2014 Vegetable Trial Report

January 2015

MP-164

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 2014.

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, Lynda Carrier, lynda.carrier@okstate.edu, Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater

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

Rocky Walker rocky.walker@okstate.edu, Department of Field and Research Service Unit, Entomology/Plant Pathology Research Farm, Stillwater

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 Lynda Carrier
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

Dewitt Seeds
Norman, OK 73070
www.dewittseed.com

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

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

Nunhems
1200 Anderson Corner rd
Parma, ID 83660
www.nunhemsusa.com

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

Harris Moran
P.O.Box 4938
Modesto, CA 95352
www.harrismoran.com

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

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

Rupp Seeds
17919 County Road B
Wauseon, OH 43567-9458
www.ruppseeds.com

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

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

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

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

Sakata
18095 Serene Drive
Morgan Hill, CA 95037
www.sakata.com

The following have provided funding for the support of research in 2014

- Illinois Foundation Seed
- Seedway
- Southern SARE On-Farm Research Grant Program
- Syngenta Inc
- Oklahoma Department of Agriculture, Food, and Forestry (ODAFF)

Table of Contents

Crop Culture

Fall 2014 Broccoli Variety Trial, Perkins, OK

Brian Kahn and Lynda Carrier

Introduction and Objectives Broccoli is a minor crop in Oklahoma, but excellent quality heads can be produced in the fall. The number of days to harvest is the main factor limiting adaptation of broccoli varieties to Oklahoma. Fall crops are limited by frost, so late varieties are unsuitable. Objectives of this trial were to evaluate 12 hybrid varieties for yield, quality, and adaptation.

Materials and Methods Seeds were sown in the greenhouse on July 31, 2014. Speedling-200 flats were used with a peat-lite medium. Five raised beds on 6-foot centers with buried drip irrigation lines were created at the Cimarron Valley Research Station circa August 20. Trifluralin at a rate of 1 pint/acre was sprayed on the plot area and incorporated into the soil. Plants were transplanted to the field on August 22. The three center beds were used for data, and each bed was considered a replication using a randomized block design. The two outer beds had single rows of guard plants, including the variety 'Emerald Pride.' Dead plants were replaced through August 29, after which all plots were topdressed with urea to supply N at 75 lbs/acre. A second topdressing with urea was made on September 11 to supply N at 50 lbs/acre. Subsequent fertilization was through the irrigation system, using a soluble complete fertilizer. Selective harvests began on October 7. Temperatures reached a low of 28°F overnight October 31 – November 1, causing minor damage to some heads. Temperatures were ≤ 28°F for several nights starting on the night of November 11, so November 11 was the final harvest.

Results and Summary Results are shown below and on the next page. 'Coronado Crown' and 'Greenbelt' produced only a few, mostly non-marketable heads before November 11. 'Emerald Pride' was a few days earlier than 'Green Magic' and heads were more flattened, but heads were large and looked good. 'Emerald Pride' was grown only in guard rows, so further trials are needed. 'Lieutenant', 'Emerald Crown', 'Green Magic', and 'Castle Dome' all performed well.

Broccoli Variety Trial – Perkins, Fall 2014[z]

		Marketable Heads					
Cultivar	**Company /source**	**Weight (ctns/A)[y]**	**Count (1000's/A)**	**Avg. head wt. (lbs.)**	**Stalk diam.[x] (in.)**	**Days to first harvest**	**Culls (ctns/A)**
Lieutenant	Seedway	358	10.0	0.80	1.5	62	38
Emerald Crown	Sakata	319	9.0	0.78	1.4	61	6
Green Magic	Sakata	285	8.3	0.76	1.5	63	24
Castle Dome	Twilley	284	9.0	0.69	1.3	56	36
Gypsy	Sakata	224	6.2	0.79	1.4	66	90
Bay Meadows	Seedway	212	6.9	0.67	1.5	69	79
Packman	Seedway	206	8.6	0.53	1.3	56	23
Green Gold	Sakata	199	4.8	0.91	1.5	66	223
Destiny	Sakata	182	5.2	0.75	1.4	72	87
Everest	Seedway	163	6.6	0.53	1.2	51	72
	MEAN	243	7.5	0.72	1.4	62	68
	$LSD_{.05}$	113	3.3	0.11	0.1	5	68

[z] Plot size 6 x 9 ft. (twin rows – 12 inches apart, 12 data plants/plot, 16 total plants/plot, 12 inches between plants within rows); 3 replications. Transplanted 8/22/14. Harvested 10/7 through 11/11.

[y] One carton (ctn) = 22 lbs.

[x] Heads trimmed to 8 inches from top of dome to butt; stalk diam. measured at butt.

FALL BROCCOLI VARIETY TRIAL (REPLICATED) – PERKINS, 2014

Summary of notes recorded by B.A. Kahn from 7 Oct. through 11 Nov. All notes based on three plots per variety.

Variety	Notes
Bay Meadows	Most heads had uniform beads and good domes, but had a distinct tendency to purpling, perhaps due to maturity after frost. Needs further trials.
Castle Dome	Best of the early varieties. Good domes with relatively small beads. Plants can be compact, so some stalks may be fibrous near the cut end.
Coronado Crown	Heads less attractive than in 2002 trial, and confirmed as too late for reliable production in Oklahoma.
Destiny	Usually had unequal flower stalk lengths. Plant vigor varied among plots and head quality was variable. Relatively late.
Emerald Crown	Nice domes in top view and a "bouquet" appearance in side view due to deep domes with lower florets on stalks of different lengths. Looked good and is recommended for Oklahoma.
Everest	Heads semi-domed and often were uneven; some also had bracting, confirming observations from 2002. Early but not attractive.
Greenbelt	An older cultivar. Made "bushy" plants with lots of foliage. Too late for reliable production in Oklahoma.
Green Gold	Most heads were uneven and had many chartreuse beads. Stalks often thick and fibrous. Heads distinctly susceptible to field mouse damage vs. other varieties.
Green Magic	Heads looked much like 'Emerald Crown.' Looked good and will continue to be recommended for Oklahoma.
Gypsy	Distinctive appearance; exserted, relatively flat heads with smooth stalks. Tended to variable bead sizes and uneven domes. Often acceptable, but not especially attractive. Second to 'Green Gold' in field mouse damage.
Lieutenant	Most uniform domes in the trial, with medium size, blue-green beads. Most culls came near the end of the picking period. Vigorous plants. Looked good and is recommended for Oklahoma.
Packman	Flat domes with medium-large, blue-green beads. Likely to produce side shoots after main head is cut. Better appearance than 'Everest' for earliest harvest, but probably best suited to home gardens and local markets.

Table of Contents

Organic Garlic Cultivar Trial

Three Springs Farm Oaks, OK
Mike Appel, Lynn Brandenberger, Danielle Williams, Lynda Carrier, Ryan Sproul
Oklahoma State University

Cooperating with Mike Appel & Emily Oakley

Introduction: Garlic (*Allium sativum*) belongs to the lily family, originated in Central Asia, and is considered a cool season perennial. Garlic is a good nutritional source supplying high levels of calcium, iron, and phosphorus, and zinc at levels equal or higher than those contained in kale (USDA National Nutrient Database http://ndb.nal.usda.gov/ndb/). 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 performance of different cultivars of garlic in north eastern Oklahoma.

Methods and Materials: The eight cultivars included in the trial were Chinese Pink, Inchellium Red, Lorz Italian, Polish White, German White, Georgian Crystal, Music, and Siberian. Seed cloves were purchased from certified organic seed clove producers. Plots were planted on 10/25/13 in double rows on top of free-standing beds spaced five feet apart. Double rows were 14 inches apart and spacing within each row was six inches between planted cloves. Plots consisted of one free-standing bed with two rows of garlic four feet in length. Plots were replicated 3 to 4 times in a randomized block design. Water needs of the crop were met through natural rainfall. Crop fertility was provided by a sidedress application of pelleted composted poultry litter (2,614 lbs./acre rate) and additional nitrogen through three foliar applications of fish oil emulsion (Phytamin fish plus at 2 tbsp./gal) + kelp (Organic liquid kelp at 4 tbsp./gal) for a total of approximately 105 lbs. of nitrogen per acre. In addition, a summer cover crop of cowpeas preceded soil preparation and planting. Weed control was managed with organic mulch (wheat straw) and cultivation. The trial was harvested on 6/23-24/14 by hand with all garlic bulbs being counted and weighed.

Results and Discussion: The number of garlic bulbs did not vary, but ranged from a low of 1.9 to 2.8 bulbs per row foot (Table 1). Yield in pounds per row foot ranged from a low of 0.10 to a high of 0.40 and 0.50 pounds for Lorz Italian and Polish White, respectively. Both Polish White and Lorz Italian were the high yielders for the trial. Average weight per bulb was highest for Polish White followed by Lorz Italian with bulb weights of 0.19 and 0.15 pound, respectively. Although there were no statistical differences between cultivars for percent culls, German White and Chinese Pink recorded 17 and 13% culls, respectively, which were the highest number of culls in the trial.

Conclusions: Based on the results the authors would make the following conclusions. First, when one considers marketable yield there were really four different tiers of performance. Polish White and Lorz Italian were the highest yielding cultivars (0.50 to 0.40 lbs. per row foot, respectively) in the trial and both had relatively low numbers of culls (5 and 2%). The next tier down includes Georgian Crystal and Siberian which were significantly more productive than German White i.e. 0.28 lbs. per row foot compared to 0.10 lbs. for German White. The third tier included Chinese Pink, Inchellium Red, and Music which ranged from 0.20 to 0.23 lbs. per row foot. One consideration that should be mentioned would be the condition of seed-stock cloves. Several of the low performers had poor or weak stands from low quality seed-stock.

Acknowledgements: The authors want to thank Three Springs Farm for support, maintenance, and care of the trial.

Table 1. Organic garlic cultivar trial, 2014, Oaks, OK.

	Marketable bulbs			
	Per row foot		Average	
	Bulbs	Weight	Bulb wt.	Culls
Variety	**---Number---**	**-------Pounds-------**		**---Percent---**
Soft neck types				
Chinese Pink	2.3 a[z]	0.23 c	0.10 c	13 a
Inchellium Red	1.9 a	0.20 c	0.11 c	3 a
Lorz Italian	2.7 a	0.40 b	0.15 b	5 a
Polish White	2.7 a	0.50 a	0.19 a	2 a
Hard neck types				
German White	1.9 a	0.10 d	0.05 d	17 a
Georgian Crystal	2.8 a	0.28 c	0.10 c	0 a
Music	2.2 a	0.23 c	0.11 c	9 a
Siberian	2.4 a	0.28 c	0.12 c	3 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

Organic High Tunnel Onion Production Trial

Jim Shrefler and Merritt Taylor

The valuable assistance of Jim Vaughan, John Johnson and Shannon Reece of the Wes Watkins Agricultural Research and Extension Center is gratefully acknowledged.

In the fall of 2012 trials were initiated to compare several growing media alternatives for growing onion transplants that could be used for organic onion production. This investigation was conducted in a high tunnel located on land that is certified organic since 2005. The growing media that were used 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. The growing media were placed in frames measuring 28 x 46 x 3.5 inches in all dimensions and a layer of woven polypropylene separated these from the soil floor. The trial was repeated beginning in the fall of 2013. As in the initial trial, onion plants were removed from the growing media treatments and transplanted into field soil on the floor of an adjacent high tunnel where they were then grown to maturity. This report presents the results of the 2013-12014 trial.

Materials and Methods: This trial was conducted during 2013-2014 at the Certified Organic Facility at the Wes Watkins Agricultural Research and Extension Center at Lane, Oklahoma. Frames constructed in 2012 and filled with one of four different growing media were reused in this study. On October 8, 2013 the frames with growing media were cleared of vegetation, loosed and leveled. Four groups of frames that each included one of each of the four growing media served as an experimental block. The plot arrangement was a randomized complete block with three replications.

On Nov. 4, 2013 seed of the onion cultivar Candy was sown into 4 rows spaced 5 inches apart at 24 seeds per foot of row. Irrigation was provided using watering cans or a garden hose with a standard spray nozzle. When onions showed signs of nutrient stress fish emulsion was applied via irrigation water. 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 8 feet in length and spaced 1 foot apart. Distance between adjacent plots was 1 foot. Onions were grown until bulb maturity and then harvested on July 3, 2014 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 2.1 lbs per 10 square feet of planted area. The percent distribution of onion bulb size into two categories was, for less than 2 inches in diameter 62% and for 2-3 inches in diameter 38%.

Additional observations of importance to these results are that the incidence of bolting of onions was less than 1%. The condition of onion leaves in the high tunnel remained very good until the time of bulb harvest. Bulbs were stored indoors in paper grocery bags for 4 months with essentially no incidence of decay.

Onion yields were lower than that obtained in a previous trial using the same transplant production system and followed by planting into a high tunnel for bulb production. In the current trial only one bulb exceeded the 3 inch diameter size category. Although no plant growth problems were observed, such as disease or insect infestation, plants were drought stressed at several times during each of the transplant production and post transplant growth phases. Similarly, the planting suffered weed competition at several times during the transplant production and post transplant growth stages.

Onion Cultivar Trial

Jim Shrefler and Merritt Taylor

The assistance of Jim Vaughan, John Johnson and Shannon Reece of the Wes Watkins Agricultural Research and Extension Center is gratefully acknowledged. The cooperation of Gingerlei Waddell of Southeastern Oklahoma State University by providing greenhouse space to grow transplants is appreciated.

Onion is an important crop for market garden growers as well as commercial farms. Although suitable cultivars are available, new cultivar releases may have attributes that would be beneficial for Oklahoma producers. In particular, more choices of intermediate maturity cultivar choices are needed. This report provides the results for a trial conducted to evaluate such cultivars during 2014 in southeast Oklahoma.

Materials and Methods: Onion plants were stared from seed in a greenhouse in late December of 2013 and kept there until March 20, 2014. Onions were then transplanted to an open field at the Wes Watkins Agricultural Research and Extension Center at Lane, Oklahoma. On February 28 the field was disked and rough bedded. On March 19 fertilizer was applied based on soil test recommendations and the bed construction was finalized. The plot arrangement was a randomized complete block with three replications. Plots consisted of a seven foot long section of two rows of onions on a 3 foot wide bed. Onions were transplanted on March 20 and plants were spaced 4 inches apart within a row and 40 transplants were set into each plot. The following day Prowl H20 herbicide was applied as a surface application. On April 2 a side-dress application of nitrogen was applied at 50 lbs. per acre using urea. Onions were harvested on June 29, classified based on diameter and weighed.

Results: Onion transplants were smaller than generally desired. Plants began to establish in the field but wet conditions resulted in substantial decay and loss of plants. In additions, caterpillars were found in the planting and likely resulted in additional plant loss. The total number of bulbs in the table is therefore a reflection of the number of plants remaining following these losses. The differences across cultivars are likely due to the vigor of the transplants of a given cultivar. Bulbs were graded such that category A is less than 2 inch diameter, B is 2 inches or greater but less than 3 inches and C is 3 to 3.5 inches in diameter. No statistical differences were detected for the number of bulbs falling in the combined B and C categories nor for the percent of bulbs that were in the A category. Similarly, no differences were detected for total weight of bulbs produced.

Onion cultivars, sources, descriptions and yield parameters in the Onion cultivar trial.

Cultivar	Source	Color	Type	Total number bulbs		Number of B&C	Percent A	Total weight (lbs)
Avalon	Crookham	yellow	intermediate	14.0	abcd	4	79	2.1
Scimitar	Crookham	yellow	intermediate	11.7	abcd	1.3	87	1.2
Salute	Crookham	yellow	intermediate	14.3	abcd	5.3	70	2.3
Candy	Seedway	yellow	intermediate	11.7	abcd	3	77	1.5
Cimarron	Nunhems	yellow	intermediate	7.3	abcd	5.3	70	2.3
Nun4008	Nunhems	yellow	intermediate	7.0	abcd	2	75	1.0
Nun4007	Nunhems	yellow	intermediate	18.3	ab	11	40	4.2
Nun 5002	Nunhems	white	intermediate	12.0	abcd	6	47	2.6
Nun 5003	Nunhems	white	intermediate	7.3	abcd	2.3	81	1.2
Nun 4005	Nunhems	yellow	intermediate	11.7	abcd	3	84	1.8
Rhumba	Nunhems	red	intermediate	18.7	a	3.7	82	2.1
Nun 4004	Nunhems	yellow	late intermed	17.3	abc	4.3	77	2.3
Nun 6005	Nunhems	red	intermediate	12.0	abcde	5	67	1.8
Renegade	Nunhems	yellow	intermediate	3.0	de	0.7	80	0.6
1015Y	DeWitt	yellow	short day	5.0	e	0.5	-	2.5
Aspen	Seminis	white	intermediate	6.3	cde	1.7	67	1.1
Exacta	Seminis	yellow	intermediate	9.7	abcde	4.3	68	2.0
Sierra blanca	Seminis	white	intermediate	8.7	abcde	1.3	87	0.9
Leona	Seminis	yellow	intermediate	3.3	de	1.7	76	0.7
Caballero	Seminis	yellow	intermediate	6.0	cde	1	80	0.8

Table of Contents

Summer Cover Crops for Spinach

Establishment and Growth (Preliminary report)

Cimarron Valley Research Station
Lynn Brandenberger, Danielle Williams, Lynda Carrier, Fred Matafari
Oklahoma State University

Introduction: The difficulty of obtaining viable plant stands and crop growth vary considerably between different vegetable crops. One of the more difficult crops to germinate in the field and to obtain viable stands with is spinach. Spinach is known for stand issues due to soil crusting and high soil temperatures during the fall planting season. Production soils in the southern plains often have issues with compaction and soil crusting due to low levels of organic matter (<0.5%). The objectives for this multi-year study is to determine if organic matter added to soil from summer cover crops can have a positive effect on spinach stand establishment and subsequent crop growth.

Methods and Materials: Four summer cover crop treatments were planted on May 30, 2014 at the Cimarron Valley Research Station near Perkins, OK. The cover crops included in the study were sesbania (*Sesbania exaltata*), sorghum-sudangrass hybrid (*Sorghum bicolor x S. bicolor var. Sudanese* AKA haygrazer), cowpea (*Vigna unguiculata*), and lablab (*Lablab purpureus*), a clean tilled summer fallow treatment was also included in the study. Seeding rates for each species were 35, 30, 37, and 22 lbs. of seed per acre for sesbania, haygrazer, cowpea, and lablab, respectively. Plots consisted of areas 40' in length and 9' in width and were planted in clean-tilled soil with a research cone planter using double disk openers with six inch spacing between rows. Clean-tilled summer fallow plots were rototilled twice during the summer and haygrazer plots were mown at a height of approximately 12 inches twice also.
All plots were mown to ground level in early September and tilled using an offset disk harrow and finished on 9/15/14 using a tractor mounted finishing tool (Triple K field cultivator) and planted on 9/16/14 using the research plot planter followed by pre application of Dual Magnum at 0.75 lbs. ai/acre. Due to poor stands of spinach the study area required replanting. Prior to replanting on 10/07/14 the entire study area was rototilled using a tractor mounted rototiller to a depth of 2-4 inches. Plots were then replanted to spinach (Olympia cultivar) at a seeding rate of approximately 500,000 seeds per acre followed by a pre application of Dual Magnum at a reduced rate of 0.5 lbs. ai/acre. Crop water needs were provided by drip irrigation using two drip lines per 4.5' planter pass. Crop ratings for percent stand and stand counts were made on 11/21/14. Stand counts were made by counting the number of seedlings within a 1.1 square foot area approximately 10 feet into the plot from the front of the plot.

Results and Discussion: Biomass of summer cover crops did not vary significantly, but did range from 3,227 to 8,810 lbs. per acre (Table 1). Lablab and haygrazer produced the highest dry weights for biomass of the five treatments included in the study with 8,810 and 6,891 lbs., respectively. Percent stands for spinach planted in the different cover crop treatments ranged from 56.3 for lablab to 61.3 for Sesbania with no differences being observed between treatments for percent stand (Table 2). Stand counts did not vary, but ranged from 5.5 plants/1.1 sq. ft. for haygrazer to 7.8 plants for the lablab plots.

Conclusions: Although no differences were observed between cover crop treatments for dry weights or for spinach stand responses there are some possible reasons for this. First, dry weights were taken from relatively small areas of each plot which may have resulted in sampling errors and variability between replications. Second, since the original spinach seeding required replanting and daily temperatures had cooled considerably from the first to

the second seeding this factor may be the reason no differences were observed in spinach response to cover crop treatments. The authors would conclude from the results that future research should include larger sampling areas for plots and earlier planting of the fall spinach that will follow the summer cover crops.

Acknowledgements: The authors want to thank Cimarron Valley research station for support, maintenance, and care of this trial.

Table 1. 2014 Summer cover crops, dry weight yields, Perkins, OK

Treatment	Dry weight yield pounds per acre
Sesbania	4,361 a[z]
Haygrazer	6,891 a
Cowpea	3,227 a
Summer fallow	4,100 a
Lablab	8,810 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 2. 2014 Summer cover crops, Percent stand and number of seedlings for fall planted spinach.

Treatment	% Stand	Number of seedlings
Sesbania	61.3 a[z]	7.0 a
Haygrazer	57.5 a	5.5 a
Cowpea	57.5 a	6.0 a
Summer fallow	60.0 a	5.8 a
Lablab	56.3 a	7.8 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

Spring 2014 Sweet Corn Variety Trial, Stillwater, Oklahoma

Brian Kahn and Danielle Williams

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 16 varieties (yellow or bicolor) for yield, earliness, and overall quality. All varieties were in the sh_2 isolation group.

Materials and Methods: The study was conducted at the Entomology/Plant Pathology Research Farm in Stillwater. Plots were fertilized with 50 lbs. N/acre, harrowed, and then direct seeded on April 22. 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 22, at the rate of 1 pint/acre. Plots were rated for seedling vigor on May 12 and then given a preliminary thinning. Final thinning to 20 plants per row was completed on May 23. Plots were topdressed with urea to supply 75 lbs. N/acre on May 24 and again on June 14. Insecticide applications began just before silking and continued throughout the harvest period. Supplemental water was applied with overhead irrigation. The two rows per plot did not always emerge uniformly, so unlike in past trials, each variety was harvested twice at optimum maturity ('XTH 2475' was harvested three times).

Results and Summary: Results are shown on the following page. The standard of comparison was 'GSS 0966'. Marketable yields did not differ for number of ears, but varied for tonnage. Among the earliest cultivars, only 'XTH 2475' performed poorly. 'Vision' was of particular interest as an early yellow; it definitely should be trialed again. 'Stellar' performed well in past trials, and the new 'Stellar XR' also looked good. 'Cabo' is a new cultivar and it stood out in the mid-season group. 'ACcentuate' and 'ACcentuate MRBC' snapped hard. The tips of the cobs were actually protruding on many ears of 'Supersweet Jubilee Plus'. The late cultivars often dominate in tonnage and this year was no exception. 'Sentinel' and 'Yosemite' had attractive ears that were above-average in diameter, but somewhat under-performed in number of marketable ears per acre. Similar observations were made for 'Sentinel' and 'Yosemite' in 2012. All three GMO cultivars (genetically engineered for earworm resistance) performed well overall, but only 'BSS 0982' showed significantly lower earworm damage than all other cultivars.

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

Acknowledgments: We thank Rocky Walker and Robert Lopez for assistance with field plot maintenance.

Table 1. Spring 2014 Sweet Corn Variety Trial, Stillwater[z].

Variety	Company/ Source	C[y]	Vigor rating[x]	Market yield (sacks/A)[w]	Yield (tons/A) Market	Culls	Number days to harvest	In-shuck rating[v]	Shucked rating[v]	Avg ear dia. (inches)	Avg ear length (inches)	Corn earworm damage[u]
GSS 0966	Syngenta	Y	3.8	433	7.2	0.4	80	3.2	2.5	1.8	7.6	3.8
BSS 0977	Syngenta	BC	5.0	428	7.2	0.4	83	3.3	2.8	1.8	7.4	3.8
Cabo	Syngenta	BC	3.3	318	6.6	0.1	76	2.7	1.5	1.9	8.0	4.0
ACcentuate MRBC	Twilley	BC	4.3	316	5.2	0.3	78	2.9	2.5	1.7	7.4	4.0
BSS 0982	Syngenta	BC	3.2	310	6.3	0.3	80	1.2	2.2	1.8	8.0	3.0
Stellar XR	Illinois	BC	4.7	279	5.6	0.7	72	2.0	2.2	1.8	7.9	4.0
Supersweet Jubilee Plus	Syngenta	Y	3.2	275	4.6	0.2	78	3.8	2.8	1.7	8.4	4.8
ACcentuate	Twilley	Y	3.7	273	5.2	0.4	78	2.3	2.7	1.7	7.7	4.0
SS #7930R	Twilley	Y	3.7	256	4.3	0.3	76	3.4	3.2	1.7	8.0	4.8
Sentinel	Harris Moran	Y	3.3	252	5.9	0.2	78	2.2	1.8	1.9	8.3	4.5
Vision	Illinois	Y	4.7	250	4.7	0.2	69	2.3	2.0	1.8	7.7	4.7
Yosemite	Harris Moran	Y	2.3	246	5.9	0.3	80	2.7	2.0	1.9	8.2	4.5
Awesome XR	Seedway	BC	4.7	228	4.5	0.7	69	1.3	2.8	1.8	7.2	4.2
XTH 1181	Illinois	Y	5.0	226	4.4	0.7	83	3.5	3.7	1.9	7.3	5.0
SS HiGlow #8902MR	Twilley	BC	4.5	221	4.7	0.6	80	2.1	2.3	1.7	8.7	4.5
XTH 2475	Illinois	BC	3.3	213	4.3	0.5	69	2.6	3.3	1.8	7.8	4.2
	Mean		3.9	282	5.4	0.4	77	2.6	2.5	1.8	7.9	4.2
	LSD $_{0.05}$		0.8	NS	1.5	NS	--	0.5	0.6	0.1	0.3	0.5

[z]Seeded April 22, 2014; Plot size: 1.8m x 6.0m (2 rows/plot, 3 plots each variety, plots thinned to 20 plants/row.) Harvested 6/30/14 to 7/16/14.

[y]C=kernel color.

[x]Vigor rating: 1=will not make stand, 5=thick stand and good vigor. 'Sentinel' and 'Yosemite' were grown from 2012 seed.

[w]One sack = 60 ears.

[v]Appearance rating: 1=best, 5=poorest.

[u]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: PermaStar, Sevin, and Warrior II were alternated and applied a total of 8 times between silking & harvest to entire planting.

Table of Contents

Sweet potato Sensory Evaluation

Oklahoma State University
F. Ojwang, T. Bowser, D. Scott, L. Carrier, and L. Brandenberger

Introduction: In 12 developing countries in Sub-Sahara African region, orange-fleshed sweet potato (OFSP) - (*Ipomoea batatas*) production is largely done on a subsistence scale. This is due to the OFSP perception as an inferior poor man's crop. Research however has shown that OFSP is rich in Vitamin A and can be used to combat malnutrition among children under 5 years and for diet diversification (IRIN, November 2011). Sweet potato also helps reduce night blindness among children under 5 (years of age) providing 8,699 international units of vitamin A per 100gms of sweet potato compared to 0 for the Irish potato (Source: USDA National Nutrient Database for standard reference, http://ndb.nal.usda.gov/ndb/search/list accessed on 10/14/2014). Sweet potato contains folic acid which is key in reducing spina bifida and other neural tube disorders http://www.spinabifidaassociation.org/site/c.evKRI7OXIoJ8H/b.8029671/k.8354/Why_Folic_Acid.htm, accessed 10/14/2014).

A sensory evaluation comparing Irish potato (IP) and orange fleshed sweet potato was conducted at the Oklahoma State University. The hypothesis was that a neutral or preferential response to OFSP would help show that OFSP was consumed by populations in developed nations, and therefore not a poor man's crop.

Methods: The sensory evaluation was carried out based on two methods of sample preparation for the Irish potato and the orange fleshed sweet potato. Roots were purchased from commercially local vendors/food stores. Evaluations were completed on October 28 and 29, 2014 in the tasting room of the Food and Ag Product Center (FAPC) on the campus of Oklahoma State University in Stillwater, OK.

Recipe: Select medium-sized roots or tubers of about ½ a pound each. Wash and Peel the roots and cube them into approximately 1" by 1" cubes. Cook by boiling for 20-30 minutes in a water and salt solution with approximately 2/3 tsp of salt per gallon of water to provide tender cooked sweet potatoes and Irish potatoes.

The respondents assessed four samples (cubed IP and OFSP, mashed IP and OFSP) for taste under masked light. They also assessed the 4 samples under direct light and rated them for appearance. A rating scale of 1-9 was used for both taste and appearance where 1 equates to disliking extremely and 9 equates to liking extremely. This was repeated for both species (Irish potatoes and orange fleshed sweet potato). Data was analyzed statistically and results are reported below.

Results: No significant differences were observed in the ratings for taste or appearance (Table 1) by the 104 respondents who came from different regions (continents) and had ages of 18 to over 35 yrs. Respondents went on to comment that the sweetpotato was a special crop that was served at thanksgiving and other events like Christmas, thus considered to be a special holiday food item and was not considered to be inferior to the Irish potato. A few participants remarked that they did not mind the appearance and were more concerned with taste, although more respondents prefer the appearance of Irish potatoes.

Based upon the results the authors would conclude that that orange fleshed sweet potato can be promoted in developing countries in Sub-Saharan Africa (SSA) as a nutritious and not a

poor man's crop as may have been perceived. Sweet potatoes can also be used to combat food insecurity in SSA as they are harvested in a shorter period and have varieties that are drought resistant and high yielding.

Table 1. 2014 Potato Evaluations, taste testing and appearance of sweet potatoes and Irish potatoes.

Sample	Taste	Appearance
Mashed Sweet Potatoes	6.3 a[z]	7.5 a
Cubed Sweet Potatoes	6.0 a	6.0 a
Mashed Irish Potatoes	6.5 a	8.2 a
Cubed Irish Potatoes	6.1 a	6.5 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

Sweet Potato Observational Trial

Cimarron Valley Research Station Perkins, OK
Lynn Brandenberger, Lynda Carrier, Danielle Williams, Fred Matofari
Oklahoma State University

Introduction: A sweet potato root increase was carried out at the OSU Cimarron Valley station in Perkins, OK during 2014 to develop stock for future university research. Although the increase was not replicated it did provide limited opportunity to observe the yield performance of four different cultivars included in the field planting. The objective was not to provide a thorough study of these cultivars in a replicated trial, but to provide producers with preliminary observations of these cultivar's yield potential in central Oklahoma.

Methods and Materials: The four cultivars included in the trial included Beauregard B-63 a release from Louisiana State University, Beauregard B-94 a release from North Carolina State University, Nugget, Purple Delight, and White Triumph. Sweet potato slips were purchased from a commercial slip producer in the area. Plots were transplanted on 6/16/14 in rows 4.5 feet apart and 1.5 feet between transplants in the row, each plot included a single row 30 feet long. Plots were grown on free-standing raised beds created with a disk-bedding tool. The trial was harvested on 10/17/14 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 are roots that range between 2-3.5" in diameter and 3-9" in length. The yield of U.S. #1's ranged from 12,259 to 17,021 lbs. per acre (Table 1). The highest recorded yield of U.S. # 1's was for Beauregard B-94 which yielded 17,021 lbs. per acre while Covington had nearly the same yield at 17,017 lbs. per acre for #1 roots. Canners are sweet potatoes that range between 1-2" in diameter and 2-7" in length. Differences in canner yield ranged from a low of 4,167 for O'Henry to a high of 7,502 lbs. per acre for Beauregard B-63. Jumbos are roots that are larger than 3.5" in diameter and longer than 9" in length. Yield of Jumbos ranged from 0 for Beauregard B-94 to 6,050 lbs. per acre for Beauregard B-63. Total marketable yield includes U.S. # 1's, canners, and Jumbos. Yield for all marketable classes ranged from 21,942 to 29,766 lbs. per acre with Beauregard B-63 having the highest yield of the four cultivars in the trial. Percentage of U.S. # 1's ranged from 54.5 to 70.8% for Beauregard B-63 and Beauregard B-94, respectively, and 55.8 and 64.2% for O'Henry and Covington, respectively.

Conclusions: Regarding yield, the highest overall marketable yield was recorded for Beauregard B-63 with 29,766 lbs. per acre while Covington came in second with overall yield of 26,523 lbs. per acre. Visual observations of the roots provided a chance to decide a favorite cultivar as relates to appearance. Most evaluators agreed that Covington's smooth well shaped roots were a favorite. Hopefully the observational data provided in this report will give central Oklahoma sweet potato growers some ideas when selecting cultivars for their own on-farm trials.

Acknowledgements: The authors want to thank Cimarron Valley Research Station staff for support, maintenance, and care of this trial. Thanks also to Frank Ojwang for assistance in harvesting the trial.

Table 1. 2014, Cimarron Valley Research Station sweet potato observational trial, Perkins, OK.

Cultivar	Flesh color	U.S. # 1's	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1's
		----------Bushels per acre----------					-----%-----
Beauregard B-63	Orange	16,214	7,502	6,050	29,766	27,104	54.5
Beauregard B-94	Orange	17,021	7,018	0	24,039	13,714	70.8
Covington	Orange	17,017	4,732	4,774	26,523	4,635	64.2
O'Henry	White	12,259	4,167	5,516	21,942	9,527	55.8

[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.
Total mrkt. – total of U.S. # 1's + Canners +Jumbos
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.
Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).

Table of Contents

Sweet Potato Trial

Deep Valley Farms Okmulgee, OK
Lynn Brandenberger, Lynda Carrier, Doug Maxey
Oklahoma State University

Cooperating with Glynis Coleman

Introduction: Sweet potato (*Ipomoea batatas*) belongs to the morning glory family, originated in Central and South America and does well in hot climates. Sweet potato is a good nutritional source supplying high levels of Beta carotene and vitamin C especially in orange cultivars. Roots of sweet potato also have ample amounts of complex carbohydrates and fiber (Peirce, 1987). Cultivar performance 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 eastern-central Oklahoma area.

Methods and Materials: The four cultivars included in the trial included Beauregard, Carolina Nugget, Purple Delight, and White Triumph. Sweet potato slips were purchased from a commercial slip producer in the area. Plots were transplanted on 6/16/14 in rows 4.5 feet apart and 1.5 feet between transplants in the row, each plot included a single row 30 feet long. Plots were grown on free-standing raised beds created during the application of black plastic mulch and the installation of drip irrigation line during bed formation. Crop fertility was provided by the application of poultry litter during soil preparation (444 lbs./acre rate) and additional nitrogen through eight applications of fish oil emulsion for a total of approximately 18.5 lbs. of nitrogen per acre. Weed control was managed with the black plastic mulch and some mowing and cultivation between rows. The trial was harvested on 10/21/14 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 are roots that range between 2-3.5" in diameter and 3-9" in length. The yield of U.S. #1's did not vary between cultivars in the trial, but ranged from 3,915 to 6,851 lbs. per acre (Table 1). The highest recorded yield of U.S. # 1's was for Beauregard. Canners are sweet potatoes that range between 1-2" in diameter and 2-7" in length. Differences in canner yield were significant and ranged from a low of 1,742 to a high of 5,378 lbs. per acre for Purple Delight and White Triumph, respectively. Jumbos are roots that are larger than 3.5" in diameter and longer than 9" in length. Yield of Jumbos ranged from 0 for Carolina Nugget to 1,162 lbs. per acre for Purple Delight. Total marketable yield includes U.S. # 1's, canners, and Jumbos. Yield for all marketable classes ranged from 6,023 to 10,551 lbs. per acre with Beauregard having the highest yield of the four cultivars in the trial. Percentage of U.S. # 1's did not vary between cultivars in the trial, but ranged from 43 to 68%.

Conclusions: Of the four cultivars included in the trial, Beauregard is a relatively recent (1987) cultivar release compared to the other three cultivars in the trial. When overall yield is considered it's difficult to separate the top three which includes Beauregard, White Triumph, and Purple Delight which had overall yields of 10,551, 9,605, and 8,486 lbs. per acre, respectively. Cultivar decisions can be based upon performance in local trials, but if yield is the prime consideration then on-your-own-farm trialing is the best way to determine what will work best. Other factors that will need to be considered include customer desires i.e. color, shape, size, and of course taste. Of the cultivars included in this trial there were two orange

fleshed (Beauregard and Carolina Nugget) one purple fleshed cultivar (Purple Delight) and one white fleshed cultivar (White Triumph).

Acknowledgements: The authors want to thank Deep Valley Farm for support, maintenance, and care of this trial. Thanks also to Nathan Pruitt and Frank Ojwang for assistance in harvesting the trial.

Table 1. 2014, Deep Valley Farms sweet potato variety trial, Okmulgee, OK.

Cultivar	Flesh color	U.S. # 1's	Canners	Jumbos	Total mrkt.	Culls	U.S. # 1's
		----------Bushels per acre----------					-----%-----
Beauregard	Orange	6,851 a[z]	2,721 b	979 a	10,551 a	2,355 a	68 a
Carolina Nugget	Orange	3,915 a	2,108 b	0 a	6,023 a	2,130 a	66 a
Purple Delight	Purple	5,582 a	1,742 b	1,162 a	8,486 a	430 a	56 a
White Triumph	White	4,119 a	5,378 a	108 a	9,605 a	2,076 a	43 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.

Total mrkt. – total of U.S. # 1's + Canners +Jumbos

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.

Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).

Table of Contents

Companion Plantings for Management of Squash Bug

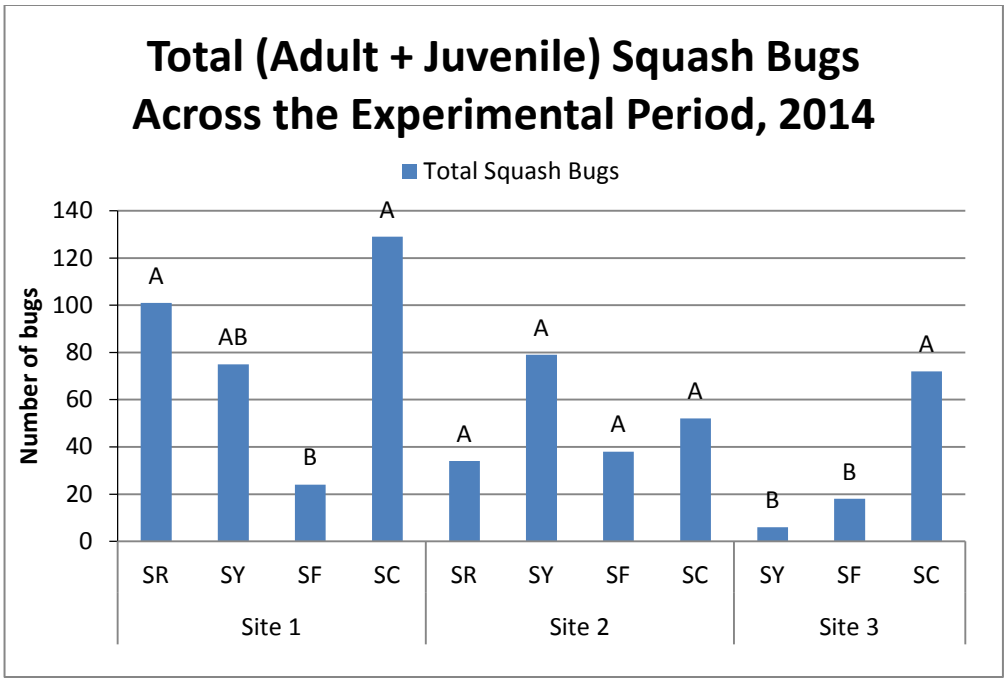
Companion Plants as Tools for Pest Management of Squash Bug on Summer Squash

Project Coordinator: B. Kahn
Cooperators: E. Rebek, L. Brandenberger, K. Reed, J. Motes, W. Whitmore

Introduction and Methods: The concept of companion planting as a potential pest management tool has received some attention recently as interest in sustainable and organic vegetable production has grown. However, the few published scientific studies have shown mixed results, and none have addressed squash bug management. We conducted a pilot study at the Cimarron Valley Research Station at Perkins in 2013. In 2014, we conducted another study at Perkins, plus on-farm trials at the Motes and Whitmore farms. Transplants of 'Lioness' summer squash were planted in the field between May 13-16, 2014 along with companion herbs as appropriate. Counts were made of squash bugs on the squash plants on 10 dates between May 24 and July 15. Squash were harvested regularly at all sites. Our treatments and some insect count results are shown on the following page (locations have been given site codes).

Results and Discussion: None of the treatments gave a statistically significant reduction in squash bugs at Perkins in 2013. The feverfew came close, reducing total (adult plus juvenile) squash bugs by 48% compared to the control. Companion planting with feverfew reduced total squash bugs compared to the control across the monitoring period at two of three sites in 2014. Companion planting with white yarrow reduced total squash bugs compared to the control across the monitoring period at one site in 2014. Plot-to-plot variation was high, making it difficult to detect statistically significant differences. Counts of adult bugs often were low, especially at Site 3, so differences were primarily due to juveniles. The row-cover treatment failed at Site 3 in 2014; excessive humidity developed under the covers and many squash plants died from the fungus *Pythium*. Squash grown with yarrow companion plants gave lower marketable fruit weights per acre than control squash at Site 3 in 2014. Treatments (including row covers) did not affect squash yields in any other cases. Squash plants eventually overwhelmed herb plants in most cases, although herbs often survived.

Further studies will be conducted in 2015. We did not expect complete control with the herbs. We hypothesized that companion planting would produce reductions in squash bug populations, or at least a delay in squash bug build-up on the squash crops.



SR = early-season vented row cover, no herbs
SY = companion planting with white yarrow
SF = companion planting with feverfew
SC = control, no row cover and no herbs
Within each site, means (depicted by bars) with the same letter do not differ according to the protected LSD, *P* = 0.05.

Table of Contents

Tomato Tasting Results

Southwood Urban Farm, Jenks, OK and
Southwood Landscape and Garden Center, Tulsa, OK

Charlotte Richert, Tracey Lane, Kendall Taber, Kenda Woodburn
Lynn Brandenberger and Lynda Carrier
Oklahoma State University

Cooperating with Kyle Dismukes

Introduction: Tomato is a popular crop for commercial farms as well as backyard gardens. Trialing different tomato cultivars normally takes into account the performance of a particular cultivar regarding yield potential, fruit size, and possibly pest resistance, but rarely are cultivars evaluated for taste. This often results in consumers and farmers alike not knowing or not liking cultivars that they considered to be superior for yield etc. The objective of this tomato tasting was to determine taste preferences of tomato cultivars that were in the 2014 trialing program along with several indeterminate cultivars.

Methods and Materials: The tasting was carried out on 7/19/14 at Southwood Landscape and Garden Center utilizing tomato fruit produced by Southwood Urban Farm. Tomato fruit of each cultivar were washed then diced by hand and placed on paper plates for sampling by participants in the tasting. Tasters were provided a score sheet and asked to rate each cultivar's taste based on a 0 to 10 scale where 0 = the worst tomato you have ever eaten and 10 = the best tomato you have ever eaten. A total of 64 people participated in the tasting. In addition tasters were encouraged to participate in tasting several salsas that utilized tomatoes as a base and to select their favorite.

Results and Discussion: Taste ratings for tomato fruit ranged from a low of 3.5 to a high of 6.6 (Table 1). In general, the average rating for determinates (D) was 4.9 while indeterminates (I) had an average rating of 5.8. The four highest ratings for specific cultivars were for three indeterminates and one determinate. Ratings were 6.6 for Better Boy (I), 6.4 for Cherokee Purple (I), and 6.3 for both Celebrity (D) and Purple Russian (I). The three lowest ratings were recorded by Charger (D) (3.5), Florida 91 (D) (3.6), and San Marzano (I) (3.7).

Conclusions: Generally tasters preferred the taste of the indeterminate cultivars, but one determinate Celebrity was in the top four cultivars. Based on the results the authors would conclude that the tasting should provide tomato growers some good background information in tomato taste for use when selecting tomato cultivars to trial in their own operations. In addition, although the salsa tasting did not use a score sheet there was a winner: Mr. Kyle Dismukes with his "Buen Provecho" salsa.

Acknowledgements: The authors want to thank Southwood Urban Farm and Southwood Landscape and Garden Center for providing tomatoes for the tasting and for hosting this event.

Table 1. 2014 Tomato Tasting, July 19, Southwood Urban Farm, Jenks, Ok.

Variety	Growth habit	Use	Rating[z]
Bella Rosa	Determinate	Slicer	4.8 e-f[x]
BHN 964	Determinate	Slicer	5.5 b-e
Charger	Determinate	Slicer	3.5 h
Florida 91	Determinate	Slicer	3.6 h
Red Morning	Determinate	Slicer	4.6 e-f
Solar Fire	Determinate	Slicer	4.8 e-f
Valley Girl	Determinate	Slicer	5.1 d-f
Tasti-Lee	Determinate	Slicer	4.8 e-f
Top Gun	Determinate	Slicer	4.5 f-g
Tribeca	Determinate	Slicer	5.3 c-f
Tribute	Determinate	Slicer	5.0 d-f
Volante	Determinate	Slicer	5.4 b-f
Celebrity	Determinate	Slicer	6.3 a-b
Better Boy	Indeterminate	Slicer	6.6 a
Early Girl	Indeterminate	Slicer	5.9 a-d
Large Chery	Indeterminate	Cherry	6.1 a-c
Humberto	Indeterminate	Heirloom plum	5.9 a-d
Big Beef	Indeterminate	Slicer	5.8 a-d
San Marzano	Indeterminate	Paste	3.7 g-h
Super San Marz	Indeterminate	Paste	5.3 c-f
Purple Russian	Indeterminate	Heirloom paste	6.3 a-b
Cherokee Purple	Indeterminate	Heirloom slicer	6.4 a

[z]Taste rating scale was 0 to 10 with 0 = the worst tomato you ever tasted and 10 = the best tomato you ever tasted.
[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 of Contents

2014 Tomato Trial Program

The tomato trial program was begun in 2012 because of encouragement from two forward thinking tomato growers within the state. From the beginning the program has depended on individual farmers volunteering to carry on trials on their own farms, planting, caring for, and collecting data. OSU involvement has included obtaining seed, producing transplants, organizing data collection and completing reports. The trials would not have been possible without the help and support of farmers and also financial support from the Oklahoma Department of Agriculture, Food, and Forestry, many thanks to all those who made 2014 a success.

The 2014 tomato trial program resulted in the completion of eight trials using the twelve cultivars selected for testing. Selection of cultivars to include in the trial has been done each year based upon farmer-cooperator feedback. Cultivars that have been included for more than one year have been repeated because of requests by farmers that carried out trials the previous year. Below you will find some information about the cultivars included in the 2014 trials. Following this page will be trial reports for individual farm sites.

2014 Tomato Trial Entries				
Variety	**Source**	**Days to Maturity**	**Years in trial**	**Seed Co. descriptions**
Bella Rosa	Rupp	72	3	9 oz., heat tolerant, Resistance to SW
BHN-964	Rupp	76	2	10 oz. early blight tolerance, FR, TMV, VW. Heat set, excellent fruit and interior quality
Charger	Rupp	72	2	10 oz. FR^{123},GLS,TYLC, excellent firmness and red color
Florida 91	Seedway	72	3	10-12 oz. Intermediate resistance: Aal, Fol $^{(1,2),}$ Ss, V
Red Morning	Harris	73	1	Early, good cover, Resistance to V,F^{12}, TSWV
Solar Fire	Harris	72	3	8-10 oz. Heat set and crack tolerance. Res: F^{123},V^{1},St
Valley Girl	Johnny's	75	1	7-8 oz fruit. Cracking resistant
Tasti-Lee	Twilley	75	3	6-8 oz. High yields, good shelf life, heat set FW^{123},V^{1}
Top Gun	Twilley	75	2	7-8 oz. heat set, V^{1}, St,TSWV,F^{1},ASC, FW^{12}
Tribeca	Seedway	76	3	10 oz. Heat set. Intermediate resistance: $Fol^{(1,2)}$, S, TSWV (0), V (0) TSMV
Tribute	Seedway	72	3	9-10 oz Highly resistant: Aal, Fol(1,2), Ss; Intermediate resistance: TYLCV, TSWV
Volante	Seedway	74	2	10-12 oz. Resistance to Aal, Fol12, Vd1; Limited resistance to Intermediate Resistance to Ss, TSMV

Disease key

Aal or ASC = Alternaria stem canker, **ALS** = Angular Leaf Spot,
Fol, F, FR or FW = Fusarium Wilt (#s indicate race), **GLS, Ss, or St** = Gray leaf spot (Stemphylium),
SW or SWV = Spotted Wilt Virus, **TSWV** = Tomato Spotted Wilt Virus,
TMV = Tobacco Mosaic Virus, **TYLCV** = Tomato Yellow Leaf Curl Virus, **V or VW** = Verticillium Wilt

Summer Tomato Trial for Heat-set Capabilities, Coyle, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Keith Reed
Oklahoma State University

Cooperating with Whitmore Farms, Coyle, OK

Introduction and Objectives: Tomato originated in the Americas i.e. Peru and Ecuador and belongs to the same family as pepper, eggplant, and yes, nightshade. European explorers of the "New World" brought tomato back to Europe where it eventually became a popular food item. Since tomato is a member of the nightshade family it was thought to be poisonous by many in areas of the world where it was introduced. Even in the U.S. the tomato was thought to be toxic as late as the 20th century (Pierce, 1987). Tomato is a "must have" for fresh market vegetable farmers and requires a high level of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is the lack of fruit set during the hotter periods of June and July. The objective of this study was to trial tomato varieties for heat-set capabilities 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted in the field near Coyle on 4/26/14. The study was organized in the field as a randomized block design with three replications. Plots were 9 feet long (length of row) and 7.5 feet wide (distance between row centers). Each plot consisted of one row and included six transplants with an in-row spacing of 1.5 feet between plants. Plot areas utilized drip irrigation and black plastic mulch. Fertility needs of the study were met following the normal production practices for the farm. There were 9 harvests of the trial between 7/25/14 and 8/24/14. 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: Marketable yields varied significantly with several cultivars yielding from 28,395 to 36,913 lbs. per acre (Table 1). The top yielding cultivars included Valley Girl (36,913), Red Morning and Tribeca (32,170), Solar Fire (30,492), Bella Rosa (29,330), and BHN 964 (28,395). Early yields did not vary significantly, but ranged from 2,044 to 7,916 lbs. per acre in the first three harvests. Red Morning, Valley Girl, and Bella Rosa had early yields of 7,916, 7,873, and 7,335 lbs. per acre, respectively. No differences were observed for individual fruit weight which ranged from a low of 0.32 lbs. for Valley Girl to 0.41 lbs. per fruit for Top Gun.

Conclusions: Generally yields at the Coyle trial site were good with the overall average yield being 27,961 lbs. per acre. Of the twelve cultivars in the trial, six yielded above 28,000 lbs. per acre in nine harvests. Considering early yield, three cultivars (Red Morning, Valley Girl, and Bella Rosa) yielded above 7,300 lbs. per acre in the first three harvests. In conclusion, there were several cultivars that merit consideration by tomato farmers in central Oklahoma when selecting cultivars for their own on-farm trials in the coming year, particularly Valley Girl, Red Morning, and Solar Fire.

Acknowledgements: The authors wish to thank Wayne and Connie Whitmore for their work and support in completing this year's trial.

References:

Peirce, L.C. 1987. Vegetables: characteristics, production, and marketing. Wiley, New York, NY.

Table 1. 2014 Heat-set tomato variety trial-summer, Whitmore Farms, Coyle, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Variety/line	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	29,330 a-b[z]	7,335 a	2,474 a	31,804 a-b	0.40 a
BHN 964	Rupp	28,395 a-b	4,464 a	2,581 a	30,976 a-b	0.35 a
Charger	Rupp	16,966 c	2,044 a	2,528 a	19,493 c	0.34 a
Florida 91	Seedway	24,501 b-c	2,721 a	2,743 a	27,244 b-c	0.36 a
Red Morning	Harris	32,170 a-b	7,916 a	1,979 a	34,149 a-b	0.40 a
Solar Fire	Harris	30,492 a-b	5,593 a	3,173 a	33,665 a-b	0.39 a
Valley Girl	Johnny's	36,913 a	7,873 a	4,571 a	41,484 a	0.32 a
Tasti-Lee	Twilley	26,329 a-c	3,958 a	3,388 a	29,717 b-c	0.35 a
Top Gun	Twilley	27,007 a-c	4,367 a	3,442 a	30,449 a-b	0.41 a
Tribeca	Seedway	32,170 a-b	5,120 a	2,850 a	35,020 a-b	0.36 a
Tribute	Seedway	27,373 a-c	3,065 a	3,764 a	31,137 a-b	0.37 a
Volante	Seedway	23,882 b-c	3,392 a	2,097 a	25,979 b-c	0.38 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

Fall Tomato Trial, Coyle, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Keith Reed
Oklahoma State University

Cooperating with Whitmore Farms, Coyle, OK

Introduction and Objectives: There are a number of ways to approach challenges to tomato fruit-set issues. The obvious approach is to search for tomato cultivars that are less sensitive to the higher temperatures that are experienced during the summer months, which is what the tomato trialing program has been working toward. Another approach is to produce tomatoes "off-season" using either season extension technology (plasticulture, high tunnels, etc.) or transplanting later in the season with the potential for a fall crop. One advantage to producing off-season tomatoes in addition to main season is that farmers can be in the market longer thereby helping their cash flow and in certain markets there is the potential for higher prices. The objective of this study was to trial tomato varieties for fall production to determine what cultivars have potential for producing for fall markets.

Methods: Tomato transplants were grown at the Oklahoma State University research greenhouse. All cultivars included in the trial program were determinant hybrid cultivars and were the same cultivars used in the spring-planted trials. Tomatoes were transplanted in the field near Coyle on 6/10/14. The study was organized in the field as a randomized block design with three replications. Plots were 9 feet long (length of row) and 7.5 feet wide (distance between row centers). Each plot consisted of one row and included six transplants with an in-row spacing of 1.5 feet between plants. Plot areas utilized drip irrigation and white plastic mulch. Fertility needs of the study were met following the normal production practices for the farm. There were 7 harvests of the trial between 8/19/14 and 9/22/14. 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 in marketable yield were observed in the trial, but yields ranged from 25,007 to 37,913 lbs. per acre (Table 1). The three highest yielding cultivars included Tribeca, Red Morning, and Bella Rosa which had yields of 37,913, 37,752, and 34,041 lbs. per acre, respectively. Early yields were highest for Valley Girl and Tribeca which were significantly higher than a majority of the other cultivars in the trial. Florida 91 had the lowest early yield (1,990 lbs.) while Valley Girl and Tribeca had early yields of 16,510 and 14,036 lbs. per acre, respectively. Average individual fruit weights varied significantly ranging from 0.35 to a high of 0.43 lbs. per fruit. All three of highest yielding cultivars (Bella Rosa, Red Morning, and Tribeca) had average fruit weights of 0.43 lbs. per fruit while Valley Girl which was the highest early yielder had the lightest average fruit weights of 0.35 lbs. per fruit.

Conclusions: In general cultivars yielded higher in the fall trial (overall average of 29,757 lbs. per acre) compared to the spring planted trial (27,961 lbs. per acre) on the same farm. Early yield in the fall was considerably higher than in the spring with early yields of 4,821 and 8,188 lbs. per acre for the spring and fall trials, respectively. In conclusion, although fall tomato production is not a common practice in Oklahoma, production in this trial exceeded production in the spring planted trial on the same farm. Fresh market tomato farmers may want to consider fall production as a possibility and consider Tribeca, Red Morning, and Bella Rosa cultivars for on-farm trials in their operations.

Acknowledgements: The authors wish to thank Wayne and Connie Whitmore for their work and support in completing this year's trial.

Table 1. 2014 Fall tomato variety trial, Whitmore Farms, Coyle, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Variety/line	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	34,041 a[z]	10,272 b-d	3,442 b-c	37,483 a	0.43 a
BHN 964	Rupp	30,169 a	4,786 d-f	3,442 b-c	33,611 a	0.41 a-b
Charger	Rupp	25,007 a	6,722 d-f	5,888 b-c	30,894 a	0.40 a-c
Florida 91	Seedway	26,889 a	1,990 f	3,119 c	30,008 a	0.43 a
Red Morning	Harris	37,752 a	13,122 a-c	4,033 b-c	41,785 a	0.43 a
Solar Fire	Harris	26,674 a	8,766 b-d	5,862 b-c	32,535 a	0.39 a-c
Valley Girl	Johnny's	29,040 a	16,510 a	8,927 a	37,967 a	0.35 c
Tasti-Lee	Twilley	27,911 a	8,013 c-e	5,378 b-c	33,288 a	0.37 a-c
Top Gun	Twilley	26,943 a	2,689 e-f	4,517 b-c	31,460 a	0.41 a-b
Tribeca	Seedway	37,913 a	14,036 a-b	3,711 b-c	41,624 a	0.43 a
Tribute	Seedway	26,459 a	5,270 d-f	6,453 a-b	32,912 a	0.37 a-c
Volante	Seedway	28,287 a	6,077 d-f	3,388 b-c	31,675 a	0.42 a-b

[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, Jenks, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Kenda Woodburn
Oklahoma State University

Cooperating with Southwood Urban Farm, Jenks, OK

Introduction and Objectives: Regardless of where you are tomato is a major produce item that people request and is a "must have" for fresh market vegetable farmers. Tomato is eaten fresh, cooked and is a major part of many dishes i.e. slices, salsas, sauces, etc. Of all the vegetable crops grown within the state, tomato requires the highest level 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. 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. All cultivars included in the trial program were determinant hybrid cultivars (Table 2). Tomatoes were transplanted at the field site near Tulsa on 4/22/14. The study was organized in the field as a randomized block design with three replications. Plots were 12 feet long (length of row) and five feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of two 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 12 harvests of the trial between 6/30/14 and 8/06/14. 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 tomato cultivars in the trial except for average individual fruit weight (Table 1). Average individual fruit weight ranged from a low of 0.52 lb. per fruit for Valley Girl to 0.92 lb. per fruit for BHN 964. The three cultivars with the highest fruit weights were BHN 964, Red Morning, and Top Gun which had average fruit weights of 0.92, 0.89, and 0.83 lb. per fruit, respectfully. Marketable yield ranged from 31,320 lbs. to 55,132 lbs. per acre. The highest yields were recorded for Solar Fire (55,132 lbs. per acre), Valley Girl (47,529 lbs. per acre), and Red Morning (44,625 lbs. per acre). The five highest early yields were recorded for Volante, Tribute, Tasti-Lee, Bella Rosa, and Solar Fire which had early yields of 9,457, 8,489, 8,395, 8,170, and 8,090 lbs. per acre, respectively.

Conclusions: Average yield for all cultivars in the trial was 39,540 lbs. per acre which likely would be considered an excellent yield for most farms in Oklahoma. Solar Fire had the highest yield in the trial with 55,132 lbs. of marketable fruit per acre. During the previous two years, Solar Fire has performed well in trials across the state and should be considered for on-farm trialing by farmers that are producing fresh market tomatoes. The trial should encourage tomato farmers in the state when they understand the potential yields that are possible with this trial. The authors would encourage tomato producers to study these results taking into consideration marketable yield, early yield and individual fruit size when selecting cultivars for on-farm trials in their own operations.

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 would also like to thank the Oklahoma Department of Agriculture, Food, and Forestry for funding for this trial.

Table 1. 2014 Heat-set Tomato Variety Trial – Southwood Urban Farm, Jenks, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Variety/line	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	39,284 a[z]	8,170 a	17,107 a	56,391 a	0.77 a-c
BHN 964	Rupp	32,825 a	3,240 a	15,672 a	48,497 a	0.92 a
Charger	Rupp	34,403 a	5,537 a	15,362 a	49,765 a	0.79 a-c
Florida 91	Seedway	40,896 a	5,561 a	20,534 a	61,429 a	0.79 a-c
Red Morning	Harris	44,625 a	5,479 a	21,497 a	66,122 a	0.89 a-b
Solar Fire	Harris	55,132 a	8,090 a	19,667 a	74,800 a	0.69 a-c
Valley Girl	Johnny's	47,529 a	6,856 a	14,227 a	61,756 a	0.52 c
Tasti-Lee	Twilley	39,417 a	8,395 a	14,610 a	54,027 a	0.63 b-c
Top Gun	Twilley	36,854 a	5,508 a	18,203 a	55,057 a	0.83 a-b
Tribeca	Seedway	31,320 a	5,389 a	15,110 a	46,430 a	0.73 a-c
Tribute	Seedway	34,432 a	8,489 a	16,487 a	50,919 a	0.66 a-c
Volante	Seedway	37,757 a	9,457 a	20,645 a	58,402 a	0.63 b-c

[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, Oklahoma City, OK

**Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Ray Ridlen with Oklahoma State University
And Micah Anderson with ODAFF**

Cooperating with the Governor's Mansion Garden, Oklahoma City, OK

Introduction and Objectives: Tomato originated in the Americas in Peru and Ecuador. As it spread around the world by explorers taking it home, it was thought to be poisonous because it is a member of the nightshade family. Even in the U.S. the tomato was thought to be toxic as late as the 20th century (Pierce, 1987). Although it doesn't have the level of nutrients of some vegetables, it is a component of many dishes and adds significantly to our diets. Tomato is a dietary source of several nutrients (calcium, potassium, vitamin A, and folate) (Source: USDA National Nutrient Database). Tomato is a "must have" for fresh market vegetable farmers and requires a high level of management and attention to detail in order to be successful. One of the biggest problems for tomato growers is fruit set which usually slows or stops completely during the hotter periods of June, July, and August. The objective of this study was to trial tomato varieties for heat-set capabilities 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted at the field site in Oklahoma City on 5/02/14. The study was organized in the field as a randomized block design with three replications. Plots were 11 feet long (length of row) and 4.5 feet wide (row center spacing). Each plot consisted of one row and included six transplants with an in-row spacing of 1.8 feet between plants. Plot areas utilized drip irrigation and black plastic mulch. Fertility needs of the study were met following the normal production practices for the garden. There were 24 harvests of the trial between 7/08/14 and 10/07/14. Data recorded at harvest included 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 for yield or fruit size (Table 1). Marketable yields ranged from 43,413 to 57,200 lbs. per acre. The cultivars that recorded the highest marketable yields included Tribeca (57,200 lbs. per acre), Top Gun (56,027 lbs. per acre), and Volante (54,560 lbs. per acre). A second grouping for yield included Valley Girl, Tribute, Charger, and Solar Fire with yields ranging from 53,093 to 53,680 lbs. per acre. Remaining cultivars had yields that ranged from 43,413 to 48,400 lbs. per acre. Early yields ranged from 3,227 to 6,160 lbs. per acre. Bella Rosa (6,160 lbs. per acre), BHN 964, Charger, Red Morning, Top Gun, and Tribute recorded early yields (1st three harvests) ranging from 5,280 up to 6,160 lbs. per acre. Valley Girl, Volante, and Top Gun had the three highest cull yields of 15,136, 14,667, and 14,373 lbs. per acre, respectively.

Conclusions: Overall marketable yields in this trial averaged 50,869 lbs. per acre, considered to be an excellent yield. There are several reasons why yields were high, first, crop care and maintenance were carefully carried out, this along with the use of drip irrigation and plastic mulch helped to reduce disease pressure. Second, harvest frequency ranged from every day to up to 4-8 days averaging 3.8 days between harvests for the entire season. Third, harvests continued on into October with a total of 24 harvests over the three month harvest season. The trial should encourage tomato farmers in the state when they understand the potential

yields that are possible with this crop. Tomato farmers in the central Oklahoma area should consider on-farm trials of Tribeca, Top Gun, and Volante cultivars in their operations.

Acknowledgements: The authors wish to thank Larry Miller and Catherine Dennis at the Governor's Mansion for their work and support in completing this year's trial and Micah Anderson with ODAFF for helping to connect us with the Governor's Garden and for installation of plastic mulch and drip tape. The authors would also like to thank the Oklahoma Department of Agriculture, Food, and Forestry for funding for this trial.

References:

Peirce, L.C. 1987. Vegetables: characteristics, production, and marketing. Wiley, New York, NY.

USDA National Nutrient Database, http://ndb.nal.usda.gov/ndb/search/list accessed on 12/9/14.

Table 1. 2014 Heat-set tomato variety trial, Governor's Mansion, Oklahoma City, OK

		Yield (lbs./A)			
Cultivar	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**
Bella Rosa	Rupp	48,400 a[z]	6,160 a	7,627 a	56,027 a
BHN 964	Rupp	44,293 a	5,280 a	10,677 a	54,971 a
Charger	Rupp	53,387 a	5,573 a	6,277 a	59,664 a
Florida 91	Seedway	46,053 a	4,107 a	13,024 a	59,077 a
Red Morning	Harris	46,933 a	5,573 a	6,453 a	53,387 a
Solar Fire	Harris	53,093 a	4,107 a	13,200 a	66,293 a
Valley Girl	Johnny's	53,680 a	4,107 a	15,136 a	68,816 a
Tasti-Lee	Twilley	43,413 a	3,227 a	9,680 a	53,093 a
Top Gun	Twilley	56,027 a	5,573 a	14,373 a	70,400 a
Tribeca	Seedway	57,200 a	4,107 a	12,701 a	69,901 a
Tribute	Seedway	53,387 a	5,573 a	12,085 a	65,472 a
Volante	Seedway	54,560 a	4,400 a	14,667 a	69,227 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, Omega, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Lorne Geisler
Oklahoma State University

Cooperating with Don's Produce, Omega, OK

Introduction and Objectives: Tomato is a very popular produce item for both commercial fresh market farms and for backyard gardeners. Tomato is a dietary source of several nutrients (calcium, potassium, vitamin A, and folate) (Source: USDA National Nutrient Database). Although it doesn't have the level of nutrients of some other vegetables it is a component of many dishes and is also consumed raw. Regardless, tomato is a major produce item that people request and is a "must have" for fresh market vegetable farmers. Of the vegetable crops grown within the state, tomato requires a high level 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. The objective of this study was to trial tomato varieties for heat-set capabilities and use drip irrigation and plastic mulch to manage 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted at the field site near Omega on 5/25/14. The study was organized in the field as a randomized block design with three replications. Plots were 9 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. Plots were grown in black plastic mulch using drip irrigation, with transplants planted through the plastic mulch. Fertility needs of the study were met following the normal production practices for the farm. There were 14 harvests of the trial between 7/08/14 and 9/04/14. 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 observed for marketable yield for cultivars in the trial (Table 1). Marketable yields ranged from 1,245 to 2,509 lbs. per acre with Tasti-Lee, Volante, and Valley Girl having yields of 2,509, 2,503, and 2,471, respectively. Early yield from the first three harvests did not vary, but ranged from zero to 656 lbs. per acre. Valley Girl, Solar Fire, and Bella Rosa had early yields of 656, 573, and 336 lbs. per acre, respectively, for the first three harvests. Differences were observed for yield of cull fruit with Solar Fire (1,288 lbs. per acre), Bella Rosa (981 lbs. per acre), and Top Gun (952 lbs. per acre) having the highest level of cull production. Total yield and fruit weights did not vary significantly in the trial.

Conclusions: Generally there were some challenges in completing this trial. The biggest challenge was from the water source used for the trial, it had excessive levels of chlorine which damaged the entire crop and actually killed several plants. It took several weeks for the trial to recover which reduced yield considerably. Although yields were low the three cultivars that recorded the highest yields were Tasti-Lee, Volante, and Valley Girl. Valley Girl recorded the highest early yields and has been a steady performer in other trials also.

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

References:

USDA National Nutrient Database, http://ndb.nal.usda.gov/ndb/search/list accessed on 12/9/14.

Table 1. 2014 Heat-set tomato variety trial, Don Blehm, Omega, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Cultivar	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	1,925 a[z]	336 a	981 a-b	2,907 a	0.27 a
BHN 964	Rupp	1,767 a	0 a	374 b	2,140 a	0.25 a
Charger	Rupp	1,812 a	0 a	508 b	2,321 a	0.27 a
Florida 91	Seedway	2,294 a	134 a	535 b	2,829 a	0.27 a
Red Morning	Harris	1,815 a	253 a	696 a-b	2,511 a	0.28 a
Solar Fire	Harris	2,046 a	573 a	1,288 a	3,334 a	0.26 a
Valley Girl	Johnny's	2,471 a	656 a	417 b	2,888 a	0.28 a
Tasti-Lee	Twilley	2,509 a	118 a	395 b	2,904 a	0.27 a
Top Gun	Twilley	1,245 a	102 a	952 a-b	2,197 a	0.27 a
Tribeca	Seedway	2,439 a	83 a	834 a-b	3,272 a	0.27 a
Tribute	Seedway	2,119 a	269 a	696 a-b	2,815 a	0.28 a
Volante	Seedway	2,503 a	0 a	334 b	2,842 a	0.27 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, Stillwater, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Keith Reed
Oklahoma State University

Cooperating with Motes Farm, Stillwater, OK

Introduction and Objectives: Tomato a member of the nightshade family originated in Peru and Ecuador. It was thought to be poisonous by many in areas of the world where it was introduced. Even in the U.S. the tomato was thought to be toxic as late as the 20th century (Pierce, 1987). Tomato is a dietary source of several nutrients (calcium, potassium, vitamin A, and folate) (Source: USDA National Nutrient Database). Although it doesn't have the level of nutrients of some vegetables it is a component of many dishes and is also consumed raw. Tomato is a "must have" for fresh market vegetable farmers and requires a high level 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. The objective of this study was to trial tomato varieties for heat-set capabilities 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted at the field site near Stillwater on 4/19/14. The study was organized in the field as a randomized block design with three replications. Plots were 9 feet long (length of row) and 10 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 drip irrigation and black plastic mulch. Fertility needs of the study were met following the normal production practices for the farm. There were 14 harvests of the trial between 6/27/14 and 8/07/14. 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: Marketable yield did not vary significantly between cultivars, but ranged from a low of 17,392 to a high of 28,798 lbs. of fruit per acre (Table 1). The five cultivars that recorded the highest yields included BHN 964 (31,202), Red Morning (28,798), Tribute (26,152), Solar Fire (25,926), and Tribeca (25,475). Differences in early yields varied significantly with Valley Girl and Tribeca having the highest early yields at 3,937 and 3,227 lbs. per acre, respectively, for the first three harvests. Yield of cull fruit was highest for Valley Girl (13,852), Charger (12,003), and Florida 91 (12,407 lbs. per acre) compared to other cultivars. Average individual fruit weights varied significantly. Two groups emerged in regard to fruit weight. Valley Girl and Tasti-Lee produced the smallest fruit with average fruit weights of 0.33 lbs. per fruit while the rest of the cultivars in the trial ranged from 0.37 to 0.41 lbs. per fruit.

Conclusions: Average yield for the trial was 24,207 lbs. per acre with five cultivars yielding higher than the average. These five cultivars included BHN 964, Red Morning, Tribute, Solar Fire, and Tribeca which averaged 27,511 lbs. per acre compared to the other seven lower yielding cultivars which averaged 21,847 lbs. per acre. Of these five high yielding cultivars Solar Fire, Tribeca, and Tribute have been included each year of the three year trial program, meaning that tomato trial sites have voted each year to retain them in the trial program. In conclusion, based upon the results it would be advisable for tomato producers considering new cultivars to select some of these top five yielding cultivars for on-farm trialing on farms in the central Oklahoma area.

Acknowledgements: The authors wish to thank Jim and Barbara Motes for their work and support in completing this year's trial.

References:

Peirce, L.C. 1987. Vegetables: characteristics, production, and marketing. Wiley, New York, NY.

USDA National Nutrient Database, http://ndb.nal.usda.gov/ndb/search/list accessed on 12/9/14.

Table 1. 2014 Heat-set tomato variety trial, Motes Farm, Stillwater, OK

		Yield (lbs/A)				Individual fruit wt. (lbs)
Variety/line	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	23,313 a[z]	2,388 b-c	10,680 b-e	33,993 a	0.40 a
BHN 964	Rupp	31,202 a	694 d-e	10,054 b-f	41,256 a	0.40 a
Charger	Rupp	21,683 a	1,936 b-d	12,003 a-c	33,686 a	0.40 a
Florida 91	Seedway	20,247 a	532 d-e	12,407 a-b	32,654 a	0.39 a
Red Morning	Harris	28,798 a	1,984 b-d	9,793 c-f	38,591 a	0.38 a
Solar Fire	Harris	25,926 a	1,775 b-e	8,276 e-f	34,203 a	0.37 a-b
Valley Girl	Johnny's	23,361 a	3,937 a	13,852 a	37,213 a	0.33 b
Tasti-Lee	Twilley	17,392 a	1,823 b-e	10,567 b-f	27,959 a	0.33 b
Top Gun	Twilley	23,555 a	339 e	11,245 b-d	34,800 a	0.40 a
Tribeca	Seedway	25,475 a	3,227 a-b	8,986 d-f	34,461 a	0.40 a
Tribute	Seedway	26,152 a	3,291 a-b	8,583 e-f	34,735 a	0.41 a
Volante	Seedway	23,377 a	1,033 c-e	8,118 f	31,495 a	0.38 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, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier
Brian Kahn and Kenda Woodburn
Oklahoma State University

Cooperating with Our Farm, Tulsa, OK

Introduction and Objectives: Regardless of location, tomato is a major produce item that people request and is a "must have" for fresh market vegetable farmers. Tomato is eaten fresh, cooked and is a major part of many dishes i.e. slices, salsas, sauces, etc. It is a dietary source of several nutrients (calcium, potassium, vitamin A, and folate) (Source: USDA National Nutrient Database). Of all the vegetable crops grown within the state, tomato requires the highest level of management and attention to detail in order to be successful. One of the biggest problems that tomato growers have is fruit set which usually stops completely during the hotter periods of June and July. Farmers continue to request help with this ongoing problem. The objective of this study was to trial tomato varieties for heat-set capabilities 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted at the field site near Tulsa on 4/22/14. 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. Plots were grown in a perma-mulch system with transplants planted through the wood-mulch of the system. Fertility needs of the study were met following the normal production practices for the farm. There were 23 harvests of the trial between 6/10/14 and 9/08/14. 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: Marketable yield varied significantly between cultivars in the trial (Table 1). Yields ranged from 3,768 to 10,420 lbs. per acre. The three highest yielding cultivars included Valley Girl (10,420), Florida 91 (9,673), and Top Gun (9,486 lbs. per acre). Early season yield also varied significantly ranging from zero to 491 lbs. per acre. Volante and Tribute had the highest early yields in the trial with 491 and 408 lbs. per acre from the first three harvests, respectively. No differences were observed between cultivars for culls or for total yield (marketable + cull yields). Average fruit size did vary significantly ranging from 0.22 lbs. to 0.31 lbs. per fruit. Valley Girl and Tasti-Lee had the lowest fruit weights with 0.22 and 0.23 lbs. per fruit, respectively, while Volante had the highest fruit weight of 0.31 lbs. per fruit.

Conclusions: In general this trial verifies the need for site specific on-farm trials particularly for tomato cultivars. Two of the three top yielding cultivars in the trial (Florida 91 and Top Gun) have not been top yielders in any of the other trials within the state, but they were in this trial. The average overall yield for the trial was 7,031 lbs. per acre. The three highest yielding cultivars (Valley Girl, Florida 91, and Top Gun) yielded considerably higher than the overall average with yields ranging from 9,486 to 10,420 lbs. per acre. Based upon the results, other tomato farms in the eastern part of Oklahoma should be able to utilize results from this trial to determine potential cultivars for on-farm trials in their operations.

Acknowledgements: The authors wish to thank Rex and Marie Koelsch and their staff at Our Farm for their work and support in completing this year's trial. The authors would also like to thank the Oklahoma Department of Agriculture, Food, and Forestry for funding for this trial.

References:

USDA National Nutrient Database, http://ndb.nal.usda.gov/ndb/search/list accessed on 12/9/14.

Table 1. 2014 Heat-set tomato variety trial, Our Farm, Tulsa, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Cultivar	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	4,764 c-d[z]	187 a-c	2,330 a	7,094 a	0.29 a
BHN 964	Rupp	5,483 b-d	90 b-c	3,886 a	9,369 a	0.26 a-c
Charger	Rupp	4,308 d	242 a-c	4,320 a	8,628 a	0.29 a
Florida 91	Seedway	9,673 a-b	83 b-c	3,208 a	12,881 a	0.29 a
Red Morning	Harris	3,768 d	55 c	4,425 a	8,193 a	0.30 a
Solar Fire	Harris	8,402 a-d	159 a-c	2,019 a	10,421 a	0.26 a-c
Valley Girl	Johnny's	10,420 a	277 a-c	3,988 a	14,408 a	0.22 c
Tasti-Lee	Twilley	7,094 a-d	0 c	1,998 a	9,092 a	0.23 b-c
Top Gun	Twilley	9,486 a-c	35 c	6,161 a	15,647 a	0.30 a
Tribeca	Seedway	4,785 c-d	256 a-c	2,730 a	7,514 a	0.27 a-b
Tribute	Seedway	9,244 a-c	408 a-b	3,678 a	12,923 a	0.28 a
Volante	Seedway	6,943 a-d	491 a	3,547 a	10,490 a	0.31 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, Woodward, OK

Lynn Brandenberger, Danielle Williams, Lynda Carrier,
Brian Kahn and Dana Bay
Oklahoma State University

Cooperating with Green Gates Garden, Woodward, OK

Introduction and Objectives: Tomato is a very popular produce item for both commercial fresh market farms and for backyard gardeners. Tomato is a dietary source of several nutrients (calcium, potassium, vitamin A, and folate). Although it doesn't have the level of nutrients of some other vegetables it is a component of many dishes and is also consumed raw. Regardless, tomato is a major produce item that people request and is a "must have" for fresh market vegetable farmers. Of the vegetable crops grown within the state, tomato requires a high level 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. The objective of this study was to trial tomato varieties for heat-set capabilities and use drip irrigation to manage 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. All cultivars included in the trial program were determinant hybrid cultivars. Tomatoes were transplanted at the field site near Woodward on 5/20/14. The study was organized in the field as a randomized block design with three replications. Plots were 16 feet long (length of row) and 4.7 feet wide (row center spacing). Each plot consisted of one row and included eight transplants with an in-row spacing of two feet between plants. Plot areas utilized drip irrigation. Fertility needs of the study were met following the normal production practices for the farm. There were 21 harvests of the trial between 7/20/14 and 9/03/14. 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: Marketable yields for cultivars in the trial ranged from 6,282 to 29,056 lbs. per acre (Table 1). Yields were highest for Valley Girl and Tasti-Lee which had marketable yields of 29,056 and 21,550 lbs. per acre, respectively. Early yields did not vary significantly, but ranged from zero for Florida 91 and Top Gun to considerably higher for Valley Girl, Tribute, Tribeca, and Solar Fire which had early yields of 744, 721, 518, and 436 lbs. per acre, respectively. Average individual fruit weights varied significantly ranging from 0.30 lbs. per fruit for Valley Girl to 0.55 and 0.54 for Bella Rosa and Tribute, respectively.

Conclusions: Several cultivars produced well in this trial including Charger, Solar Fire, Valley Girl, Tasti-Lee, and Tribute. This year's trial in Woodward was the initial tomato trial done in the northwest area of the state. Around the Woodward area there are several fresh market vegetable producers and since tomato cultivars can be relatively site specific in their response to different environments, trial results from this area should be useful to these farmers. The authors would encourage tomato producers to consider different aspects of each cultivar when choosing cultivars to do on-farm trials with.

Acknowledgements: The authors wish to thank Rod and Dana Franks at Green Gates Garden for their work and support in completing this year's trial.

Table 1. 2014 Heat-set Tomato Variety Trial – Green Gates Garden, Woodward, OK

		Yield (lbs./A)				Individual fruit wt. (lbs)
Variety/line	**Seed source**	**Marketable**	**Early mkt**	**Culled**	**Total**	
Bella Rosa	Rupp	11,774 b-c[z]	66 a	6,279 a	18,053 a	0.55 a
BHN 964	Rupp	6,832 c	378 a	10,625 a	17,457 a	0.45 a-b
Charger	Rupp	16,397 a-c	82 a	6,882 a	25,280 a	0.42 a-b
Florida 91	Seedway	11,965 b-c	0 a	6,136 a	18,101 a	0.45 a-b
Red Morning	Harris	13,858 b-c	82 a	12,339 a	26,197 a	0.49 a
Solar Fire	Harris	16,939 a-c	436 a	11,679 a	28,618 a	0.37 a-b
Valley Girl	Johnny's	29,056 a	744 a	8,234 a	37,289 a	0.30 b
Tasti-Lee	Twilley	21,550 a-b	238 a	9,792 a	31,342 a	0.35 a-b
Top Gun	Twilley	6,282 c	0 a	7,428 a	13,710 a	0.48 a
Tribeca	Seedway	11,735 b-c	518 a	6,703 a	18,438 a	0.42 a-b
Tribute	Seedway	14,501 b-c	721 a	13,835 a	28,335 a	0.54 a
Volante	Seedway	12,319 b-c	168 a	10,177 a	22,497 a	0.49 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 Observation Trial - Lane

Jim Shrefler, Merritt Taylor and Lynn Brandenberger

This observational trial was conducted during the summer of 2014 in southeast Oklahoma as part of a larger project to assess tomato cultivars for fruit set capability under summer conditions t.

Materials and Methods: This trial was conducted during 2014 at the Wes Watkins Agricultural Research and Extension Center at Lane, Oklahoma. A single row of tomatoes was grown on a raised bed covered with plastic mulch having a silver upper surface. Drip irrigation was installed below the plastic. Tomato plants were spaced 2 feet apart with the row and were supported by a single metal stake at each plant. Cultivars used in the trial are shown in the table. For all cultivars there were 3 plants with the exception of Solar Fire for which there were 2 plants. Tomatoes were transplanted on May 7 using plants grown in a greenhouse in Stillwater in the OSU Horticulture greenhouses. Plants were fertilized periodically with a soluble 20-20-20 fertilizer source using a watering can or drip irrigation. No chemical insect or disease control measures were employed.

Results: Harvesting of tomatoes began on July 14 and continued through October 9. It should be noted that Tasti-Lee plants were in poor condition compared to the others at transplant but gradually recovered. Because this is an observational trial conclusions should be drawn with discretion. Over the duration of the trial, on several occasions, tomato hornworms caused considerable defoliation of plants. Major causes of non-marketability of fruit included insect damage, fruit cracking, and diseases.

		Marketable fruit			Non-Marketable fruit		
Cultivar	Source	Number per plant	Weight (lbs/plant)	Lbs./fruit	Number per plant	Weight (lbs/plant)	Lbs./fruit
Solar Fire	Harris	23	2.64	0.23	41	4.62	0.22
Bella Rosa	Twilley	20	1.17	0.18	16	0.79	0.15
Charger	Seedway	22	2.1	0.27	29	2.14	0.22
Volante	Seedway	17	1.31	0.23	32	2.68	0.25
Florida 91	Seedway	28	1.78	0.19	51	3.85	0.23
Red Morning	Harris	12	1.27	0.32	46	3.14	0.20
Tribute	Seedway	48	3.41	0.21	64	4.08	0.19
Tribeca	Seedway	30	2.1	0.21	35	1.38	0.12
BHN-964	BHN Seed	34	3.77	0.33	38	3.34	0.26
Top Gun	Twilley	17	2.8	0.37	42	2.41	0.18
Valley Girl	Johnny's	37	1.9	0.15	68	3.47	0.17
Tasti-Lee	Twilley	17	0.91	0.16	15	0.84	0.17

Table of Contents

Watermelon Following Winter Cover Crops

Observational Trial, 2014
Cimarron Valley Research Station
Lynn Brandenberger, Danielle Williams, Lynda Carrier, Fred Matafari
Oklahoma State University

Introduction: A major concern regarding soil quality in the southern plains is the low level of organic matter in soils, often less than 0.5%. This is particularly a problem in soils that are under conventional tillage. Organic matter (O.M.) is a key ingredient to healthy soils since it helps to glue soil particles together (aggregation) stores and releases nutrients, creates channels for air and water in the soil, and provides feed stocks for soil organisms such as beneficial fungi, bacteria, and worms. Soils with adequate levels of O.M. will be more productive and will recover faster from the natural wear and tear of crop production. Cover crops are one means of improving soil quality for Oklahoma vegetable producers. One advantage that cover crops have over manures, composts, etc. is the much lower risk of food safety problems compared to animal manures or even some types of compost. Objectives for this multi-year study are to determine if increases in soil O.M. can be made with winter cover crops proceeding summer vegetable crops and what combinations of cover crops and summer vegetables will be compatible with one another.

Methods and Materials: Four winter cover crop treatments included hard red winter wheat (*Triticum aestivum* L.), crimson clover (*Trifolium incarnatum*), and Austrian winter pea (*Pisum sativum arvense*), a combination of crimson clover, and Austrian winter pea, and a non-planted control was also included in the study. Prior to seeding, weeds were controlled for the entire plot area using 41% glyphosate at a rate of 3 quarts per acre. Plots were direct seeded using a Great Plains no-till grain drill on October 10, 2013 in plots that were 45' in length and 9' wide. Seeding rates were 75, 15, and 75 lbs. per acre for wheat, crimson clover, and Austrian winter pea, respectively, with the combination treatment using the same seeding rates for clover and pea as the single species plots. No supplemental irrigation was provided for the cover crop treatments which depended upon natural rainfall for germination and growth. The study was arranged in a randomized block design with five replications.

All cover crop plots were terminated on May 23, 2014 using a combination of Poast (sethoxydim at 2 pts/acre) + crop oil concentrate at 0.5% volume to volume + glyphosate at 3 qts/acre + ammonium sulfate at a rate of 8.5 lbs./100 gallons of spray volume. Each plot was direct seeded to Sangria hybrid watermelon with 10 feet between row centers with 2' spacing between seeds in the row on May 28, 2014. Drip irrigation was installed the following day providing each row of watermelon with one drip-tape per row and irrigation was initiated. Crop nutritional needs were met with the application of 20-10-20 water soluble fertilizer applied multiple times through the drip system for a total of 30 lbs. of nitrogen per acre. Disease control was managed by the application of Bravo (chlorothalonil) and Quadris (azoxystrobin) fungicide applications every 10 to 14 days. During the month following seeding, weed control was dependent on shading by cover crop residue which resulted in very weedy plots. The first replication was hand weeded and then rototilled on each side of the row on July 2nd. Weeding was followed by the application between rows of a tankmix consisting of ethalfluralin at 3 pints per acre + Sandea (halosulfuron) at 0.024 lbs a.i. per acre. The remaining four replications were abandoned and weeds controlled in them with glyphosate at 3 qt. /acre rate for the remainder of the season. Watermelons from each plot in the first replication were harvested on August 25, 2014 and weighed to determine an overall plot yield.

Results and Discussion: Marketable yield in the first replication ranged from 22,206 to 37,655 lbs. per acre (Table 1). Yields were 22,206 for the wheat plot, 31,034 lbs. per acre for the no cover plot, 33,812 lbs. per acre for the crimson clover plot, 35,196 lbs. per acre for the Austrian winter pea plot, and 37,655 lbs. per acre for the combination of Austrian winter pea + crimson clover plot. Number of fruit per acre ranged from 1,839 (wheat cover) to 3,485 fruit per acre (Austrian winter pea and the combination winter pea + crimson clover). Average fruit weight ranged from 10.1 to 12.1 lbs. per fruit.

Conclusions: Although there were problems with weed control due to no herbicide early in the season, plots that were weeded and then sprayed with the preemergence tankmix did reasonably well. The primus that watermelon could be grown with no tillage and no herbicides did not work, but it appears that reduced tillage and the use of preemergence herbicides in close proximity to the planted rows does have potential for future investigation. Next year's plans will include soil sampling to determine organic matter content for each treatment.

Acknowledgements: The authors want to thank Cimarron Valley research station for support, maintenance, and care of this trial.

Table 1. 2014 Winter cover crop trial Watermelon observational study, Perkins, OK

Treatment	Yield (lbs/acre)	Number fruit/acre	Average wt. (lbs.)
No Cover	31,034	2904	10.7
Austrian Winter Pea	35,196	3485	10.1
Crimson Clover	33,812	2904	11.6
Winter wheat (HR)	22,206	1839	12.1
Winter Pea/Crimson Clover mix	37,655	3485	10.8

Table of Contents

Pest Management

Evaluation of Fungicides for Control of Disease on Pumpkin

Evaluation of fungicides for control of powdery mildew on pumpkin, 2014

John Damicone and Tyler Pierson
OSU Dept. of Entomology and Plant Pathology

Introduction: Powdery mildew is an important foliar disease of pumpkin and other cucurbit crops in Oklahoma. The disease causes premature leaf drop which may reduce vine productivity and fruit quality. There are partially resistant cultivars of pumpkin available, but fungicide application is a primary method of disease control. The objective of this trial was to compare registered fungicides for control of powdery mildew. The inorganic fungicides Cuprofix (copper sulfate) and Microthiol (sulfur) were compared to synthetic fungicides.

Material and Methods: The experiment was conducted at the Entomology/Plant Pathology Research Farm in Stillwater, OK in a field of Easpur loam previously cropped to watermelon. The field was direct seeded with the susceptible cultivar 'Howden' on 14 Jul. The herbicides Sonalan 3E at 3.5 pt/A, Permit 75DF at 0.75 oz/A, and Round-Up 4L were broadcast after planting to control weeds. Plots were top-dressed with granular fertilizer (50-0-0 lb/A N-P-K) on 5 Aug. 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 5 Sep and 3 Oct. 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 (8002vk) spaced 18-in. apart using a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 25 gal/A at 40 psi. Applications were made on ca. 14-d intervals beginning at early fruit set on 5 Sep. Rainfall during the cropping period (14 Jul to 6 Nov) totaled 3.38 in. for Jul, 2.01 in. for Aug, 4.19 in. for Sep, 2.18 in. for Oct, and 1.88 in for Nov. Plots received 14 applications of sprinkler irrigation that totaled 6.1 in. of water. Powdery mildew was assessed by visually estimating disease incidence (percentage of leaves with symptoms that included defoliation) and defoliation (percentage of leaves defoliated) in three areas of each plot. Yield of marketable pumpkins was taken on 6 Nov.

Results: Rainfall was 20% below normal (30 yr avg.) and average daily temperature was above normal from Aug through Oct. Powder mildew appeared in Sep and reached severe levels by harvest compared to previous trials at this site. On 8 Oct, all treatments except Cuprofix reduced disease incidence and defoliation compared to the untreated check. However by 27 Oct, only Procure and Quintec reduced disease incidence compared to check. All treatments except Bravo, and Cuprofix reduced defoliation compared to the check on 27 Oct. Inspire Super, Procure, and Quintec generally provided the best control. Plot yields were variable (cv=31.5), but were statistically higher than the untreated check for all treatments except Folicur, Fontelis, Procure, Nova, and Cuprofix. None of the treatments caused phytotoxicity symptoms.

Treatment and rate/A (timing)[z]	Powdery mildew (%)		Defoliation (%)		Yield (cwt/A)
	8 Oct	27 Oct	8 Oct	27 Oct	
Bravo 6F 2 pt (1-3)	25.8 b[y]	92.5 a	7.9 b	40.0 ab	314.0 ab
Microthiol 80DF 6 lb (1-3)	14.6 bcd	91.2 a	1.6 bc	26.7 bcd	358.8 a
Folicur 3.6F 6 fl oz (1-3)	21.7 bc	97.9 a	0.0 c	32.1 b	239.6 abc
Fontelis 1.67F 1 pt (1-3)	9.3 de	95.0 a	1.2 bc	27.1 bcd	227.0 bc
Inspire Super 2.82F 1 pt (1-3)	6.0 de	90.8 a	0.0 c	15.0 cde	343.9 ab
Procure 4F 6 fl oz (1-3)	5.2 de	75.0 b	0.0 c	12.9 de	254.7 abc
Quintec 2.08F 5 fl oz (1-3)	2.5 e	40.8 c	0.4 c	7.9 e	347.6 ab
Nova 40W 4 oz (1-3)	12.5 cde	93.3 a	0.8 c	28.8 bc	243.7 abc
Cuprofix 40DF 2 lb (1-3)	46.2 a	94.6 a	15.4 a	49.1 a	258.8 abc
Untreated check	55.0 a	96.2 a	15.8 a	50.8 a	166.3 c
LSD P=0.05[x]	11.9	10.7	6.7	14.4	125.9

[z] Numbers (1 to 3) correspond to the spray dates of 1=5 Sep, 2=18 Sep, and 3=3 Oct.
[y] Values in a column followed by the same letter are not significantly different at P=0.05.
[x] Fisher's least significant difference.

Table of Contents

Evaluation of Fungicides for White Rust Control in Spring Spinach

Evaluation of fungicides for control of white rust on spring-cropped spinach, 2014

John Damicone and Tyler Pierson
OSU Dept. of Entomology and Plant Pathology

Introduction: White rust is the most important foliar disease of spinach in Oklahoma and surrounding states. It causes leaf blemishing which renders leaves unmarketable. Partially resistant cultivars are available for fall production, but these are not suitable for over-winter and spring production seasons. The strobilurin fungicides Abound, Reason, and Cabrio provide a high level of disease control, but many diseases have become broadly resistant to this class of fungicides. The objective of this trial was to evaluate experimental and registered fungicide alone to determine their innate activity on white rust, and in spray programs with strobilurin fungicides for resistance management.

Materials and Methods: 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 prior to planting the susceptible cultivar 'Melody' on 12 Mar 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 31 Mar. Plots were top-dressed with granular fertilizer (50-0-0 lb/A, N-P-K) on 4 Apr. 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 7-day intervals beginning at the first true-leaf stage. Plots received a total of 12.45 inches of sprinkler irrigation at 0.1 to 1.0 in. water per application as needed to promote crop and disease development. Rainfall during the cropping period (12 Mar to 27 May) totaled 0.84 in. for Mar 0.84 in. for Apr, and 0.65 in. for May. Disease incidence (percentage of leaves with symptoms) and severity (percentage of leaf area with symptoms) were assessed on 27 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 nearly 9 inches below normal (30-yr avg.) for Mar through May. Plots were heavily irrigated during the drought conditions to promote disease development. White rust was first observed in mid-May and reached moderate levels compared to previous trials at this site. However, levels of disease were highly variable. All treatments except QGU42 applied alone reduced disease incidence (leaves with rust) compared to the untreated check. All of the treatments numerically reduced disease severity (leaf area with rust) compared to the untreated check, but because of the variable levels of disease, differences among treatments were not statistically significant. None of the treatments caused leaf injury (phytotoxicity).

Treatment and rate/A (timing)[z]	Leaves w/rust (%)	Leaf area w/rust (%)
Untreated check	42.5 a[y]	9.19 a
QGU42 100OD 4.8 fl oz (1-4)	35.0 abc	5.08 a
QGU42 100OD 2.4 fl oz (1-4)	29.0 a-d	5.16 a
QGU42 100OD 1.2 fl oz (1-4)	36.5 ab	5.97 a
QGU42 100OD 2.4 fl oz (1,3) Tanos 50WG 8 oz + Aliette 80WG 2 lb (2,4)	10.0 cde	1.16 a
Tanos 50WG 8 oz + Aliette 80WG 2 lb (1,3) Presidio 4F 4 fl oz + Aliette 80WG 2 lb (2,4)	7.5 de	1.16 a
Quadris 2.08F 12.3 fl oz (1,3) Presidio 4F 4 fl oz (2,4)	0.0 e	0.00 a
Cabrio 20WG 12 (1,3) Presidio 4F 4 fl oz (2,4)	0.7 e	0.02 a
Cabrio 20WG 16 oz (1,3) Switch 62.5WG 14 oz (2,4)	8.2 de	1.07 a
Cabrio 20WG 16 oz (1,3) Fontelis 1.67F 1.5 pt (2,4)	0.0 e	0.00 a
A20941 0.83F 2.4 fl oz (1) Actigard 50WG 0.75 oz (2) Quadris 2.08F 12.3 fl oz (3) Revus 2.09F 8 fl oz (4)	3.2 de	0.81 a
A20941 0.83F 2.4 fl oz + Revus 2.09F 5.5 fl oz (1) Actigard 50WG 0.75 oz (2) Quadris 2.08F 12.3 fl oz (3) Revus 2.09F 8 fl oz (4)	15.7 b-e	4.17 a
Revus 2.09F 8 fl oz (1) Actigard 50WG 0.75 oz (2) Quadris 2.08F 12.3 fl oz (3) A20941 0.83F 2.4 fl oz + Revus 2.09F 5.5 fl oz (4)	10.0 cde	1.55 a
LSD (P=0.05)[x]	25.8	NS

[z] The numbers (1-4) correspond to the spray dates of 1=25 Apr, 2= 2 May, 3=9 May, and 4=16 May.

[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 at P=0.05.

Table of Contents

Evaluation of Fungicides for White Rust Control in Fall Spinach

Evaluation of fungicides for control of white rust on fall-cropped spinach, 2014

John Damicone and Tyler Pierson
OSU Dept. of Entomology and Plant Pathology

Introduction: White rust is the most important foliar disease of spinach in Oklahoma and surrounding states. It causes leaf blemishing which renders leaves unmarketable. Partially resistant cultivars are available for fall production, but these are not suitable for over-winter and spring production seasons. The strobilurin fungicides Abound, Reason, and Cabrio provide a high level of disease control, but many diseases have become broadly resistant to this class of fungicides. The objective of this trial was to evaluate experimental and registered fungicide alone to determine their innate activity on white rust, and in spray programs with strobilurin fungicides for resistance management.

Material and Methods: 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 prior to planting the susceptible cultivar 'Melody' on 22 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 (50-0-0 lb/A, N-P-K) on 21 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 7-day intervals beginning at the first true-leaf stage. Plots received a total of 3.12 inches of sprinkler irrigation at 0.1 to 0.5 in. water per application as needed to promote crop and disease development. Rainfall during the cropping period (22 Sep to 10 Nov) totaled 0.0 in. for Sep, 2.18 in. for Oct, and 1.88 in. for Nov. Disease incidence (percentage of leaves with symptoms) and severity (percentage of leaf area with symptoms) were assessed on 10 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 below normal (30-yr avg) and average daily temperature was above normal during the cropping period. White rust was first observed in mid-Oct and reached severe levels compared to previous trials at this site. All treatments reduced disease incidence and severity compared to the untreated check. However, treatments with QGU42 and A20941 were less effective than the other treatments, which provided excellent disease control (less than 1% disease severity). None of the treatments caused leaf injury (phytotoxicity).

Treatment and rate/A (timing)[z]	Leaves w/rust (%)	Leaf area w/rust (%)
Untreated check	62.5 a[y]	16.91 a
QGU42 100OD 4.8 fl oz (1-4)	12.5 c	1.76 c
QGU42 100OD 2.4 fl oz (1,3) Tanos 50WG 8 oz + Aliette 80WG 2 lb (2,4)	33.5 b	4.36 bc
Tanos 50WG 8 oz + Aliette 80WG 2 lb (1,3) Presidio 4F 4 fl oz + Aliette 80WG 2 lb (2,4)	0.0 c	0.00 c
Quadris 2.08F 12.3 fl oz (1,3) Presidio 4F 4 fl oz (2,4)	0.2 c	0.17 c
Cabrio 20WG 12 (1,3) Presidio 4F 4 fl oz (2,4)	0.1 c	0.08 c
Cabrio 20WG 16 oz (1,3) Switch 62.5WG 14 oz (2,4)	0.8 c	0.76 c
Cabrio 20WG 16 oz (1,3) Fontelis 1.67F 1.5 pt (2,4)	0.3 c	0.35 c
A20941 0.83F 4.8 fl oz (1-4)	10.3 c	10.3 b
Ridomil Gold Copper 65W 2 lb (1,3) Quadris 2.08F 12.3 fl oz + Taegro ECO 5.6 fl oz (2,4)	0.4 c	0.44 c
LSD (P=0.05)[x]	13.4	5.93

[z] The numbers (1-4) correspond to the spray dates of 1=17 Oct, 2= 24 Oct, 3=31 Oct, and 4=7 Nov.

[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.

Table of Contents

Preemergence Weed Control in Pepper

Lynn Brandenberger, Danielle Williams, and Lynda Carrier
Oklahoma State University

In Cooperation with
Schantz Family Farms, Hydro, OK

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 (Palmer amaranth, carpetweed, and spurge-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. 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 5/1/14 and completed on 5/3/14. Row spacing was three feet between row centers with a transplant in-row spacing of 12 inches. The study included eight different herbicides Callisto (mesotrione), Devrinol (napropamide), Dual Magnum (S-metolachlor), Fierce (flumioxazin + pyroxasulfone), League (imazosulfuron), Outlook (dimethenamid-P), Surflan (oryzalin), and Zedua (pyroxasulfone). All were applied pre-transplant except for Dual Magnum which was applied post-transplant on the same day. Treatments were applied to plots two rows wide (6 feet) by 20 feet in length in a randomized design with three replications on 5/2/14. Treatment applications were made with a hand boom CO_2 sprayer at an overall rate of 25 gallons of spray solution per acre. Crop plant counts were recorded and treatments were rated for percent control of Palmer amaranth (Amaranthus palmeri), tumble pigweed (Amaranthus albus L.), carpetweed (*Mollugo verticillata* L.), goathead (Tribulus terrestris L.), spurge (Euphorbia species), and purslane (Portulaca oleracea L.) were recorded on 7/1/14. Percent control of spurge and carpetweed were also recorded again on 7/17/14.

Results and Discussion: No differences were observed for pepper plant counts or for percent control of tumble pigweed, purslane, or spurge on 7/1/14, and carpetweed on 7/17 (Table 1). Control of Palmer amaranth was highest for Surflan and Zedua at 0.025 lb./acre ai on 7/1/14 with ratings of 47 and 40%, respectively. Control of goat head and carpetweed was lowest for Dual Magnum on 7/1/14.

Conclusions: Very few differences were observed in this screening study of preemergence herbicides on pepper. Possible reasons could include variability between replications possibly caused by erratic weather and the loss of several plots due to high winds. Based upon the lack of conclusive data the authors would suggest that this study be repeated in the coming year.

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

Table 1. 2014 Pepper preemergence herbicide study, Schantz Farm, Hydro, OK.

	Plant counts[z]	Palmer amaranth	Tumble pigweed	Goat head	Purslane	Spurge		Carpetweed	
		7/1				7/1--&--7/17		7/1--&--7/17	
Treatment and rate (lbs. ai/acre)	Plants per plot	% Control							
Callisto 0.088	11 a[y]	23 a-c	97 a	80 a	52 a	83 a	42 a	93 a	72 a
Callisto 0.175	13 a	35 a-c	97 a	93 a	62 a	78 a	47 a	100 a	95 a
Devrinol 3.0	13 a	12 c	100 a	83 a	63 a	83 a	32 a	100 a	72 a
Dual Magnum 0.75	3 a	30 a-c	82 a	52 b	25 a	85 a	33 a	67 b	100 a
Fierce 0.414	11 a	15 b-c	100 a	92 a	60 a	82 a	35 a	100 a	73 a
League 0.094	15 a	15 b-c	98 a	93 a	73 a	87 a	88 a	100 a	72 a
Outlook 1.0	17 a	20 b-c	100 a	100 a	62 a	98 a	37 a	100 a	100 a
Surflan 0.56	17 a	47 a	100 a	100 a	75 a	100 a	65 a	100 a	100 a
Zedua 0.025	17 a	40 a-b	100 a	100 a	75 a	98 a	65 a	100 a	100 a
Zedua 0.05	16 a	28 a-c	98 a	98 a	57 a	95 a	30 a	100 a	100 a
Non Treated check	18 a	12 c	100 a	98 a	38 a	98 a	30 a	100 a	93 a

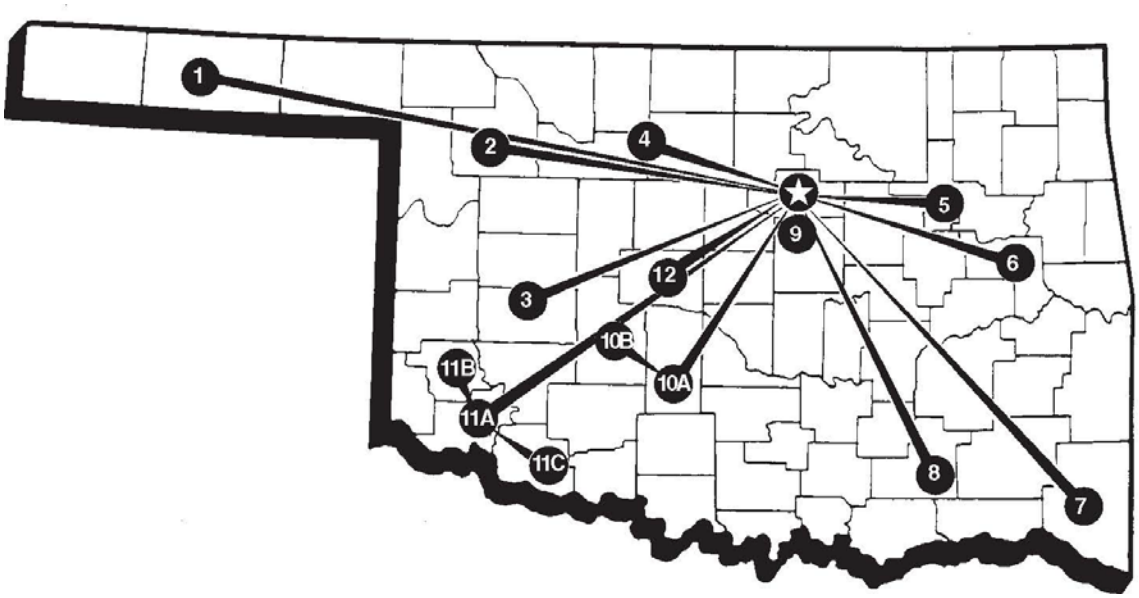
[z] Plant counts = number of Pepper plants in a 6' x 20' plot
[y] Numbers in a column followed by the same letter exhibited no significant differences based on Duncan's Multiple Range Test where P=0.05.

Table of Contents

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. **Cimarron Valley 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***