisture levels to determine if gains can be made in tomato yield during the hot months of summer.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. Tomatoes were direct seeded in flats on 3/16/13 into a peat lite mix and were transplanted into a community garden site at Red Rock on 5/6/13. The study was organized in the garden as a randomize block design with three replications. Plots were six feet wide and twelve feet long and included six transplants with an in-row spacing of two feet between plants. Plot areas utilized reflective silver plastic mulch and drip irrigation for all plots. Water and fertility needs of the study were met following the normal production practices for the garden. Fruit counts of the two middle plants in each plot were recorded on 7/22/13. Fruit counts were used instead of actual harvest data due to the trial being harvested by numerous garden participants.

Results: No statistical differences were observed between cultivars for number of fruit on 7/22/13 (Table 1). Fruit counts ranged from 8.0 (‘Volante’) to a high of 40.0 (‘Solar Fire’). Cultivars in the trial with fruit numbers higher than 27 included ‘Solar Fire’ (40 fruit), ‘Florida 91’ (38.7 fruit), ‘BHN-964’ (32.3 fruit), ‘Bella Rosa’ (29.3 fruit), and ‘Sunkeeper’ (28.0 fruit).

Conclusions: The authors would conclude that ‘Solar Fire’, ‘Florida 91’, and ‘BHN-964’ had higher numbers of fruit set at the time that fruit counts were taken, but further testing that includes recording harvest data is needed to determine how valid these fruit numbers are.

Acknowledgements: The authors wish to thank the Otoe-Missouria and Ponca tribes for their work and support in completing this year’s trial. The authors also want to thank Oklahoma Department of Agriculture, Food, and Forestry for support of this study.

Table 1. 2013 Tomato Trial for Heat-set capabilities, Red Rock, OK, Fruit counts.

Cultivar	**Seed source**	**7/22/13 (Fruit count)**
Bella Rosa	Twilley	29.3 a
BHN-964	BHN Seed	32.3 a
Charger	Seedway	14.0 a
Florida 91	Seedway	38.7 a
Rocky Top	Seedway	19.7 a
Solar Fire	Harris	40.0 a
Sunkeeper	Seedway	28.0 a
Tasti-Lee	Twilley	8.0 a
Top Gun	Twilley	21.7 a
Tribeca	Seedway	24.7 a
Tribute	Seedway	23.0 a
Volante	Seedway	19.0 a

Figure 1. Tomato Trial in Cooperation with the Otoe-Missouria and Ponca Tribes

Table of Contents

Cucumber Fall Planting Demonstration, Lane, OK

Oklahoma State University Wes Watkins Agricultural Center, Lane, OK
Jim Shrefler, Merritt Taylor, Micah Anderson and Robert DeWitt

The assistance of Jim Vaughan, John Johnson, Phil Powell and Shannon Reece is appreciated.

Introduction and objectives: Fall can be a good time to grow both cool and warm season vegetables in southeastern Oklahoma. Compared to the summer growing season, at this time of the year temperatures are more favorable for the growth of many crops and better quality at maturity is sometimes obtained. Short production cycle cucurbits crops such summer squash and cucumber can be grown in the fall but there are some risks such as insect pest attack of newly planted crops and weather events such as frosts that may cause injury. However, the use of row covers can protect crops from these hazards and allow growers to take advantage of the generally favorable growing conditions of autumn. In order to take advantage of this fall growing season growers need information on the potential productivity of crop varieties for fall planting. This trial was conducted to evaluate five cucumber varieties for fall production.

Materials and Methods: The trial was conducted during the fall of 2013 at the Wes Watkins Agricultural Research and Extension Center at Lane, Oklahoma. Cucumber seed of the varieties Eureka (hybrid, pickle type), Turbo (hybrid), Dasher II (hybrid), Poinsett 76, and Thunder (hybrid) was sown in foam trays on august 14. On September 14, cucumber plants were transplanted in a single row on a 2 foot wide raised bed and 12 plants of each cultivar were spaced 1 foot apart in the row. The bed was constructed in late June of 2013, covered with white plastic mulch that had an opaque backing and that was not planted previously. Soil was fertilized prior to bed construction using OSU soil test recommendations. Immediately following transplanting wire hoops were installed over the row and a spunbound row cover was installed because grasshoppers were abundant in the vicinity. On October 8 female cucumber blossoms were evident and row covers were removed to allow access to pollinating insects. Fruits were harvested, counted and weighed on October 22 and November 4, 7 and 12. A killing freeze stopped plant production.

Note: Because this is a single run of a non-replicated trial caution should be used in drawing conclusions. It can be said that all cultivars showed potential for fall production. The results also show that cultivars may differ in characteristics such as earliness. Based on causal tasting, flavor of all cultivars was acceptable.

Results

Table 1. Cucumber fall planting marketable yields.

	Yield of marketable size cucumbers for 12 plants (lbs)							
	Oct. 22		Nov. 4		Nov. 7		Nov. 12	
Cultivar	**Number**	**Weight***	**Number**	**Weight**	**Number**	**Weight**	**Number**	**Weight**
Eureka	3	2.0	8	4.9	7	1.9	1	0.3
Turbo	6	2.6	9	6.2	6	2.2	5	2.2
Dasher II	5	1.4	11	6.2	6	2.5	7	2.2
Poinsett 76	3	0.7	9	4.2	12	4.5	11	2.9
Thunder	22	9.8	18	12.3	7	2.6	5	1.3

Table of Contents

Organic High Tunnel Onion Production Trial, Lane, OK

Oklahoma State University Wes Watkins Agricultural Center, Lane, OK
Jim Shrefler, Merritt Taylor and Chuck Webber

The valuable assistance of Jim Vaughan, John Johnson, Phil Powell, Shannon Reece and Tony Goodson is gratefully acknowledged.

Introduction and objectives: Based on trials and casual observation over several years in southeast Oklahoma high tunnels appear to provide a favorable environment for growing fresh market onions. This includes the production of transplants during the winter months for which trials over 8 years showed that transplants grown in high tunnels exhibit a low incidence of bolting following transplant to open field conditions. Based on casual observation, bulb production during spring and summer also appears favorable in the tunnels. Organic onion producers face a challenge of how to establish field plantings. Organically grown transplants are several times more costly than non organic plants. In the transplant production trials disease incidence has been minimal for plants growing within high tunnels and this production system has not required the use of practices (e.g. fungicide applications) that would not be allowed under certified organic guidelines. Several difficulties with transplant production include uniform onion seed germination and emergence, and the labor requirements for weeding and transplant removal from beds. The use of non-soil growing media was found to alleviate each of these difficulties. The objective of the current trial was to compare several growing media for the production of certified organic onion transplants in a high tunnel. Transplants were grown in one of four different growing media and then transplanted to a field soil floor of a high tunnel and grown until bulbs matured.

Materials and Methods: This trial was conducted during the 2012-2013 cool weather growing season on the Certified Organic Facility at the Wes Watkins Agricultural Research and Extension Center at Lane, Oklahoma. Two by four lumber was used to construct frames measuring 28 x 46 x 3.5 (depth) inches. Woven polypropylene landscape fabric was placed on the leveled soil of the high tunnel floor and the wood frames arranged on the landscape fabric. Additional pieces of landscape fabric were cut to fit the wood frames to keep growing media from moving beneath the frame and the floor fabric. Growing media included field soil (fine sandy loam) from the house floor, masonry sand, two mixtures of masonry sand (S) and organic approved commercial potting mixture (Sunshine) (M) ½ S : ½ M and 2/3 S : 1/3 M. Four frames were filled with each of the growing media. Frames were arranged in groups so that each included one each growing media. Each group served as an experimental block and the plot arrangement was a randomized complete block with four replications.

On October 26, 2012 onion seed of the cultivar Candy was seeded in rows spaced 5 inches apart at 30-40 seeds per foot of row. Onions were grown in the boxes until March 28, 2013 at which time they were removed from the beds and transplanted onto the floor of an adjacent high tunnel. Plots were arranged by transplanting the plant groups from the transplant beds in similar groups. Plots consisted of two rows ten feet in length and spaced 1 foot apart. Distance between adjacent plots was 1.5 feet. Onions were grown until bulb maturity and then harvested on July 7, 2013 to determine bulb weights and size categories.

Results: The type of growing media used to grow onion transplants did not affect onion bulb yields or the percent size categories. The average yield of onion bulbs was 3.7 lbs per 10 square feet of plot area. The percent distribution of onion bulb size into four categories was less than 2 inches in diameter 23%, 2-3 inches in diameter 43%, 3-3.5 inches in diameter 27% and greater than 3.5 inches in diameter 6%.

Additional observations of importance to these results are that the incidence of bolting of onions was less than 1% and the condition of the onion leaves in the high tunnel remained very good until harvest. In comparison, plants grown outdoors in an adjacent planting had poor quality leaves at harvest time.

Table of Contents

Disease Management

Anthracnose Control on Spinach Fall 2012

John Damicone and Tyler Pierson
OSU Department of Entomology and Plant Pathology

Methods: The experiment was conducted at the Entomology and Plant Pathology Research Farm in Stillwater in a field of Easpur loam previously cropped to wheat. Granular fertilizer (82-0-0 lb/A, N-P-K) was incorporated into the soil prior to planting the cultivar melody' on 24 Sep at a seeding rate of two seeds per inch. The herbicide Dual Magnum II Parallel 7.6E at 0.75 pt/A was broadcast post-emergence on 1 Oct. Plots were top-dressed with granular fertilizer (46-0-0 lb/A, N-P-K) on 22 Oct. Plots consisted of 4-row beds, 20-ft long, with rows spaced 14 in. apart. The experimental design was a randomized complete block with four replications separated by a 5-ft-wide fallow buffer. Fungicides were broadcast using flat-fan nozzles (Tee-jet 8002vk) spaced 18-in. apart with a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 26 gal/A at 40 psi. Treatments were applied on ca. 7-day intervals beginning at the first true-leaf stage on 16 Oct. Plots were inoculated with the anthracnose fungus by spreading 50 ml of oat kernels colonized by the fungus along the center of each plot immediately after the first treatments were applied on 16 Oct. Plots received a total of 3.0 inches of sprinkler irrigation at 0.125 to 0.25 in. water per application as needed to promote crop and disease development. Rainfall during the cropping period (24 Sep to 7 Dec) totaled 0.37 in. for Sep, 0.61 in. for Oct, 0.45 in. for Nov, and 0.0 in. for Dec. Disease incidence (percentage of leaves with symptoms) and severity (percentage of leaf area with symptoms) were assessed on 7 Dec. Five, 6-in.-long row segments were harvested arbitrarily from the middle two rows of each plot. The harvested leaves were bulked and mixed, and disease severity was visually estimated on 30 blindly sampled leaves.

Results: Rainfall was over 5 inches below normal (30-yr avg.) for Oct and Nov. Despite irrigation, the dry weather did not support severe anthracnose development and disease levels were low compared to previous trials at this site. All of the fungicide treatments numerically reduced levels of anthracnose compare to the untreated check (Table 1). However, because of the low and variable levels of disease, differences among treatments were not statistically significant. None of the treatments caused leaf injury (phytotoxicity) symptoms.

Table 1. Fall 2012 spinach fungicide trial for control of anthracnose

Treatment and rate/A (timing)[z]	Anthracnose (%)	
	Leaves with disease	Leaf area with disease
Fontelis 1.7F 1.5 pt (1-5)	3.3 a[y]	0.4 a
Cabrio 20WG 1 lb (1-5)	9.1 a	0.9 a
Fontelis 1.7F 1 pt + Cabrio 20WG 1 lb (1-5)	0.0 a	0.0 a
Switch 62.5WG 14 oz (1-5)	4.2 a	0.3 a
Switch 62.5WG 11 oz + Cabrio 20WG 1 lb (1-5)	5.8 a	1.4 a
Vanguard 75WG 7.5 fl oz (1-5)	8.2 a	1.0 a
Vanguard 75WG 7.5 fl oz + Cabrio 20WG 1 lb (1-5)	7.5 a	0.9 a
Priaxor 4.17F 4 fl oz (1-5)	4.2 a	0.3 a
Luna Sensation 4.2F 7.6 fl oz (1-5)	3.1 a	0.6 a
Untreated check	10.0 a	2.3 a
LSD (P=0.05)[x]	NS	NS

[z] 1-5 correspond to the spray dates of 1=16 Oct, 2= 24 Oct, 3=31 Oct, 4=8 Nov, and 5=19 Nov.

[y] Values in a column followed by the same letter are not statistically different according to Fisher's least significant difference test.

[x] Fisher's least significant difference, NS=treatment effect not significant at P=0.05.

Table of Contents

Control of Spinach White Rust Fall 2012

John Damicone and Tyler Pierson
OSU Department of Entomology and Plant Pathology

Methods: The objective of this study was to identify the best starting point for calendar and weather-based fungicide programs in order to minimize the number of applications while maintaining good disease control. The experiment was conducted at the Entomology and Plant Pathology Research Farm in Stillwater in a field of Easpur loam previously cropped to spinach. The field was planted with the cultivar 'Melody' on 24 Sep at a seeding rate of two seeds per inch. The herbicide Dual Magnum II 7.6E at 0.75 pt/A was broadcast post-emergence on 1 Oct. Plots were top-dressed with granular fertilizer (46-0-0 lb/A, N-P-K) on 22 Oct. Plots consisted of 4-row beds, 20-ft long, with rows spaced 14 in. apart. The experimental design was a randomized complete block with four replications separated by a 5-ft-wide fallow buffer. The first spray for the calendar (7-day) program, and monitoring of the weather based program (Spinach White Rust Advisor; http://agweather.mesonet.org/) began at the first true leaf stage, 7 days after first true leaf, and 14 days after first true leaf. Applications made according to the weather-based program were made within 3 days of a spray recommendation. Following each application made according to the weather-based program, plots were considered protected for the next 7 days. For each program and starting point, the fungicides Cabrio 20WG at 0.75 lb/A and Presidio 4F at 4 fl oz/A were alternated with Cabrio applied first. Fungicides were broadcast using flat-fan nozzles (Tee-jet 8002vk) spaced 18-in. apart with a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 26 gal/A at 40 psi. Plots received a total of 3.0 inches of sprinkler irrigation at 0.125 to 0.25 in. water per application as needed to promote crop and disease development. Rainfall during the cropping period (24 Sep to 7 Dec) totaled 0.37 in. for Sep, 0.61 in. for Oct, 0.45 in. for Nov, and 0.0 in. for Dec. Disease incidence (percentage of leaves with symptoms) and severity (percentage of leaf area with symptoms) were assessed on 29 Nov. Five, 6-in.-long row segments were harvested arbitrarily from the middle two rows of each plot. The harvested leaves were bulked and mixed, and disease severity was visually estimated on 30 blindly sampled leaves.

Results: Rainfall was over 5 inches below normal (30-yr avg.) for Oct and Nov. White rust developed to severe levels, but only in parts of two of the four blocks of treatments. In the other areas of the trial, white rust only reached trace levels. Because of the variability in levels of white rust, treatments were not statistically significant. However, advisory treatments had numerically higher levels of white rust that the calendar applications, which provided complete disease control (Table 1). The advisory program did not recommend any fungicide applications because of the dry weather.

Table 1. Fall 2012 spinach fungicide trial for control of white rust.

		White rust (%)	
Program - Starting point (timing)[z]	Sprays (no.)	Leaves w/ rust	Leaf area w/ rust
Calendar - 1^{st} true leaf (1-5)	5	0.0 a[y]	0.0 a
Calendar - 1^{st} true leaf + 7 d (2-5)	4	0.0 a	0.0 a
Calendar - 1^{st} true leaf + 14 d (3-5)	3	0.8 a	0.0 a
Advisory - 1^{st} true leaf	0	20.0 a	2.8 a
Advisory - 1^{st} true leaf + 7 d (A1, A2)	0	23.3 a	3.6 a
Advisory - 1^{st} true leaf + 14 d (A2)	0	10.8 a	1.2 a
Untreated check	0	22.4 a	4.8 a
LSD(P=0.05)[x]		NS	NS

[z] 1-5 correspond to the spray dates of 1=16 Oct, 2= 24 Oct, 3=31 Oct, 4=8 Nov, and 5=19 Nov for the calendar program; no sprays were recommended by the advisory program.
[y] Values in a column followed by the same letter are not statistically different according to Fisher's least significant difference test.
[x] Least significant difference, NS=treatment effect not significant.

Table of Contents

Control of Spinach White Rust Spring 2013

John Damicone and Tyler Pierson
OSU Department of Entomology and Plant Pathology

Methods: The objective of this study was to identify the best starting point for calendar and weather-based fungicide programs in order to minimize the number of applications while maintaining good disease control. The experiment was conducted at the Entomology and Plant Pathology Research Farm in Stillwater in a field of Easpur loam previously cropped to spinach. Granular fertilizer (75-0-0 lb/A, N-P-K) was incorporated into the soil on 19 Feb. The cultivar 'Melody" was planted on 8 March at a rate of two seeds per inch. The herbicide Dual Magnum II 7.6E at 0.75 pt/A was broadcast post-emergence on 22 Mar. Plots were top-dressed with granular fertilizer (46-0-0 lb/A, N-P-K) on 16 Mar. Plots consisted of 4-row beds, 20-ft long, with rows spaced 14 in. apart. The experimental design was a randomized complete block with four replications separated by a 5-ft-wide fallow buffer. The first spray for the calendar (7-day) program, and monitoring of the weather based program (Spinach White Rust Advisor; http://www.mesonet.org/) began at the first true leaf stage, 7 days after first true leaf, and 14 days after first true leaf. Applications made according to the weather-based program were made within 3 days of a spray recommendation. Following each application made according to the weather-based program, plots were considered protected for the next 7 days. For each program and starting point, the fungicides Cabrio 20WG at 0.75 lb/A and Presidio 4F at 4 fl. oz./A were alternated with Cabrio applied first. Fungicides were broadcast using flat-fan nozzles (Tee-jet 8002vk) spaced 18-in. apart with a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 26 gal/A at 40 psi. Plots received a total of 2 inches of sprinkler irrigation at 0.125 to 0.25 in. water per application as needed to promote crop and disease development. Rainfall during the cropping period (8 Mar to 17 May) totaled 1.12 in. for Mar, 5.33 in. for Apr, and 1.16 in. for May. Disease incidence (percentage of leaves with symptoms) and severity (percentage of leaf area with symptoms) were assessed on 17 May. Five, 6-in.-long row segments were harvested arbitrarily from the middle two rows of each plot. The harvested leaves were bulked and mixed, and disease severity was visually estimated on 30 blindly sampled leaves.

Results: Rainfall was below normal (30-yr avg.) for March, but above normal in April and May. Average daily temperatures were well below normal each month. White rust developed to severe levels in the untreated check, but most of the disease occurred in one block. All fungicide programs reduced disease incidence compared to the check (Table 1). Disease severity was numerically reduced for all fungicide programs compared to the untreated check, but because of the variability in levels of white rust, treatments were not statistically significant. The programs that provided the best disease control with the fewest number of applications were the calendar program starting at 1st true leaf + 14 days and the advisory program starting at first true leaf.

Table 1. Spring 2013 spinach fungicide trial for control of white rust.

Program - Starting point (timing)[z]	Sprays (no.)	White rust (%)	
		Leaves w/rust	Leaf area w/rust
Calendar - 1st true leaf (1-4)	4	0.0 b[y]	0.00 a
Calendar - 1st true leaf + 7 d (2-4)	3	0.8 b	0.04 a
Calendar - 1st true leaf + 14 d (3-4)	2	0.0 b	0.00 a
Advisory - 1st true leaf (A1,A3)	2	3.3 b	0.13 a
Advisory - 1st true leaf + 7 d (A2,A3)	2	13.3 b	1.73 a
Advisory - 1st true leaf + 14 d (A3)	1	19.9 ab	2.50 a
Untreated check	0	38.3 a	9.00 a
P>F[x]		<0.01	NS

[z] Spray timings 1 to 4 correspond to the spray dates of 1=16 Apr, 2=22 Apr, 3=29 Apr, and 4=7 May for the calendar program; A1 to A3 correspond to the spray dates of A1=25 Apr, A2=29 Apr, and A3=10 May made according to the advisory program.
[y] Values in a column followed by the same letter are not statistically different at P=0.05.
[x] Probability of a significant treatment effect.

Table of Contents

Control of Anthracnose and Gummy Stem Blight on Watermelon 2013

John Damicone and Tyler Pierson
OSU Department of Entomology and Plant Pathology

Methods: The experiment was conducted at the Entomology/Plant Pathology Research Farm in Stillwater, OK in a field of Easpur loam previously cropped to wheat. Granular fertilizer (50-0-0 lb/A N-P-K) was incorporated into the soil prior to direct seeding the cultivar 'Crimson Sweet' on 20 Jun. The herbicides Sonalan 3E at 3.5 pt/A and Permit 75DF at 0.75 oz/A were broadcast after planting to control weeds. Plots were top-dressed with granular fertilizer (50-0-0 lb/A N-P-K) on 19 Jul. Plots were single, 25-ft-long rows spaced 15 ft apart. Plots were thinned to a 2-ft within row spacing. Insects were controlled with Warrior 1F at 3.84 fl oz/A on 29 Aug. Treatments were arranged in a randomized complete block design with four replications and a 10-ft fallow buffer separating replications. Fungicides were broadcast through flat-fan nozzles (8003vk) spaced 18-in. apart using a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 33 gal/A at 40 psi. Applications were made on ca. 7-d intervals beginning 5 Aug. Plots were inoculated with the anthracnose fungus by spreading 50 ml of oat kernels colonized by the fungus along the center of each plot on 5 Aug. Rainfall during the cropping period totaled 5.57 in. for Jul, 2.54 in. for Aug, and 1.69 in. for Sep. Plots received 11 applications of sprinkler irrigation that totaled 4.6 in. of water. Disease incidence was assessed by visually estimating disease incidence (percentage of leaves with symptoms of foliar disease that included defoliation) and defoliation (percentage of leaves defoliated) in three areas of each plot on 23 Sep. Yield of marketable watermelons weighing ≥12 lb was taken on 25 Sep. Watermelons were classified as diseased or healthy based on the presence or absence of anthracnose lesions.

Results: Rainfall was above normal (30 yr avg.) in July, nearly normal in Aug, and below normal in Sep. The average daily temperature was below normal for Jul and Aug, but above normal in Sep. Conditions generally favored foliar disease development. Both anthracnose and gummy stem blight appeared in plots during Aug and reached severe levels by harvest. Anthracnose appeared to be more prevalent, but the presence of gummy stem blight may have resulted in higher levels of foliar disease than in previous trials. All treatments reduced disease incidence and defoliation compared to the untreated check. Treatments with Penncozeb generally provided the best control. Yields of healthy and total melons were numerically lowest for the untreated check, but treatment effects on yield were not significant. Treatments did not provide control of fruit infections as observed in previous trials. None of the treatments caused phytotoxicity symptoms.

Table 1. 2013 Watermelon fungicide trial for control of anthracnose and gummy stem blight.

Treatment and rate/A (timing)[z]	Diseased leaves (%)[y]	Defoliated leaves (%)	Yield (cwt/A)		
			Healthy	Diseased	Total
Bravo 6F 2 pt (1-6)	45.8 cd[x]	22.1 cd	94.1 a	59.9 a	153.9 a
Bravo 6F 2 pt (1,3,5) Quadris Top 2.72F 14 fl oz (2,4,6)	58.3 bc	36.7 bcd	102.0 a	89.8 a	191.8 a
Penncozeb 75DF 3 lb (1-6)	36.2 d	21.2 d	117.6 a	79.8 a	197.4 a
Penncozeb 75DF 2 lb + Topsin 70W 0.5 lb (1-6)	31.7 d	17.1 d	120.3 a	60.6 a	180.9 a
Catamaran 5.3F 5 pt (1-6)	63.3 bc	35.0 bcd	62.5 a	95.7 a	158.2 a
Bravo 6F 2 pt (1,3,5) Fontelis 1.67F 1 pt (2,4,6)	69.2 b	45.0 b	85.0 a	78.0 a	163.0 a
Bravo 6F 2 pt (1,3,5) Luna Experience 3.3F 17 fl oz (2,4,6)	61.6 bc	41.7 bc	126.8 a	61.5 a	188.3 a
Bravo 6F 2 pt (1,3,5) Luna Sensation 4.2F 7.6 fl oz (2,4,6)	46.2 cd	23.7 cd	194.0 a	104.9 a	298.9 a
Untreated check	94.2 a	78.3 a	33.3 a	73.8 a	107.1 a
P>F[w]	<0.01	<0.01	0.21	0.85	0.24

[z] Numbers (1 to 5) correspond to the spray dates of 1=5 Aug, 2=15 Aug, 3=21 Aug, 4=28 Aug, 5=4 Sep, and 6 =11 Sep.
[y] Leaves with symptoms of anthracnose and/or gummy stem blight on 23 Aug.
[x] Values in a column followed by the same letter are not significantly different at P=0.05.
[w] Probability of a significant treatment effect.

Table of Contents

Weed Management

Postemergence Weed Control in Pepper, Hydro, OK

Lynn Brandenberger and Danielle Williams
Oklahoma State University
In Cooperation with Schantz Family Farms

Introduction: Pepper production in Oklahoma includes pepper for fresh market and for processing. Weed control during the growing season is critical due to the competitiveness of several weed species with peppers. Weed control by existing preemergence herbicides is supplemented by cultivation and hand hoeing. Although effective, it is expensive to hire hoe crews for weed control. Therefore a need exists to identify potential postemergence herbicides that can be used for controlling broadleaf weeds in pepper fields. The objective of this study was to screen several herbicides that have potential for weed control in commercial pepper production when applied later in the season postemergence with a shielded sprayer.

Methods and Materials: The field used for the study was transplanted to the pepper cultivar 'Okala' on 4/30/13. Row spacing was three feet between row centers with a transplant in-row spacing of 24 inches. The study included eight different herbicide treatments that utilized four different herbicides Fierce (flumioxazin + pyroxasulfone), League (imazosulfuron), Sharpen (saflufenacil), and glyphosate it also included a non-treated check and Soft Cede II water conditioner was added to each herbicide treatment (Table 1). All treatments were applied to plots eight rows wide (24 feet) by 40 feet in length in a randomized block design with four replications. Applications were started on 7/10/13 and finished on 7/12/13. Treatment applications were made with a commercial shielded sprayer at an overall rate of 15 gallons of spray solution per acre. Treatments were rated for injury on 7/25/13 and 9/17/13, as were plant counts of Palmer amaranth (Amaranthus palmeri), carpetweed (*Mollugo verticillata* L.), spurge (*Euphorbia* species), and morning glory (*Ipomoea* species). Fresh weights were recorded for five pepper plants per plot on 10/08/13.

Results and Discussion: No differences were observed between treatments or the non-treated check for crop injury, weed control or for fresh weights of plants on any date that data were recorded (Table 1). Crop injury was zero for all treatments and the non-treated check on 7/25. On 9/17 injury to the crop ranged from zero for non-treated check to 6.3% for Fierce at 0.621 lbs. ai/acre. Very little Palmer amaranth was observed in the plots with the highest occurrence being 0.8 per plot on 7/25 for only one treatment. Carpetweed on 7/25 ranged from 1.8 for League at 0.094 lbs. ai/acre to 3.5 carpetweeds per plot for League at 0.1875 lbs. ai/acre. Carpetweed counts were somewhat higher on 9/17 and ranged from 4.0 to 10.5 weeds per plot. Spurge ranged from 2.0 to 13.0 on 7/25 and from 5.5 to18.3 spurge per plot on 9/17. Morning glory counts ranged from 0.3 to 6.8 on 7/25 and went to nearly zero for a majority of plots on 9/17. Weight of 5 random plants per plot did not vary between treatments and ranged from 11.9 to 13.3 lbs. per plot.

Conclusions: Although no differences were observed between treatments or the non-treated check for weed counts there was possibly very low weed pressure in the study field or conditions were not favorable for weed development. That said there were also no differences observed for crop injury or crop fresh weight which indicates to the authors that none of the treatments as applied were detrimental to crop development and growth. In conclusion the authors would suggest that further testing of these herbicides is needed to determine their potential for weed control in commercial pepper production under higher weed pressure.

Acknowledgements: The authors want to thank the Schantz family for their help and support in completing this study. We also want to thank BASF and Valent companies for product support.

Table 1. 2013 Pepper postemergence weed control, Hydro, OK

Treatments			Palmer amaranth		Carpetweed		Spurge		Morning glory		Fresh weight
	7/25	9/17	7/25	9/17	7/25	9/17	7/25	9/17	7/25	9/17	5 plts.
lbs. ai/acre	----% injury----		--------------Number of weeds per plot on 6/19/13---------------								lbs.
Non-treated check	0a^{z}	0.0a	0.0a	0.0a	2.0a	7.0a	5.3a	10.3a	4.3a	0.3a	13.1a
League 0.094	0a	1.3a	0.0a	0.0a	1.8a	4.0a	4.8a	11.3a	2.0a	0.3a	13.2a
League 0.1875	0a	1.3a	0.0a	0.0a	3.5a	8.0a	2.0a	10.0a	2.8a	0.0a	12.9a
League 0.375	0a	1.3a	0.0a	0.0a	2.8a	5.5a	6.8a	9.8a	0.3a	0.0a	13.0a
Fierce 0.414	0a	5.0a	0.8a	0.0a	2.8a	8.0a	2.5a	9.0a	0.8a	0.0a	13.3a
Fierce 0.621	0a	6.3a	0.3a	0.0a	2.5a	7.5a	2.5a	5.5a	6.8a	0.0a	12.8a
League 0.1875 + Sharpen 0.033	0a	3.8a	0.0a	0.0a	3.8a	9.0a	13.0a	18.3a	0.3a	0.0a	12.5a
League 0.1875 + Fierce 0.0621	0a	3.8a	0.3a	0.0a	2.3a	10.5a	4.5a	9.5a	0.8a	0.0a	11.9a
Sharpen 0.0334 + glyphosate 1.0	0a	3.8a	0.0a	0.0a	3.3a	8.5a	2.5a	7.3a	2.3a	0.3a	12.8a

^{z}Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table of Contents

Preemergence Weed Control in Pepper, Hydro, OK

Lynn Brandenberger and Danielle, Williams
Oklahoma State University
In Cooperation with Schantz Family Farms

Introduction: Pepper production in Oklahoma includes pepper for fresh market and for processing. Weed control during production is critical due to the competitiveness of several weed species with peppers. Some herbicides are labeled for this crop, but are not effective enough to be the sole means of control. Weed control by herbicides is supplemented by cultivation and hand hoeing. Although effective, it is difficult and expensive to hire hoe crews for weed control. Costs for hand hoeing can be several hundred dollars per acre if labor is available. Therefore there is a need to identify potential preemergence herbicides that can be utilized for controlling broadleaf weeds in pepper fields. The objective of this study was to screen herbicides that may have potential for weed control in commercial pepper production when applied early in the season as a preemergence application.

Methods and Materials: The study field was transplanted to the pepper cultivar 'Okala' on 5/13/13 and treatments were applied pre-transplant on the same day. Row spacing was three feet between row centers with a transplant in-row spacing of 24 inches. The study included two different herbicides Devrinol (napropamide) and League (imazosulfuron) with three rates for each herbicide (Table 1). Both were applied pre-transplant on the same day that the plots were transplanted. All treatments were applied to plots one row wide (3 feet) by 20 feet in length in a randomized design with four replications on 5/13. Treatment applications were with a hand boom CO_2 sprayer at an overall rate of 25 gallons of spray solution per acre. Treatments were rated for injury and plant counts of Palmer amaranth (Amaranthus palmeri) buffalo burr (*Solanum rostratum* Dun.*),* carpetweed (*Mollugo verticillata* L.), and morning glory (*Ipomoea* species) on 6/19, fresh weights were recorded for five pepper plants per plot on 10/08/13.

Results and Discussion: No differences were observed for crop injury, number of weeds per plot or the fresh weight of five plants in the fall (Table 1). Injury ranged from 2.5 to 21.7% on 6/19 and from 2.5 to 26.7% on 7/25. League at 0.375 lbs. ai/acre recorded the highest levels of injury on both 6/19 and 7/25. Counts of weed species were made on 6/19 and did not vary between treatments. Palmer amaranth and buffalo burr weed counts were very low ranging from zero to 0.8 plants per plot. Carpetweed numbers ranged from zero to 2.3 with Devrinol at 1.0 lb. ai/acre recording the highest number of carpetweeds per plot. Morningglory numbers were highest for the three Devrinol treatments which ranged from 3.3 to 8.0 morningglories per plot. Fresh weight of five plants per plot on 10/08/13 did not vary and ranged from 12.7 to 16.6 lbs.

Conclusions: Although no differences were recorded there were some trends that should be considered. First, injury in general was higher for League treatments although League at 0.094 and 0.1875 lbs. ai/acre had injury ratings of only11.3 and 6.3%, respectively, on 7/25/13. Second, weed control was generally lower for Devrinol treatments particularly for carpetweed and morningglory. Last none of the treatments appears to have any effect on yield potential. The authors would conclude by stating that further study is needed to fully determine the effect of these treatments on weed control and crop response.

Acknowledgements: The authors want to thank the Schantz family for their help and support in completing this study. We also want to thank Valent company for product support.

Table 1. 2013 Pepper preemergence weed control, Hydro, OK

Treatments	6/19	7/25	Palmer Amaranth	Carpetweed	Buffalo Burr	Morning glory	Weight 5 plants
lbs. ai/acre	------% injury------		-------Number of weeds per plot on 6/19/13-------				Lbs.
League 0.094	16.3 a[z]	11.3 a	0.0 a	0.0 a	0.0 a	0.5 a	16.3 a
League 0.1875	21.3 a	6.3 a	0.0 a	0.0 a	0.0 a	1.8 a	12.7 a
League 0.375	21.7 a	26.7 a	0.0 a	0.0 a	0.0 a	1.3 a	15.1 a
Devrinol 1.0	3.8 a	11.3 a	0.3 a	2.3 a	0.0 a	3.3 a	15.0 a
Devrinol 2.0	2.5 a	8.8 a	0.3 a	0.5 a	0.0 a	4.5 a	15.3 a
Devrinol 3.0	5.0 a	2.5 a	0.3 a	0.3 a	0.8 a	8.0 a	16.6 a

[z]Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Figure 1. Pepper preemergence weed control, Hydro, OK

Table of Contents

Preemergence Weed Control in Pumpkin, Bixby, OK

Oklahoma State University Vegetable Research Station
Lynn Brandenberger and Danielle Williams
Oklahoma State University

Introduction: Cucurbits are a major group of warm season vegetables grown throughout the world for fresh and processing markets. Of this group of crops, pumpkin (*Cucurbita pepo*) is a favorite in the U.S. for fall markets. This fast growing vine crop is normally direct seeded in June or early July for fall production in Oklahoma. Weed control for pumpkin is critical during the establishment growth phase prior to the crop shading the ground from vining. The objectives of this study included determining the safety of different herbicides and herbicide combinations on crop growth and yield, and the efficacy of those same herbicides for control of different weed species.

Methods and Materials: The study was initiated on 7/9/13 at the Oklahoma State University Vegetable Research Station in Bixby, Oklahoma. Treatments were replicated four times in randomized block design. Plots consisted of one row of direct seeded pumpkins 20 feet long with 20 feet between rows and a seeding spacing of one foot between seeds in the row. Rows consisted of free-standing raised beds created with a bed shaper/drip-tape layer approximately 24 inches wide on top of the bed. Drip irrigation was used to irrigate on an as needed basis and 20-20-20 was applied through the drip irrigation twice a week for a total of 100 lbs. of nitrogen per acre. Soil in the study area was a Choska very fine sandy loam pH 6.0. The study included seven different herbicide treatments using Reflex (fomesafen) and Dual Magnum (S-metolachlor) alone and in combination (table 1) and also untreated and weeded checks. All treatments were applied preemergence following direct seeding of the pumpkin cultivar 'Orange Smoothie' except for the Reflex preemergence + Dual Magnum 4 WAP (WAP=weeks after planting) treatment where Dual Magnum was applied after planting.
Ratings were taken on three different dates including 7/29/2013, 8/08/2013, and 8/19/2013. Ratings included: Percent injury to the crop where 0=no injury and 100=complete death of the crop; Percent control of weed species where 0=no control and 100=no weed growth. Other data recorded included plot yields on 8/19/2013.

Results and Discussion: No differences were observed for crop injury on any of the three days that ratings were recorded (Tables 1 and 2). On 7/29 injury ranged from 3.8% for the untreated check to 13.8% for the Reflex + Dual Magnum 4WAP treatment. Injury ranged from 3.8 to 20% on 8/08 and from 8.8 to 22.5% on 8/19. Although ratings were higher on 8/19, injury increased for all treatments even the untreated check, which could possibly be explained by incidence of a potyvirus in the crop. Injury was primarily observed as reduced crop growth.
Weed control ratings were recorded for both carpetweed (*Mollugo verticillata* L.) and amaranth (*Amaranthus palmeri* S. Wats.). Control ratings for all three dates were highest for the herbicide treatments compared to the untreated and weeded checks for a majority of days (Tables 1 and 2). Carpetweed control ranged from 18.8% for the weeded check to 91.3% on 7/29 with all herbicide treatments recording higher levels of control than the

checks. Control on 8/08 for carpetweed ranged from zero to 88.8% for the untreated check and Reflex + Dual Magnum, respectively. Both combinations of Reflex + Dual Magnum (preemergence treatment and preemergence + 4 WAP) recorded 91.3% control of carpetweed on 8/19 compared to 32.5% control for the untreated check. Amaranth control was highest for Dual Magnum pre, Reflex 0.37, Reflex 0.49, and Reflex + Dual Magnum pre with control ranging from 91.3 to 95.0% compared to 15.0% for the weeded check on 7/29. On 8/08 Reflex at 0.49 and 0.37, and Dual Magnum at 0.95 provided the highest level of amaranth control compared to both the untreated and weeded checks. Amaranth control did not vary between the weeded check and the herbicide treatments on 8/19, but all had higher levels of control than the untreated check. Counts of amaranth were also recorded on 8/19. Numbers of amaranth were highest for the untreated check (37.3) compared to all other treatments which ranged from 0.8 to 7.8 plants per plot.
Yield did not vary between the treatments or the untreated and weeded checks (Table 2). Plot yields ranged from 25.7 lbs. to 36.8 lbs. per plot with a majority of treatments/checks yielding 30 lbs. or higher.

Conclusions: Generally all herbicide treatments in the study provided higher levels of weed control than the untreated check and in several instances higher than the weeded check. Most herbicide treatments provided adequate control for carpetweed, but the Reflex + Dual Magnum preemergence tank-mix resulted in control over 90% for two of the three ratings. Reflex alone at 0.37 and 0.49 provided good control of amaranth in the study while Reflex + Dual Magnum at 4WAP tended to provide less control of amaranth likely due to the delayed application of Dual Magnum. Dual Magnum applied preemergence and Dual Magnum in combination with Reflex (preemergence tank-mix) also provided control of 90% or higher for all three amaranth ratings. Although yields were approximately ½ of what has been observed in previous pumpkin trials there were several compounding factors that may have caused lower yields. First, a viable stand was not obtained from the first planting that was done in June, therefore the study got off to a late start in July. Second, the study became infected with potyvirus which resulted in less vigorous growth and subsequently lower yields. Pumpkins were also harvested a few weeks early due to the virus. All these factors had their effect on yield. In conclusion, the authors would consider that Reflex and Dual Magnum applied singly and in combination as a tank mix did not cause overly high levels of crop injury and provided more than adequate levels of weed control.

Acknowledgements: The authors want to thank Syngenta Inc. for support of this study. We would also like to thank Bobby Adams of the Oklahoma State University Vegetable Research Station for maintenance and care.

Table 1. 2013 Pumpkin preemergence herbicide study at Bixby, OK. Crop injury and control of carpetweed and Palmer amaranth on 7/29/2013 and 8/08/2013.

	-----Injury----- %		-----Carpetweed----- control %		----Palmer amaranth---- control %	
Treatment lbs. ai/acre	7/29/2013	8/08/2013	7/29/2013	8/08/2013	7/29/2013	8/08/2013
Untreated check	3.8 a[z]	3.8 a	36.3 b	0.0 b	46.3 b	0.0 d
Weeded check	8.8 a	15.0 a	18.8 b	83.8 a	15.0 b	75.0 c
Reflex 0.19 pre	5.0 a	5.0 a	88.3 a	83.3 a	81.7 a	78.3 bc
Reflex 0.25 pre	9.0 a	9.0 a	82.0 a	84.0 a	89.0 a	91.0 abc
Reflex 0.37 pre	8.8 a	11.3 a	86.3 a	86.3 a	93.8 a	93.8 ab
Reflex 0.49 pre	8.8 a	10.0 a	80.0 a	83.8 a	92.5 a	95.0 a
Reflex 0.25 + Dual Magnum 0.95 pre	12.5 a	11.3 a	91.3 a	88.8 a	91.3 a	90.0 abc
Dual Magnum 0.95 pre	10.0 a	10.0 a	88.8 a	81.3 a	95.0 a	93.8 ab
Reflex 0.2495 pre + Dual Magnum 4 WAP 0.95	13.8 a	20.0 a	82.5 a	82.5 a	81.3 a	81.3 abc

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table 2. 2013 Pumpkin preemergence herbicide study at Bixby, OK. Crop injury, control of carpetweed and Palmer amaranth, and plot yields on and 8/19/2013.

	8/19/2013				
Treatments lbs. ai/acre	**Injury %**	**Carpetweed control %**	**Palmer amaranth control %**	**Palmer amaranth plant counts** #/plot	**Plot yield lbs.**
Untreated check	8.8 a[z]	32.5 b	42.5 b	37.3 a	33.3 a
Weeded check	21.3 a	90.0 a	87.5 a	7.8 b	34.9 a
Reflex 0.19 pre	11.7 a	90.0 a	86.7 a	7.3 b	25.7 a
Reflex 0.25 pre	22.0 a	90.0 a	90.0 a	6.8 b	30.4 a
Reflex 0.37 pre	21.3 a	91.0 a	97.5 a	3.6 b	36.8 a
Reflex 0.49 pre	18.8 a	85.0 a	92.5 a	2.5 b	34.4 a
Reflex 0.25 + Dual Magnum 0.95 pre	22.5 a	91.3 a	91.3 a	1.8 b	31.1 a
Dual Magnum 0.95 pre	16.3 a	87.5 a	92.5 a	1.8 b	35.1 a
Reflex 0.2495 pre + Dual Magnum 4 WAP 0.95	18.8 a	91.3 a	83.8 a	0.8 b	30.5 a

[z] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table of Contents

Weed Control in Sweet Potato, Albert, OK

Lynn Brandenberger and Danielle Williams Oklahoma State University
Cooperating with Hydro Sweet Potato Inc.

Introduction: Sweet potato is an important crop for both processing and fresh market growers in Oklahoma. As a warm season root crop, sweet potato does well in the summer heat of this region. Weed control is critical for this crop during its establishment period, particularly during the first few weeks after transplanting. The use of preemergence herbicides to control weeds during the critical establishment period will reduce the cost of hand weeding and help ensure a vigorous start for commercial crops. The objectives of this study were to determine the crop safety of different preemergence herbicides and their effectiveness for control of weed species under commercial conditions.

Methods and Materials: Six different herbicides (Dual Magnum/S-metolachlor, Valor sx/flumioxazin, Fierce/flumioxazin + pyroxasulfone, Reflex/fomesafen, Prefix/S-metolachlor + fomesafen, and Lorox/linuron) were used alone and in combination for a total of 14 treatments along with non-treated and weeded checks (Table 1). Plots were replicated four times in a randomized block design where each plot consisted of four rows of sweet potatoes on 36” row centers 20’ in length. Pre and post-transplant treatment applications were made on 6/12/13 with a tractor-mounted PTO driven pump sprayer (cone tank, 12’ wide boom with seven Tee Jet DG 11004 nozzles) at a spray volume of 25 gpa at 38 psi. Following the application of pre-transplant treatments the entire study area was transplanted with ‘Beauregard’ sweet potato slips using a commercial transplanter and crew (approximately 20 slips for each 20’ long plot). Post-transplant treatments were applied the same day as transplanting except for the second application (4 weeks after transplanting) of Dual Magnum for the Valor sx + Dual Magnum post-transplant + Dual Magnum 4 WAT treatment which was applied on 7/10/13 using a CO_2 hand boom sprayer with a six foot wide boom, again at a rate of 25 gpa. This was done to reduce damage to growing vines and was more convenient. Crop water and fertility needs were provided with the same program that the commercial field utilized and included overhead irrigation from a pivot system and several fertilizer applications. Crop plant counts were recorded on 6/19 and crop injury ratings and weed counts were recorded on 7/10 and 7/25. Weeded check plots were weeded on 6/19, 7/10, and 7/25. One inside row (row 3 of 4) for each plot was harvested on 10/23 using a one row digger and data recorded included weight of U.S. # 1’s, canners, jumbos, and culls.

Results and Discussion: Plant counts on 6/19 did not vary between treatments and ranged from 9 to 15 plants per plot (data not shown). Crop injury (Table 1) did not vary on either day that ratings were recorded for any of the treatments, weeded or non-treated checks. Initial ratings ranged from 8.8 to 26.3% injury while the second ratings ranged from zero to nearly nine percent.

Numbers of weeds per plot did not vary for either date (7/10 and 7/25) for either weed species (Palmer amaranth and carpetweed) (Table 1). On 7/10 the number of Palmer amaranth ranged from zero to 0.8 and carpetweed ranged from zero to 0.3 plants per plot. Weed counts on 7/25 ranged from zero to 4.3 for Palmer amaranth and from zero to 9.0 for carpetweed.

Yield for the treatments, weeded, and non-treated checks did not vary for any of the categories (U.S. # 1's, canners, jumbos, culls, total marketable, % of U.S. # 1's) (Table 2). Yield of U.S. # 1's ranged from 159.3 (weeded check) to 385.3 bu./acre (Reflex pre-transplant at 0.25 lbs. ai/acre). Percent U.S. # 1's ranged from 26 to 53% for the non-treated check and the weeded check, respectively. Canner yields were 39.8 bu./acre for the weeded check and 137.8 bu./acre for Lorox pre-transplant at 0.75 lbs. ai/acre. Jumbo yield ranged from 182.8 bu./acre (weeded check) to 577.3 bu./acre (Reflex pre-transplant at 0.25). Total marketable yield ranged from 382.0 bu./acre for the weeded check to 1,063 bu/acre for Reflex pre-transplant at 0.25 lbs. ai/acre. Culls ranged from 19.8 (Dual Magnum post-transplant at 1.24 lbs. ai/acre) to 62.3 bu./acre (Lorox + Valor sx pre-transplant at 0.75 and 0.10 lbs. ai/acre, respectively).

Conclusions: Although no differences were observed between treatments for any of the recorded data there are some trends that the authors would like to point out. First, the weeded check had lower yields than any of the treatments except for culls. Second, Reflex pre-transplant at 0.25 lbs. ai/acre yielded well overall and would appear to have some potential for future work. Other treatments that yielded well overall also included Lorox post-transplant, Valor sx + Dual Magnum pre-transplant, Valor sx pre-transplant at 0.06 lbs. ai/acre, and Lorox + Valor pre-transplant. The authors would further conclude that there were stand problems in many plots with the highest percent stand at approximately at 75% the remainder averaging approximately 59%. This variability in stands could account for the lack of differences recorded in the study. Part of the stand issue was likely caused from high temperatures during transplanting (95-100°F).

Acknowledgements: The authors would like to thank Hydro Sweet Potato Inc. for their help and support in this study, particularly Jonathan Robbins for arranging field support and field space for the study. The authors would also like to thank Valent Inc. for partial support of the study.

Table 1. 2013 Weed control in sweet potato, Albert, OK, Crop injury and efficacy.

Treatment[z]	lbs. ai/ acre	Crop Injury[y] 7/10/13	Crop Injury[y] 7/25/13	Palmer amaranth 7/10/13	Palmer amaranth 7/25/13	Carpetweed 7/10/13	Carpetweed 7/25/13
		-------------%-------------		------------------# of weeds per plot (Weed counts)------------------			
Weeded check	NA	13.8 a[x]	0.0 a	0.0 a	3.5 a	0.0 a	4.3 a
Non-treated check	NA	18.8 a	1.3 a	0.0 a	2.3 a	0.3 a	1.3 a
Dual Magnum poT	1.24	26.3 a	3.8 a	0.8 a	4.3 a	0.0 a	0.0 a
Valor sx preT	0.06	8.8 a	0.0 a	0.8 a	1.0 a	0.3 a	0.3 a
Valor sx preT	0.10	22.5 a	8.8 a	0.0 a	0.0 a	0.0 a	0.8 a
Lorox preT	0.75	18.8 a	5.0 a	0.3 a	0.0 a	0.0 a	2.3 a
Lorox poT	0.75	11.3 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Fierce preT	0.41	10.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Reflex preT	0.25	12.5 a	0.0 a	0.0 a	0.0 a	0.0 a	3.0 a
Prefix preT	0.99	13.8 a	0.0 a	0.0 a	0.0 a	0.0 a	2.5 a
Lorox + Dual Magnum preT	0.75 1.24	20.0 a	2.5 a	0.0 a	0.3 a	0.0 a	9.0 a
Lorox + Prefix preT	0.75 0.99	17.5 a	1.3 a	0.0 a	0.0 a	0.3 a	2.3 a
Lorox + Fierce preT	0.75 0.41	13.8 a	1.3 a	0.0 a	0.0 a	0.0 a	0.0 a
Lorox + Valor preT	0.75 0.10	13.8 a	2.5 a	0.3 a	0.3 a	0.0 a	3.5 a
Valor sx + Dual Magnum preT	0.10 1.24	16.3 a	2.5 A	0.0 a	0.0 a	0.0 a	1.3 a
Valor sx preT + Dual Magnum poT + Dual Magnum 4 WAT	0.10 1.24 1.24	23.8 a	8.8 a	0.0 a	0.0 a	0.0 a	0.3 a

[z]Treatment application times: poT=post transplant; preT=pre transplant; WAT=weeks after transplanting
[y]Crop injury ratings were made on a zero to 100 scale where zero = no crop injury and 100 = complete death of all crop plants.
[x]Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table 2. 2013 Weed control in sweet potato, Albert, OK, Harvest data.

Treatment[z]	lbs. ai/ acre	U.S. # 1's	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1's
		-----------------------------	Bushels per acre	-----------------------------			-----%-----
Weeded check	NA	159.3 a[y]	39.8 a	182.8 a	382.0 a	21.5 a	53.0 a
Non-treated check	NA	208.3 a	62.5 a	299.0 a	570.0 a	44.8 a	26.0 a
Dual Magnum poT	1.24	268.5 a	98.3 a	396.8 a	763.8 a	19.8 a	34.3 a
Valor sx preT	0.06	381.3 a	91.8 a	403.8 a	876.3 a	48.8 a	44.5 a
Valor sx preT	0.10	189.8 a	63.5 a	204.5 a	457.8 a	27.0 a	40.8 a
Lorox preT	0.75	263.8 a	137.8 a	323.0 a	724.3 a	34.3 a	35.5 a
Lorox poT	0.75	291.0 a	98.8 a	513.0 a	902.5 a	20.8 a	31.5 a
Fierce preT	0.41	286.8 a	77.8 a	369.5 a	734.0 a	28.8 a	41.5 a
Reflex preT	0.25	385.3 a	100.8 a	577.3 a	1063.0 a	38.8 a	36.0 a
Prefix preT	0.99	290.5 a	121.5 a	337.5 a	749.8 a	50.5 a	38.8 a
Lorox + Dual Magnum preT	0.75 1.24	299.0 a	68.5 a	343.0 a	710.8 a	34.3 a	42.0 a
Lorox + Prefix preT	0.75 0.99	246.3 a	110.3 a	385.8 a	741.5 a	52.5 a	33.0 a
Lorox + Fierce preT	0.75 0.41	262.5 a	72.8 a	461.0 a	796.0 a	50.5 a	34.5 a
Lorox + Valor preT	0.75 0.10	327.8 a	87.8 a	397.0 a	812.8 a	62.3 a	38.3 a
Valor sx + Dual Magnum preT	0.10 1.24	327.0 a	109.8 a	442.3 a	878.8 a	58.0 a	38.8 a
Valor sx preT + Dual Magnum poT + Dual Magnum 4 WAT	0.10 1.24 1.24	211.3 a	68.0 a	380.8 a	660.0 a	26.5 a	32.8 a

[z]Treatment application times: poT=post transplant; preT=pre transplant; WAT=weeks after transplanting
[y]Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table of Contents

Weed Control in Seeded Watermelon, Lane, OK

Oklahoma State University Lane Agriculture Center
Jim Shrefler, Lynn Brandenberger and Merritt Taylor

Introduction and Objectives: Watermelon is a major vegetable crop in Oklahoma and requires effective and economical weed control in order for growers to obtain good yields of marketable fruit and earn a profit. Chemical weed control is crucial for commercial growers particularly as labor become scarce and costly. The objective of this study was to determine the crop safety and effectiveness of Reflex herbicide for use in direct seeded, bare soil watermelon production.

Materials and Methods: The study was conducted on a Stigler very fine sandy loam soil at the Wes Watkins Agriculture Research and Extension Center at Lane, Oklahoma (Atoka County). The field was fallow the previous summer and had a grass cover crop winter 2012-2013. The field was disked mid April and fertilizer applied broadcast in late May based on soil test results and Oklahoma Cooperative Extension Service recommendations. On June 11 the field was disked and bedded and watermelon (Delta, a diploid hybrid) was seeded on June 13 with a seed spacing of 2 feet.

Herbicide treatments in this study included preemergence (PRE) application of Reflex (fomesafen) at 4 rates or Strategy (pre mix of ethalfluralin and halosulfuron-methyl), PRE application of Reflex followed by an early post-directed application (EPD) of Dual Magnum (s-metolachlor) and post-directed (PD) application of Reflex at 3 rates. The post-directed Reflex treatments were preceded by a PRE band application of Sandea (halosulfuron-methyl) to a 1 foot band centered on the row at a rate of 0.5 oz per treated acre. There were unweeded and weeded check plots and a check plot that received a band application of Sandea. Treatment details are provided in Table 1.

The study was a randomized block design with four replications. Plots consisted of one plant row 12 feet wide and 25 feet long. Herbicide treatments were applied to a 12 foot wide swath centered on the crop row. Treatments were applied with a CO2 pressurized hand held boom fitted with 8002VS flat fan nozzles, calibrated to apply 15 gal / acre and operated at 30 psi boom pressure. The PD Reflex treatment included Induce nonionic surfactant at 0.25% v/v.

Herbicide applications were made on 6-14 for PRE, 6-27 for EPD and 7-8 for PD treatments. Soil moisture was adequate for rapid crop germination without supplemental watering. Five days after planting there was a 1 inch rainfall. Tensiometers were used to monitor soil moisture and overhead irrigation was used when deemed necessary. An application of Topsin (0.5 lb/acre) and Dithane F45 (2 qt/acre) fungicides was made on 7-12 as a preventive measure and no watermelon diseases were observed over the course of the trial. Following the evaluation of annual grass control on 7-12 the entire trial received a broadcast application of a postemergence grass herbicide (sethoxydim).

Crop data that was collected included crop stunting (6- 27, 7-12 and 7-28), stand reduction (7-12), phytotoxicity (7-12), canopy cover (8-15) and fruit yield (8-22). Yield was determined by removing mature fruits from the field and weighing them individually. Weed control was evaluated visually on 7-12, 7-28 and 8-15 for cutleaf groundcherry (*Physalis angulata*) (PHYAN) and tumble pigweed (A*maranthus albus*) (AMAAL), on 7-12 and 7-28 for carpetweed (MOLVE) (M*ullugo verticillata*) and yellow nutsedge (*Cyperus esculentus*) (CYPES) and on 7-12 for annual grasses (AG), which included primarily broadleaf signalgrass (*Urochloa platyphylla*).

Results and Discussion: Crop response that can be attributed directly to the herbicide treatments was minimal to minor for the PRE treatments and substantial for the PD treatments. PRE treatments did not result in significant stunting, stand reduction or phytotoxicity of watermelon (Table 1). Similarly, Reflex applied PRE followed by the EPD treatment of Dual Magnum had not direct effect on the crop. For the PD treatments there were detrimental effects on watermelon. Significant stunting was observed following the PD applications and was as great as 37%. Significant phytotoxicity resulted from all rates of Reflex applied PD. As the crop approached maturity watermelon vine canopy cover for all treatments that received Reflex was not reduced significantly as compared to the hoed check plot.

Weed responses to PRE treatments are shown in Table 2. Reflex provided very good control of the broadleaf weeds PHYAN, AMAAL and MOLVE while Strategy was especially weak on PHYAN and dropped below acceptable levels for AMAAL at the 7-28 evaluation. Annual grass control was acceptable for all PRE herbicide treatments except for Reflex at the lowest rate. Strategy did not control CYPES while all Reflex treatments gave very good control.

Weed control by the PD treatments is shown in Table 3. For PHYAN and AMAAL, treatment differences were detected only at the 7-12 evaluation. For PHYAN the lowest rate of Reflex was inadequate for satisfactory control. Initial annual grass control was minimal and subsequent evaluations are not available due to the broadcast application of postemergent grass herbicide to the trial. At 7-28 CYPES control was substantial across the Reflex rates.

Control of PHYAN and AMAAL by PRE treatments at crop maturity is shown in Table 4. There were no differences across the rates of Reflex for either weed species. Application of Dual Magnum EPD following Reflex at 16 ounces was equally effective. Strategy gave poor control of PHYAN. Crop canopy cover was reduced in this treatment (Table 1.) and this can be attributed to the abundant weed growth, primarily of PHYAN.

Watermelon yield data is provided in Table 5. Greatest total harvest weights resulted from the Reflex PRE treatments. Within this group of treatments there were no differences in either the number of fruits harvested, the total harvest weight or the average weight per fruit.

In summary, Reflex applied PRE in this study provided excellent control of broadleaf weeds and yellow nutsedge with no appreciable harm to watermelon. PD treatments showed potentially useful weed control but crop injury was excessive. Post directed application may still be possible with alternative application equipment, such as a shielded sprayer. However, due to the prostrate growth habit of watermelon vines such procedures would require careful implementation as the potential for crop injury is quite evident. Strategy herbicide is a useful product for watermelon production when only weed species controlled by the product are present. It appears that Reflex herbicide would offer a good alternative for situations where direct seeded watermelon is planted in land infested with yellow nutsedge , cutleaf groundcherry or other weeds controlled by the product.

Table 1. Crop responses to weed control treatments[z]

Treatments[y] (Pre = Preemergence) (PD= Post Directed) (EPD) = Early Post Directed) Rates in Ounces / Acre	**Crop stunting**			**Stand**	**Phytotoxicity[x]**	**Canopy cover**
	6-27	**7-12**	**7-28**	**7-12**	**7-12**	**8-15**
	Percent reduction in plant size			**Percent reduction of full stand**	**o=none and 100=all foliage abnormal**	**Percent of plot covered by vines**
Non-weeded	0	10 cd[w]	0 c	0	0 c	--
Hoed check	0	0 d	0 c	0	0 c	91 a
Reflex / Pre / 12	15	2.5 d	0 c	2.5	0 c	86 a
Reflex / Pre / 16	12.5	7.5 cd	0 c	5	0 c	92 a
Reflex / Pre / 24	13.7	12.5 b-d	2.5 bc	10	0 c	92 a
Reflex / Pre / 32	18.3	13.3 b-d	6.7 bc	13.3	0 c	93 a
Reflex / PD / 12	7.5	20 a-c	15 a-c	5	17.5 b	76 a
Reflex / PD / 16	15	25 ab	25 a-c	7.5	17.5 b	95 a
Reflex / PD / 24	15	30 a	37.5 a	12.5	35 a	86 a
Untreated / PD / control	8.3	10 cd	26.7 ab	10	0 c	90 a
Strategy / Pre / 48	10	2.5 d	20 a-c	0	0 c	37 b
Reflex / Pre / 16 followed by Dual Magnum / EPD / 16	6.2	5 d	0 c	2.5	1.2 c	90 a

[z]Values are means of 4 replications. [y]PD treatments received a preemergence band treatment (1 foot wide centered on the row) of Sandea (halosulfuron-methyl) at ½ ounce per acre. In the (Untreated / PD / control) weeds were removed manually after the 7-12 evaluation. Reflex PD application was applied 7-8 and included Induce nonionic surfactant @ 0.25%.
[x] Phytotoxicity is leaf burn.[x] Means within a column followed by a common letter are not different based on Duncan's Multiple Range Test with α=0.05.

Table 2. Weed responses to preemergence weed control treatments [z].

Treatments (Pre = Preemergence) (EPD = Early Post Directed) Rates in Ounces / Acre	Percent Weed Control[y]								
	PHYAN[x]		AMAAL		MOLVE		AG	CYPES	
	7-12	7-28	7-12	7-28	7-12	7-28	7-12	7-12	7-28
Non-weeded	0 c[w]	0 c	0 c	0 b	0 c	0 c	0 c	0 b	0 c
Hoed check	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
Reflex / Pre / 12	91 a	91 a	100 a	100 a	99 ab	99 a	62 b	77 a	96 a
Reflex / Pre / 16	100 a	98 a	100 a	100 a	100 a	98 a	84 a	99 a	99 a
Reflex / Pre / 24	100 a	100 a	100 a	100 a	100 a	100 a	90 a	87 a	100 a
Reflex / Pre / 32	100 a	100 a	100 a	100 a	100 a	100 a	96 a	98 a	100 a
Strategy / Pre / 48	35 b	22 a	95 b	71 a	98 b	95 b	99 a	12 b	12 b
Reflex / Pre / 16 followed by Dual Magnum / EPD / 16	99 a	98 a	100 a	100 a	100 a	99 a	85 a	94 a	99 a

[z] Values are means of 4 replications.
[y] Weed control visual evaluation using non-weeded plots as a reference where 0=no control and 100=complete control.
[x] Weed species are PHYAN=Cutleaf groundcherry, AMAAL=Tumble pigweed, MOLVE=Carpetweed, AG=annual grasses (primarily broadleaf signalgrass), and CYPES=Yellow nutsedge.
[w] Means within a column followed by a common letter are not different based on Duncan's Multiple Range Test with α=0.05.

Table 3. Weed responses to post directed weed control treatments [z].

Treatments[y] (PD= Post Directed) Rates in Ounces / Acre	Percent Weed Control[x]								
	PHYAN[w]		AMAAL		MOLVE		AG	CYPES	
	7-12	7-28	7-12	7-28	7-12	7-28	7-12	7-12	7-28
Reflex / PD / 12	72 b[v]	51	94 a	87	93 b	81 a	12 a	12	81
Reflex / PD / 16	89 a	91	91 a	81	99 a	76 a	10 a	12	87
Reflex / PD / 24	91 a	89	97 a	96	98 a	91 a	12 a	10	92
Untreated/PD/ control	0 c	80	0 b	92	0 c	60 b	0 b	0	43

[z] Values are means of 4 replications.
[y] PD treatments received a preemergence band treatment (1 foot wide centered on the row) of Sandea (halosulfuron-methyl) at ½ ounce per acre.
In the (Untreated / PD / control) weeds were removed manually after the 7-12 evaluation. Reflex PD application was made 7-8 and received Induce nonionic surfactant at 0.25%v/v.
[x] Weed control visual evaluation such that 0=no control and 100=complete control.
[w] Weed species are PHYAN=Cutleaf groundcherry, AMAAL=Tumble pigweed, MOLVE=Carpetweed, AG=annual grasses (primarily broadleaf signalgrass), and CYPES=Yellow nutsedge.
[v] Means within a column followed by a common letter are not different based on Duncan's Multiple Range Test with α=0.05.

Table 4. Weed control at crop maturity in response to weed control treatments [z].

Treatments (PRE = Preemergence) (EPD = Early Post Directed) Rates in Ounces / Acre	Percent Weed Control [y]	
	PHYAN [x]	AMAAL
Non-weeded	0 cd[w]	0 b
Hoed check	75 b	97 a
Reflex / PRE / 12	84 ab	100 a
Reflex / PRE / 16	95 a	100 a
Reflex / PRE / 24	98 a	100 a
Reflex / PRE / 32	100 a	100 a
Strategy / PRE / 48	17 c	94 a
Reflex / PRE / 16 followed by Dual Magnum / EPD / 16	97 a	100 a

[z] Values are means of 4 replications.
[y] Weed control visual evaluation such that 0=no control and 100=complete control.
[x] Weed species are PHYAN=Cutleaf groundcherry and AMAAL=Tumble pigweed.
[w] Means within a column followed by a common letter are not different based on Duncan's Multiple Range Test with α=0.05.

Table 5. Watermelon fruit yield parameters responses to weed control treatments[zy]

Treatment[x] (Pre = Preemergence) (PD= Post Directed) (EPD = Early Post Directed) Rates in Ounces / Acre	Total fruits harvested (#/acre)	Total harvest weight (lb/acre)	Average fruit wt (lb)
Non Weeded	181 f [w]	2284 d	11.2 d
Hoed check	1740 b-d	27753 b	15.7 a-c
Reflex / Pre / 12	2320 a-c	44653 a	19.2 a
Reflex / Pre / 16	2429 ab	44685 a	18.5 ab
Reflex / Pre / 24	2574 ab	45628 a	18.0 ab
Reflex / Pre / 32	2175 a-c	41040 a	19.1 a
Reflex / PD / 12	1305 de	20173 bc	15.2 a-d
Reflex / PD / 16	1559 c-e	22906 bc	14.8 b-d
Reflex / PD / 24	1559 c-e	23950 bc	15.9 a-c
Untreated / PD / control	773 ef	10609 cd	13.7 cd
Strategy / Pre / 48	870 ef	13282 cd	14.8 b-d
Reflex / Pre / 16 followed by Dual Magnum / EPD / 16	2791 a	50855 a	18.3 ab

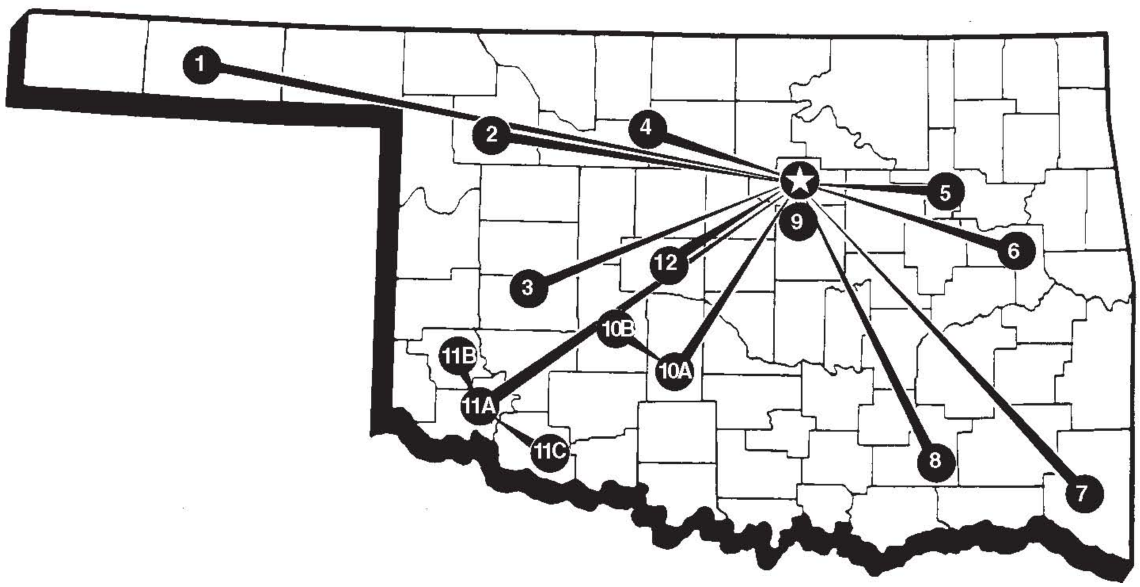
[z] Values are means of 4 replications.
[y] Fruits weighing 9 lbs or greater were included in data analysis.
[x] PD treatments received a preemergence band treatment (1 foot wide centered on the row) of Sandea (halosulfuron-methyl) at ½ ounce per acre. In the (Untreated / PD / control) weeds were removed manually after the 7-12 evaluation.
[w] Means within a column followed by a common letter are not different based on Duncan's Multiple Range Test with α=0.05.

Table of Contents

SI (METRIC) CONVERSION FACTORS

Approximate Conversions to SI Units					*Approximate Conversions from SI Units*				
Symbol	**When you know**	**Multiply by**	**To Find**	**Symbol**	**Symbol**	**When you know**	**Multiply by**	**To Find**	**Symbol**
		LENGTH					**LENGTH**		
in	inches	25.40	millimeters	mm	mm	millimeters	0.0394	inches	in
ft	feet	0.3048	meters	m	m	meters	3.281	feet	ft
yd	yards	0.9144	meters	m	m	meters	1.094	yards	yds
mi	miles	1.609	kilometers	km	km	kilometers	0.6214	miles	mi
		AREA					**AREA**		
in^2	square inches	645.2	square millimeters	mm^2	mm^2	square millimeters	0.00155	square inches	in^2
ft^2	square feet	0.0929	square meters	m^2	m^2	square meters	10.764	square feet	ft^2
yd^2	square yards	0.8361	square meters	m^2	m^2	square meters	1.196	square yards	yd^2
ac	acres	0.4047	hectacres	ha	ha	hectacres	2.471	acres	ac
mi^2	square miles	2.590	square kilometers	km^2	km^2	square kilometers	0.3861	square miles	mi^2
		VOLUME					**VOLUME**		
fl oz	fluid ounces	29.57	milliliters	mL	mL	milliliters	0.0338	fluid ounces	fl oz
gal	gallon	3.785	liters	L	L	liters	0.2642	gallon	gal
ft^3	cubic feet	0.0283	cubic meters	m^3	m^3	cubic meters	35.315	cubic feet	ft^3
yd^3	cubic yards	0.7645	cubic meters	m^3	m^3	cubic meters	1.308	cubic yards	yd^3
		MASS					**MASS**		
oz	ounces	28.35	grams	g	g	grams	0.0353	ounces	oz
lb	pounds	0.4536	kilograms	kg	kg	kilograms	2.205	pounds	lb
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	megagrams	1.1023	short tons (2000 lb)	T
		TEMPERATURE (exact)					**TEMPERATURE (exact)**		
°F	degrees Fahrenheit	(°F-32)/1.8	degrees Celsius	°C	°C	degrees Fahrenheit	9/5(°C)+32	degrees Celsius	°F
		FORCE and PRESSURE or STRESS					**FORCE and PRESSURE or STRESS**		
lbf	poundforce	4.448	Newtons	N	N	Newtons	0.2248	poundforce	lbf
lbf/in^2	poundforce per square inch	6.895	kilopascals	kPa	kPa	kilopascals	0.1450	poundforce per square inch	lbf/in^2

THE OKLAHOMA AGRICULTURAL EXPERIMENT STATION
SYSTEM COVERS THE STATE



✪ **MAIN STATION—*Stillwater and adjoining areas***

1. **Oklahoma Panhandle Research and Extension Center—*Goodwell***
2. **Southern Plains Range Research Station—*Woodward***
3. **Marvin Klemme Range Research Station—*Bessie***
4. **North Central Research Station—*Lahoma***
5. **Oklahoma Vegetable Research Station—*Bixby***
6. **Eastern Research Station—*Haskell***
7. **Kiamichi Forestry Research Station—*Idabel***
8. **Wes Watkins Agricultural Research and Extension Center—*Lane***
9. **A. Agronomy Research Station—*Perkins***
   B. Oklahoma Fruit and Pecan Research Station—*Perkins*
10. **A. South Central Research Station—*Chickasha***
    B. Caddo Research Station—*Ft. Cobb*
11. **A. Southwest Research and Extension Center—*Altus***
    B. Sandyland Research Station—*Mangum*
    C. Southwest Agronomy Research Station—*Tipton*
12. **Grazingland Research Laboratory—*El Reno***