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 2005.

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.

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The following have provided funding for the support of research in 2005

- Allen Canning Co.
- Centest Inc.
- Crookham Co.
- Gowan Co.
- Syngenta Seed Co.
- Syngenta Crop Protection
- USDA Interregional Research Project #4
- USDA CSREES

Table of Contents

Crop Culture

Basil yield trials

2005 Season, Bixby Oklahoma

N. Maness, D. Chrz, L. Brandenberger, R. Havener, A. Brothers

Materials and Methods: Basils were evaluated in 2005 as a new herb crop for Oklahoma. Since each basil has its own unique flavor and aroma characteristics, samples from each harvest will be chemically evaluated in a continuation of this study to chemotype different varieties and evaluate their potential as an extraction crop. Five basil varieties were selected for study based on their typical use/aroma characteristics: ‘Italian Large Leaf’ and ‘Genovese’ were common basil types with “typical” flavor and aroma; ‘Mrs. Burns’ Lemon’ was a lemon flavored basil; ‘Sweet Thai’ and ‘Ethiopian’ were regional-type basils, with unique flavors characteristic of their use in their geographic region. All seeds were obtained from Johnny’s seed company. Two sets of plots were direct seeded with a Monosem air planter in rows 3 feet apart at a total plot length of 200 feet on April 21. One set of plots were treated with 10 lb/ac ai Dacthal as herbicide on April 22 using a tractor mounted 12 foot broadcast sprayer calibrated to deliver 25 gallons of spray per acre. The other set of plots were not treated with herbicide. Soil tests indicated adequate phosphorus and potassium, but very low nitrogen. Nitrogen was applied as urea at a rate of 40 lb/ac just after planting. Plots were irrigated with 0.5 inch of overhead irrigation following herbicide application. Plots were topdressed with nitrogen from urea at a rate of 40 lb N/ac on May 17. By May 22 severe crop injury in terms of failure to emerge was noted in the herbicide treated plots and they were abandoned. Harvests for the remaining plots were initiated on June 29 and continued until October 11, for a total of 6 harvests. After each harvest, plots were topdressed with nitrogen from urea at a rate of 30 lbs N/ac. A Kincaid plot harvester, equipped with a 4.5 ft sickle-style cutting bar, a bat system for moving harvested material onto a 2.2 ft conveyer system which emptied into pre-weighed harvest lugs, was utilized to harvest all plots. Cutting height was set at 10 inches for all basils except ‘Sweet Thai’, which was cut at 6 inches. During harvest 10 to 15 pounds of basil from each plot was transported to a cooler at 45 F and held prior to transport to Stillwater lab facilities on ice for drying. Just prior to drying, basil was washed to remove soil and other debris, spin-dried in a greens washer, weighed and placed onto cheesecloth. The cheesecloth was then tied to contain the samples and dried for five days at 74 to 80 F in a Proctor-Shwartz forced air drier. Moisture content was determined for all samples.

Conclusions: Due to severe crop damage, causing us to abandon herbicide-treated plots for yield evaluations, Dactal can not be recommended for use as a herbicide on basil. It should be noted that the rate tried (10 lbs ai/ac) was at the high end of recommended rates for onions and other vegetable crops. Basil stand establishment was variable and yield information on a fresh basis (Table 1) and on a dry basis (Table 2) has been corrected to eliminate plant skips in the plots. Harvests were timed relative to plant growth (3 to 5 fully expanded leaves per stem) and flowering status (flower stalks developed, approximately ½ florets in flower) and yields were calculated based on the correction referred to above, with 3 foot between row spacing. ‘Mrs. Burns’ Lemon’ basil yielded slightly more at the first harvest, but yields were comparable thereafter. Both ‘Sweet Thai’ and ‘Ethiopian’ basils yielded less than the other three varieties during the first three harvests, but per harvest yields were greater on the last two harvests, making cumulative yields comparable between all the basils by the last harvest. We noted that washing should be accomplished just prior to drying or other use for basils – if basils were washed prior to transport to Stillwater and then processed for drying the next day there was severe to slight damage in washed samples, versus only slight damage for non-washed samples. A relative ranking for the severity of damage (judged by leaf and/or stem discoloration) caused by prewashing was ‘Mrs. Burns’ Lemon’>>‘Ethiopian’>’Italian Large Leaf’>’Genovese’>>’Sweet Thai’. When storage was required, temperature should be 48 to 52 F to avoid chilling damage, and herbs should be stored dry under high humidity. Under this condition, only minor deterioration was noted after one week of storage. Basils appear to have good yield potential for Oklahoma production. We are in the process of chemical evaluation to assess their value as new extraction crops.

Table 1. 2005 Cumulative Basil Fresh Yields in Bixby, OK

Harvest #	Harvest Date	Italian Large Leaf	Mrs. Burn's Lemon	Genovese	Sweet Thai	Ethiopian
1	29-Jun	3009	3938	2688	1161	331
2	19-Jul	15412	16643	16083	8656	8034
3	2-Aug	18025	20179	18776	10528	9917
4	30-Aug	41957	40828	41220	31395	32130
5	20-Sep	47850	48356	47547	53198	44012
6	11-Oct	61922	58984	60219	66749	58944

Table 2. 2005 Cumulative Basil Air Dry Yields in Bixby, OK

Harvest #	Harvest Date	Italian Large Leaf	Mrs. Burn's Lemon	Genovese	Sweet Thai	Ethiopian
1	29-Jun	373	639	370	172	42
2	19-Jul	2100	2308	2290	1225	1104
3	2-Aug	2414	2777	2594	1497	1364
4	30-Aug	4650	4872	4776	4124	3638
5	20-Sep	5480	5568	5391	6849	4946
6	11-Oct	6760	6768	6745	8556	6707

Beet Variety Trial

Spring 2005, Caddo County, Oklahoma

L. Brandenberger, L. K. Wells, M. Schantz

Materials and Methods: During the spring of 2005 a beet variety trial was conducted to determine the potential of 6 different beet cultivars for commercial production in Oklahoma. The trial was direct seeded on 3/23/05 using a research cone-planter with rows 18 inches apart at a seeding rate of approximately 15 seeds per foot. Each plot consisted of 2 rows 20 feet long, plots were replicated 4 times in a randomized block design. Plots were fertilized with a total of 87 lbs of N, 52 lbs of P, 180 lbs of K, and 60 lbs of S per acre spread over three applications. Yield and quality data (amount of interior root zoning) were recorded at harvest from one meter of row per plot on 6/21/05.

Results and Discussion: No differences were observed for yield of table beets in this trial (Table 1). Yields were 13.7, 13.9, 16.5, 14.0, 17.2, and 15.7 tons/acre for Cylindra Long Red, Detroit Dark Red, Early Wonder, Red Ace, Ruby Queen, and Warrior, respectively. Average root weight ranged from a low of 1.1 oz for Cylindra Long Red to 1.7oz for Ruby Queen, respectively. Red Ace, Ruby Queen and Warrior had significantly lower amounts of interior root zoning than Early Wonder. These three cultivars had interior root zoning ratings of 1.1, 2.1, and 1.9, respectively.

Conclusions: The main objective of this trial was to determine the potential that table beet cultivars would have for production in Oklahoma. A secondary objective was to demonstrate if table beets would be a viable crop for the state. The authors feel that both objectives were met, and that table beets can be produced in Oklahoma for use by the food processing industry. Of the cultivars tested, Red Ace appears to have the highest quality root with low levels of zoning. Based upon the results of this trial the authors would recommend further testing of Red Ace, Ruby Queen, and Warrior cultivars.

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

Table 1. Spring Beet Variety Trial. Caddo County, Oklahoma.

Variety	Seed company	Yield tons/acre[z]	Average size root (oz.)	Zoning[y]
Cylindra Long Red	Chesmore	13.7 a[x]	1.1 a	2.4 ab
Detroit Dark Red	Willhite	13.9 a	1.6 a	2.4 ab
Early Wonder	Dewitt	16.5 a	1.5 a	3.6 a
Red Ace	Dewitt	14.0 a	1.2 a	1.1 b
Ruby Queen	Dewitt	17.2 a	1.7 a	2.1 b
Warrior	Chesmore	15.7 a	1.2 a	1.9 b

[z] Yield=tons per acre, harvested on June 21, 2005.

[y] Zoning=scale 1-5, 5 being most evident differences in color between the xylem and phloem of the root (largest differences in color), 1=small or no differences.

[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.

Cabbage Variety Trial

Spring 2005, Hydro, OK

Brian Kahn, Lynda Wells, and Merlin Schantz

Introduction and Objectives: Vaughan Foods, an Oklahoma fresh processor, is exploring possibilities for raw product procurement within Oklahoma. The objective of this study was to compare two of Vaughan's approved cabbage cultivars ('Bravo' and 'Blue Vantage') with possible alternatives under western Oklahoma growing conditions.

Materials and Methods: Plots were direct seeded on the Schantz farm using a Planet Junior on March 4. Plots followed planter tracks, giving double rows 16 inches apart on 36 inch centers. An application of 32 lbs/acre of actual nitrogen was made during ground preparation, followed by split applications during the season for a total of 100 lbs N/acre. Following ground preparation and prior to planting, Treflan (trifluralin) preemergence herbicide was applied at a rate of 1 pint/acre and immediately incorporated. Double-row plots were 16 feet long and were thinned on April 7 to an average within-row spacing of 16 inches, giving 13 plants per row and 26 plants per plot. The design was a randomized complete block with 3 replications. Volunteer wheat presented a weed control problem early in the study. Plots were irrigated by an overhead sprinkler system. Plots were harvested on June 21, 24, and 28 and on July 6. A once-over harvest was done by hand within each cultivar. Heads weighing less than 1.5 lbs. each were considered too small to be marketable and were discarded without record, with the exception of 'Ruby Dynasty' where heads began to split while still small. Marketable head weights were averaged in each plot, and four heads close to that average (per plot) were cut in half to measure compactness, core length, head thickness, and head diameter, and to check for internal tipburn.

Results and Discussion: Results are shown in the accompanying table. No tipburn was seen in cut heads of 'Atlantis', 'Lynx', 'Pacifica', 'Platinum Dynasty', and 'Royal Dynasty'. In contrast, 'Royal Vantage' had tipburn in 8 of the 12 heads cut. In general, the earlier cultivars were under less stress and thus were less subject to tipburn. Optimum maturity times were missed for 'Pacifica' and 'Royal Dynasty', resulting in some split heads. 'Ruby Dynasty' never sized its heads and they began to split while still very small. 'Atlantis' should be evaluated for cole slaw quality by Vaughan Foods, as it is a proven cultivar for Oklahoma. 'Pacifica' is early and could be an alternative to 'Grenadier'. 'Blue Thunder' also performed relatively well in a 2000 spring trial at Bixby and has potential. 'Early Dynasty', 'Platinum Dynasty', and 'Royal Dynasty' should be trialed again. 'Bobcat' looked better than 'Lynx' here and also in the 2000 Bixby trial.

Acknowledgments: Sincere thanks to Merlin Schantz and his family for providing field space for this trial, for trial inputs and maintenance, and for hospitality while we were on the farm.

Table 1. Spring Cabbage Variety Trial, Yield data (marketable[z] heads only), Hydro, OK.

							Head		
Cultivar	**Seed Source**	**Days to Harvest**	**Count (no./acre)**	**Weight (lbs./acre)**	**Avg. wt./head (lbs.)**	**Core length (in.)**	**Compact-ness[y]**	**Thickness[x] (in.)**	**Diameter (in.)**
Blue Thunder	Chesmore	124	10065	32068	3.2	3.9	4.4	5.9	6.3
Bravo	Harris Moran	124	10065	29281	2.9	3.2	4.7	5.5	5.9
Blue Vantage	Sakata	116	9570	27550	2.9	3.8	3.5	5.8	6.1
Atlantis	Rupp	112	9240	25458	2.7	3.2	4.5	5.9	5.9
Early Dynasty	DeWitt	109	9075	25372	2.8	3.6	4.9	5.8	5.8
Bobcat	Reed's	116	9653	24597	2.6	3.5	4.1	5.6	5.9
Royal Dynasty	DeWitt	124	8250	23876	2.9	3.1	4.7	5.6	5.9
Platinum Dynasty	DeWitt	112	7920	22169	2.8	3.3	4.5	5.6	6.0
Royal Vantage	Chesmore	124	7755	21795	2.8	2.9	4.5	5.7	5.7
Pacifica	Reed's	109	7755	20326	2.7	3.1	4.9	5.9	5.6
Lynx	Reed's	116	7590	17973	2.4	3.3	4.3	5.3	5.7
Ruby Dynasty	DeWitt	116	9405	11959	1.3	2.9	4.5	4.8	4.0
	Mean	117	8839	23505	2.7	3.3	4.5	5.6	5.7
	LSD $_{0.05}$	n/a	NS	7169	0.41	0.34	0.34	0.35	0.30

[z] Heads weighing less than 1.5 lbs. (0.7 kg) each were considered too small to be marketable and are excluded from these data, with the exception of Ruby Dynasty.

[y] Scale is 1=loose and puffy to 5=rock solid and compact.

[x] Thickness is measured from top of head (outer wrapper leaves removed) to base of trimmed butt.

Carrot Variety Trial

Spring 2005, Caddo County, Oklahoma

L. Brandenberger, L. K. Wells, M. Schantz

Materials and Methods: During the spring of 2005 a carrot variety trial was conducted to determine the potential of 30 different carrot cultivars for use in commercial production in Oklahoma. The trial was direct seeded on 3/23/05 using a research cone-planter with rows 18 inches apart at a seeding rate of approximately 20 seeds per foot. Each plot consisted of 2 rows 20 feet long, plots were replicated 4 times in a randomized block design. Plots were fertilized with a total of 87 lbs of N, 52 lbs of P, 180 lbs of K, and 60 lbs of S per acre spread over three applications. Weeds were controlled with two applications of Lorox (linuron) and one application of Select (Clethodim), all applied postemergence. Yield and quality data were recorded at harvest from one meter of row per plot on 7/28/05. Root quality data included the number of forked and split roots, other root defects, interior root color ratings, three root diameter size classes (0.75 to 1.0 inch, >1.0 to 1.5 inch, >1.5 inch), and root weight and length.

Results and Discussion: Yield of marketable roots and also of culls did not vary between cultivars in the trial (Table 1), but several root quality measurements did. Subjective interior root color ratings were lowest (indicating less difference between core and cortex color) for Sugar Snax 54, Sun 255, Prime Cut 59, and Dillon which had 1.0, 1.2, 1.2, and 1.3 on a 1 to 5 scale, respectively. Red Chantenay had the largest roots in weight (average root weight was 4.4oz, Table 1) and in diameter (65% were larger than 1.5 inches and 80% of root weight was attributable to roots >1.5 inches in diameter, Table 2). Sugar Snax 54, SRC 8508, and Dillon had the longest roots in the trial with average root lengths of 9.2, 9.0, and 8.7 inches, respectively. Choctaw, Prime Cut 59, and Sun 255 had the highest percentages of roots between 0.75 and 1.0 inch in diameter which ranged between 90% for Choctaw to 78% for Prime Cut 59 (Table 2). Seven cultivars ranged between 52 to 60% in >1.0 to 1.5 inch diameter class. Choctaw at 76% had the highest percentage weight in the 0.75 to 1.0 inch diameter size. Heritage had the highest percentage of >1 to 1.5 inch diameter roots with 64% of it's yield attributable to this size class.

Conclusions: There were a multitude of cultivars in this trial providing a good representation of both slicing and dicing types. Due to the number of cultivars it was difficult to statistically show differences between them particularly regarding yield, but marketable yields ranged considerably. The authors feel that based upon the results of the trial, producers should have ample information to select the type of carrot they need. For smaller diameter carrots, Sugar Snax 54, Sun 255, Prime Cut 59, and Dillon exhibited excellent interior quality. Abledo exhibited good yield potential in the trial and also appears to have acceptable interior root color quality.

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

Table 1. Spring 2005 Carrot Variety Trial, Caddo County, Oklahoma.

Variety	Seed Source	Yield in Tons/acre		Interior root color ratings (field)^x	Average size root (oz.)	Average root length (inches)
		Marketable^z	Culls^y			
7105	Christianson	24.4 a^w	4.1 a	2.8 bcde	1.7 bcd	6.4 ij
Abledo	Seminis	36.6 a	5.8 a	1.8 defgh	2.0 bcd	5.3 k
Bolero	Seedway	20.7 a	3.2 a	4.5 a	2.2 bcd	6.8 ghi
Bremen	Bejo	26.4 a	2.2 a	3.3 abc	3.0 bc	7.1 efghi
Choctaw	Sunseeds	22.7 a	2.4 a	2.3 cdefg	1.3 d	7.7 cdefg
C2589	Christianson	21.6 a	6.2 a	2.5 cdef	2.3 bcd	5.7 jk
C97576	Christianson	26.1 a	4.3 a	2.7 bcde	2.4 bcd	5.6 jk
Danvers 126	Chriseeds	20.7 a	3.3 a	3.8 ab	2.0 bcd	5.3 k
Dillon	Sunseeds	19.8 a	2.3 a	1.3 fgh	2.0 bcd	8.7 abc
Euforo	Seminis	27.5 a	0.8 a	3.2 bcd	3.0 b	7.3 efghi
First Class	Seminis	19.3 a	5.8 a	2.7 bcde	2.0 bcd	8.1 abcdef
Florida F1	Bejo	29.4 a	2.0 a	2.7 bcde	1.6 bcd	6.5 hij
Heritage	Seminis	19.1 a	1.2 a	2.2 cdefgh	2.3 bcd	7.6 cdefgh
Ingot	Christianson	24.1 a	2.8 a	3.2 bcd	1.4 cd	6.5 hij
Kamaran	Bejo	24.3 a	4.6 a	2.8 bcde	2.2 bcd	7.0 fghi
Maverick	Sunseeds	17.6 a	2.6 a	2.0 defgh	2.3 bcd	8.5 abcd
Neptune	Christianson	25.3 a	2.2 a	2.0 defgh	2.7 bcd	7.6 cdefghi
Pipeline	Seminis	24.5 a	2.0 a	1.7 efgh	2.4 bcd	8.3 abcde
PrimeCut 59	Sunseeds	20.8 a	2.3 a	1.2 gh	1.7 bcd	7.9 bcdefg
Prodigy	Seminis	27.5 a	1.1 a	2.7 bcde	2.2 bcd	6.8 ghi
Recoleta	Seminis	29.2 a	2.4 a	3.0 bcd	2.3 bcd	7.2 efghi
Red Chantenay	Chriseeds	22.1 a	0.8 a	4.5 a	4.4 a	5.2 k
Royal Chantenay	Chriseeds	28.6 a	2.8 a	4.5 a	2.4 bcd	4.9 k
Sirocco	Seedway	21.7 a	1.1 a	3.2 bcd	1.7 bcd	7.0 fghi
SRC 8508	Sunseeds	23.8 a	0.7 a	2.8 bcde	3.0 bc	9.0 ab
SugarSnax 54	Sunseeds	15.0 a	6.2 a	1.0 h	1.8 bcd	9.2 a
Sun 255	Sunseeds	23.0 a	3.1 a	1.2 gh	1.6 bcd	7.4 defghi
SX 8501 CE	Sunseeds	21.7 a	3.1 a	2.2 cdefgh	2.6 bcd	7.7 cdefg
TenderSnax	Nunhems	21.3 a	1.0 a	1.8 defgh	1.8 bcd	7.0 fghi
TriplePlay 58	Sunseeds	18.1 a	8.0 a	2.0 defgh	2.5 bcd	7.9 cdefg

[z] Marketable=marketable roots.

[y] Culls=unmarketable defective roots.

[x] Field interior root color ratings are based upon a 1 to 5 scale with 1 indicating no color differences between the core and cortex in color and 5 indicating major differences in color between the core and cortex.

[w] Numbers in a column followed by the same letter exhibited no significant differences where P=0.05.

Table 2. Spring 2005 Carrot Variety Trial, Caddo County, Oklahoma.

	Percent defects[z]			**Percent number of roots[y]**			**Percent weight[x]**		
Variety	**Forks**	**Splits**	**Other**	**¾-1”**	**>1-1½”**	**>1½”**	**¾-1”**	**>1-1½”**	**>1½”**
7105	3 a[w]	4 bc	9 a	60 abcdef	38 abc	1 e	41 bcdefg	56 abc	3 hi
Abledo	3 a	4 bc	6 a	25 fgh	54 a	22 bcde	8 hi	48 abcd	43 bcd
Bolero	10 a	0 c	2 a	44 bcdefg	55 a	1 e	28 cdefghi	69 a	3 hi
Bremen	7 a	0 c	1 a	27 efgh	60 a	13 bcde	14 efghi	64 ab	22 cdefghi
Choctaw	5 a	1 c	3 a	90 a	9 c	1 e	76 a	21 d	3 hi
C2589	13 a	9 ab	0 a	29 defgh	50 ab	21 bcde	10 ghi	52 abcd	38 bcde
C97576	4 a	7 bc	3 a	20 gh	55 a	26 bcd	7 i	45 abcd	48 bc
Danvers 126	9 a	5 bc	0 a	30 defgh	50 ab	20 bcde	12 fghi	53 abcd	35 bcdefg
Dillon	2 a	1 c	9 a	65 abcd	32 abc	4 de	47 abcd	44 abcd	9 fghi
Euforo	3 a	0 c	0 a	26 fgh	40 abc	34 b	11 fghi	35 abcd	54 b
First Class	7 a	6 bc	7 a	58 abcdef	41 abc	1 e	39 bcdefg	58 abc	3 hi
Florida F1	1 a	0 c	6 a	56 abcdefg	38 abc	6 cde	30 cdefghi	53 abcd	17 defghi
Heritage	7 a	0 c	0 a	43 bcdefg	50 ab	8 cde	18 defghi	64 a	18 defghi
Ingot	8 a	1 c	1 a	68 abc	32 abc	1 e	47 abcd	50 abcd	3 hi
Kamaran	2 a	0 c	13 a	38 cdefgh	52 a	10 cde	15 efghi	62 ab	23 cdefghi
Maverick	10 a	0 c	4 a	66 abcd	34 abc	0 e	43 bcdef	57 abc	0 i
Neptune	5 a	2 bc	0 a	35 cdefgh	48 ab	17 bcde	23 cdefghi	48 abcd	29 bcdefgh
Pipeline	3 a	4 bc	0 a	56 abcdefg	35 abc	10 cde	32 cdefghi	47 abcd	21 cdefghi
PrimeCut 59	6 a	0 c	3 a	78 ab	18 bc	4 de	62 ab	30 bcd	8 ghi
Prodigy	1 a	0 c	3 a	30 defgh	56 a	14 bcde	11 ghi	61 ab	28 bcdefghi
Recoleta	5 a	3 bc	0 a	45 bcdefg	38 abc	17 bcde	23 cdefghi	43 abcd	34 bcdef
Red Chantenay	1 a	3 bc	0 a	2 h	33 abc	65 a	0 i	20 d	80 a
Royal Chantenay	2 a	6 bc	0 a	19 gh	54 a	27 bc	6 i	43 abcd	51 b
Sirocco	5 a	0 c	0 a	49 bcdefg	48 ab	3 e	26 cdefghi	68 a	6 hi
SRC 8508	3 a	0 c	0 a	44 bcdefg	41 abc	15 bcde	22 cdefgh	48 abcd	30 bcdefgh
SugarSnax 54	6 a	2 bc	35 a	68 abc	31 abc	1 e	52 abc	46 abcd	2 hi
Sun 255	11 a	0 c	1 a	80 ab	17 bc	3 e	65 ab	26 cd	9 ghi
SX 8501 CE	6 a	1 c	5 a	43 bcdefg	38 abc	19 bcde	20 defgh	44 abcd	36 bcdef
TenderSnax	2 a	0 c	2 a	64 abcde	35 abc	1 e	45 bcde	52 abcd	3 hi
TriplePlay 58	8 a	15 a	8 a	48 bcdefg	49 ab	4 de	28 cdefghi	62 ab	10 efghi

[z] Percent defects= weight of each defect category divided by total yield (marketable + culls) x 100.

[y] Percent number of roots= Percentage of roots for each of three diameter categories.

[x] Percent weight= Percentage weight for each of the three diameter categories.

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

Cilantro/Coriander yield trials

2005 Season, Bixby Oklahoma

N. Maness, D. Chrz, L. Brandenberger, R. Havener, A. Brothers

Materials and Methods: Three cilantro varieties (‘Santo’, ‘Slow Bolt’ and ‘Jantar’) were evaluated in 2005 as an herb crop for Oklahoma. Cilantro is a term used for the green herb and coriander is a term used for seed produced after cilantro plants bolt, flower and set seed. *Spring planting - cilantro.* Seeds for ‘Santo’ and ‘Jantar’ were obtained from Johnny’s seed company; ‘Slow Bolt’ was obtained from Seedway seed company. Plots were established by direct seeding with a Monosem air planter in beds of 4 rows, 12 inches apart at a total plot length of 200 feet on April 21. One replication of the three varieties was treated with 1.5 pts/acre Treflan ppi. Two more replicates were planted without herbicide treatment, one was harvested and allowed to regrow, bolt and set seed and the other was not harvested for herb, but allowed to bolt and set seed. Soil tests indicated adequate phosphorus and potassium, but very low nitrogen. Nitrogen was applied as urea at a rate of 40 lb N/ac just after planting. Herb harvests were conducted upon first sign of bolting on June 9. A Kincaid plot harvester, equipped with a 4.5 ft sickle-style cutting bar, a bat system for moving harvested material onto a 2.2 ft conveyer system which emptied into pre-weighed harvest lugs, was utilized to harvest all plots. Cutting height was set at 2 inches. Herb yield data is presented in Table 1. During the spring harvest 10 to 15 pounds of herb from each cultivar was divided into two approximately equal samples and either hydrocooled and spin dried within 2 hours after harvest, or held dry after harvest. Both samples were placed into a cooler at 45 F and held prior to transport to Stillwater lab facilities on ice. Cilantro was stored in a cooler at 38 F, and visual herb quality was assessed the day after harvest, and after one and two weeks of storage.

Spring planting – coriander. Plots were topdressed with nitrogen from urea on June 13, 4 days after herb harvest, at a rate of 40 lb N/ac. By June 21 all plots were strongly bolting and were allowed to set seed. Seed yield was estimated by harvesting six, three foot segments of seed stalks from plots designated for herb plus seed, and seed-only on August 4 with the Kincaid harvester, at a 4 inch cutting height. After harvest seed stalks were air dried and seed were manually removed, cleaned and weights were recorded. Coriander yield data from plants which were previously harvested for cilantro herb and allowed to regrow and set seed (Herb plus Seed), and from plants which were not harvested for cilantro herb (Seed only) is presented in table 2.

Fall planting – cilantro. A fall planting of cilantro was conducted with variety ‘Santo’ only, on July 26, August 9 and September 6. Plots were direct seeded and fertilized preplant as previously described. Since a previous observational study in the spring indicated that Dual herbicide exhibited no apparent damage for cilantro, and since Dual exhibits better weed control than Treflan, Dual 8E was applied post plant at a rate of 1.25 pts/ac. The first planting failed to emerge, probably due to too hot soil conditions, and was abandoned on August 9. The remaining plantings emerged to an acceptable stand and were topdressed with urea on September 21 at a rate of 30 lbs N/ac. The August 9 planting was harvested on October 13 as described for the spring harvest, and herb yields are shown in Table 1. Plants from the September 6 planting did not reach harvestable size before frost damage occurred and plots were abandoned.

Conclusions: Either Treflan applied ppi at 1.5 pts/acre or Dual 8E applied postplant at 1.25 pts/ac appear to have potential as herbicides for cilantro. Herb yield from the Treflan plots was not different from herb yield without herbicide in our spring planting, and an associated cilantro herbicide tolerance study showed zero apparent crop damage using Dual. It should be noted that the Dual rate was at the lower range of traditional application rates, and higher rates should be evaluated for possible phytotoxicity. Our spring and fall cilantro yields (Table 1) were well below other published yields, and we noted relatively small plant stature in all cultivars at harvest (4 to 6 inch plant height). Regardless of the low total yield, we did observe substantial differences in yield potential with ‘Santo’ and ‘Slow Bolt’ highest, and ‘Jantar’ consistently lowest in herb yield. We evaluated different cooling methods using cilantro produced in the spring harvest to establish whether hydrocooling was applicable for extending shelf life of fresh cilantro. Substantial crop damage was evident in hydrocooled samples even one day after treatment, and damage appeared to be related to the degree to which herb was spin dried after cooling. Damage appeared as brown leaf and stem discolorations and was worse for subsamples which contained more water after arrival in Stillwater. After one week of storage the wet samples had developed progressively more brown discolorations, affected tissues appeared slimy and storage was abandoned. Samples stored dry and without hydrocooling were acceptable in appearance up to the second week of storage, although some minor degreening was apparent in the two-week samples. Clearly, cilantro should not be hydrocooled to remove field heat due to the observed damage symptoms presumably caused by exposure to excess water prior to storage. Our fall plantings, using only the highest yielding spring cultivar (‘Santo’) resulted in only one harvest from three planting dates. The late July planting was abandoned due to very poor crop emergence, presumably caused by too hot soil conditions. The early August planting was harvested in mid-October but produced a lower yield than the spring planting. The early September planting did not achieve harvestable mass prior to frost damage, but could have been harvested in late October. Further work on fall plantings should include more planting dates within the early to late August time frame to evaluate possible yield influence. Our coriander yields (Table 2), although lower than previously published, exhibited a similar ordering to the cilantro herb yields – 'Santo' was highest, followed by 'Slow Bolt' and then 'Jantar'. Seed yield did not appear to be negatively influenced by a previous herb harvest. Seed yields were comparable for 'Santo' and 'Slow Bolt' from plants which were allowed to regrow, flower and set seed following an herb harvest (Herb plus Seed) versus plants which were never harvested for herb (Seed only). For 'Jantar', seed yields appeared to be higher for the "Herb plus Seed" versus the "Seed only" treatment. Based on our 2005 cilantro/coriander trials we can conclude that either 'Santo' or 'Slow Bolt' are better selections for production in Oklahoma than 'Jantar'. It should be noted that one year's trial can serve as a guideline, but that additional years trials will be needed to fully assess cilantro and/or coriander as crops to be recommended for Oklahoma.

Table 1. 2005 Cilantro Yields (lbs per acre) in Bixby, OK

Harvest Season	Planting Date	Harvest Date	Santo	Slow Bolt	Jantar
Spring	April 21	June 9	3118	2413	1634
Fall	August 9	October 13	2363		

Table 2. 2005 Coriander Yields in Bixby, OK

End Use	Planting Date	Harvest Date	Santo	Slow Bolt	Jantar
Herb plus Seed	April 21	August 4	363	234	212
Seed only		-------	328	221	83

Eggplant Variety Trial

Spring 2005, Bixby, Oklahoma

Brian Kahn, Amy Brothers, Lynda Wells

Introduction and Objectives: Eggplant is a minor vegetable, but is popular for direct marketing and as an ethnic specialty. This trial was designed to evaluate yield and fruit quality of 11 purple eggplant cultivars.

Materials and Methods: Seeds were sown in Speedling-type flats (128 cells per flat) filled with a peat-based plug and seedling mix on March 17, 2005. A preplant application of urea to supply 50 lbs/A of N was made at Bixby on April 25, followed by an application of napropamide at 1.25 lbs/A (a.i.). After incorporation of the fertilizer and herbicide, 10 plants/plot were transplanted to the field. Plots were 18 ft long with 5.9 ft between rows. Varieties originally were replicated 4 times in a randomized block design. Due to transplant loss, the study was later reconfigured as a completely randomized design with 3 replications. Insecticide applications alternating between Pounce WP and Asana began on June 3 and continued through July 13, with a total of 4 applications. Fungicide applications were made on July 21 and July 27 using Bravo (chlorothalonil). Plants were sidedressed with 50 lbs/A of N from urea on June 7. Harvest began on June 20 and continued 2 times weekly until August 4. Data were collected on marketability and weight per fruit.

Results and Discussion: 'Santana' and 'Classic' will continue to be recommended for Oklahoma producers desiring a large, long oval eggplant. 'Dusky' is a productive, slightly smaller alternative. 'Nadia' performed much like 'Dusky' and should be trialed again. 'Epic' and 'Twilight' also were in the fruit size group with 'Dusky' and might be considered for the earliest markets. 'Black Bell' had a more rounded fruit shape and was notably susceptible to Phomopsis fruit rot. 'Vernal' set well but did not seem to have the genetic potential to produce large fruits; average fruit size did not even reach 0.75 lbs. 'Black Beauty' was included as an open-pollinated comparison, and was much inferior to the hybrids for both yield and fruit quality. Problems such as poor color and susceptibility to Phomopsis fruit rot resulted in more than half of the 'Black Beauty' fruits being culled. 'Megal' and 'Vittoria' were European-type eggplants; they produced smaller fruits with a shape varying from a very elongated oval to cylindrical. 'Megal' fruits were shiny and almost black, and had the better appearance of these two.

Table 1. Eggplant Variety Trial – Bixby, 2005[z]

		Marketable		Early mkt.[y]	Cull		Total[x]	% mkt. by count	Avg. mkt. fruit wt.
Cultivar	**Company/ source**	**(bu/A)[w]**	**(thou/A)**	**(bu/A)**	**(bu/A)**	**(thou/A)**	**(bu/A)**	**(%)**	**(lbs)**
Santana	Chesmore	1312	35.4	120	142	4.6	1454	88	1.22
Classic	Chesmore	1180	35.8	102	246	8.7	1426	80	1.09
Dusky	Chesmore	925	30.8	127	218	8.7	1144	78	0.99
Nadia	Seedway	870	29.1	94	254	10.8	1124	73	0.98
Black Bell	Chesmore	779	21.2	205	508	16.2	1287	57	1.22
Epic	Chesmore	743	26.6	148	314	12.5	1058	68	0.92
Vernal	Holmes	691	31.2	116	153	7.5	844	80	0.73
Twilight	Twilley	671	22.9	172	279	11.7	950	66	0.96
Megal	Seedway	650	39.6	117	213	16.2	863	71	0.54
Black Beauty	Chesmore	601	13.3	42	662	17.1	1264	44	1.49
Vittoria	Twilley	544	43.3	78	195	17.9	739	70	0.42
	Mean	815	29.9	120	290	12.0	1105	71	0.96
	LSD $_{05}$	270	10.5	NS	144	6.2	305	11	0.08

[z] Transplanted April 25, 2005 (3 plots each).
Plot size (data area, excluding end guards): 5.9' x 5.9' ; 3 data plants per plot.
Harvested: 6/20/05 to 8/4/05 (14 picks).

[y] Early harvest: 6/20/05 to 7/1/05 (4 picks).

[x] Total=marketable + cull.

[w] One bushel (bu) = 33 lbs.

Specialty Eggplant Demonstration

Summer 2005, Stillwater, Oklahoma

Brian Kahn, Tina Johnson, Lynda Wells

Materials and Methods: Seeds were sown in Speedling-type flats (128 cells per flat) filled with a peat-based plug and seedling mix on March 17, 2005. Six plants of each cultivar spaced 24” apart were transplanted to the field at the OSU Botanical Garden on May 5. Insects were controlled by applications of Sevin dust (carbaryl) periodically throughout the growing season. Detailed observations were recorded on July 7, July 26, and August 7, but no yield data were taken. The demonstration was featured as part of an episode of *Oklahoma Gardening* that aired on July 23.

Results and Discussion:

Cultivar	Company	Hybrid	Description
Antigua	Tomato Growers Supply	No	Heirloom. Attractive, long white fruit streaked w/lavender. Moderate set that continued into August. Looked good.
Apple Green	Tomato Growers Supply	No	Early. Moderate set. Fruit round to oval and pale green, but definite plant-to-plant variability in fruit color & plant size.
Black Beauty	Chesmore	No	Heirloom. Large, oval, purple fruit that often were somewhat ribbed. Fruit color often was poor and fruit were very susceptible to *Phomopsis* rot.
Bride	Tomato Growers Supply	Yes	Long white fruit blushed w/lavender and more slender than ‘Antigua’. Late to set but loaded with fruit by August.
Casper	Twilley	Yes	Shortest plants of the three white cultivars in trial. Moderate set of cylindrical, white fruit.
Cloud Nine	Tomato Growers Supply	Yes	Big, vigorous plants. Moderate but variable set of long oval, white fruit.
Fairy Tale	Tomato Growers Supply	Yes	Small lavender fruit streaked w/white; often set in clusters. Good production for a dwarf plant. A cute novelty.
Ghostbuster	Twilley	Yes	Big, vigorous plants. Moderate set of cylindrical, white fruit. Possibly the best of the three white cultivars in trial.
Green Goddess	Tomato Growers Supply	Yes	Long, lime green fruit that tended to curve and fatten with age. Variable set but produced into August.
Kermit	Tomato Growers Supply	Yes	Plants started slowly, but grew well once established and were very productive. Fruit round, green marbled w/white. Thai type.
Listada de Gandia	Tomato Growers Supply	No	Heirloom. Oval white fruit striped w/lavender. Plants not as vigorous as some others such as ‘Antigua’. Relatively low set and fruit were susceptible to *Phomopsis* rot.
Neon	Tomato Growers Supply	Yes	Cylindrical fruit that only looked “neon” when small; otherwise, fruit pink-purple and often streaked w/white. Poor early set; more set by July 26.
Pingtung Long	Tomato Growers Supply	No	Very long, purple to lavender fruit w/purple calyx. Many of the fruit set high enough to stay relatively straight while becoming quite long. Moderate set. Very striking.
Prosperosa	Tomato Growers Supply	No	Heirloom. Round, dark purple fruit w/purple calyx. Relatively compact plants and only fair set. Some fruit not well shaped. Can catch the eye, but overall did not seem to be a high producer of marketable fruit.
Rosa Bianca	Tomato Growers Supply	No	Heirloom. Fruit round to oval, white streaked w/lavender, with a big calyx. Fruit often ribbed, scarred, or malformed; not a refined fruit appearance. A novelty.
Zebra	Tomato Growers Supply	Yes	Big, vigorous plants. Long oval fruit, purple streaked w/white. Fruit fatter and with more purple than ‘Antigua’. Poor early set; moderate set by July 26.

Carrot and Spinach Planting Methods Trial

Spring 2005, Blaine County, Oklahoma

L. Brandenberger, L. K. Wells, M. Schantz

Materials and Methods: Planting methods can have a direct effect upon plant stands in any crop, but are of particular interest to carrot and spinach producers. A demonstration trial was begun on 3/04/05 to initiate efforts to determine the effect of different planting methods on plant stand in both carrot and spinach crops. The trial included 20 carrot planting treatments and 24 spinach planting treatments (Table 1). Cultivars used in the demonstration included 'Ventus' spinach and 'Chantanay red cored' carrot. The demonstration utilized one plot per treatment with plots being 6 feet wide by 50 feet long. Two planters were used in the demonstration. The first planter was a Brillion culti-planter and the second was a Case International planter that utilized John Deere seeding boxes for seed metering and had 9 rows planted on 5 inch row centers utilizing double disk seed furrow openers. The trial area was prepared by chisel plowing twice at a 10 inch depth and then using a field cultivator twice to level and smooth the soil surface. Pre-planting soil preparation treatments included: rototilling; rototilling + raised beds; raised beds; rolling with soil roller; no change to field cultivated soil. Planting treatments included: one planting pass with the Brillion planter (one pass); one empty pass with Brillion planter + one planting pass with Brillion planter (two passes); one planting pass with the Case International planter (one pass); two planting passes with the Case International planter (two passes). Plant stand ratings were recorded for each treatment on 5/10/05.

Results and Discussion: The highest recorded plant stand ratings for carrot were two treatments that included the use of the Brillion planter (Table 1). The first treatment utilized one pass of the Brillion planter combined with soil preparation that included rototilled-bedded-nonrolled soil, this treatment had a rating of 4.5 out of a possible score of 5.0. The carrot treatment with the highest plant stand rating utilized one pass of the Brillion planter combined with soil preparation of rototilled-bedded-rolled soil, this treatment had a rating of 5.0. Three treatments had a plant stand rating of 5.0 in spinach (Table 2). Two of these utilized the Brillion planter, they included the nonrototolled-nonbedded-nonrolled treatment and the rototilled-bedded-rolled treatment. The Case IH planter combined with rotollilled-bedded-nonrolled soil also had a 5.0 plant stand rating.

Conclusions: In summary, it appears that the Brillion planter has the potential to provide for better plant stands in carrot and would warrant further investigation. Spinach on the other hand had several treatments with both the Brillion and Case IH planters that showed promise.

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

Table 1. Spring 2005 Carrot Planting Methods Trial, Hydro, Oklahoma. Plant Stand Ratings.

Treatments[z]	**Plant stand ratings**[y]
Brillian planter one pass on rototilled-nonbedded-nonrolled soil	2.0
Brillian planter one pass on rototilled-bedded-nonrolled soil	4.5
Brillian planter one pass on nonrototilled-bedded-nonrolled soil	3.5
Brillian planter one pass on nonrototilled-nonbedded-nonrolled soil	2.5
Brillian planter two passes on rototilled-nonbedded-nonrolled soil	1.0
Brillian planter two passes on rototilled-bedded-nonrolled soil	1.5
Brillian planter two passes on nonrototilled-bedded-nonrolled soil	1.5
Brillian planter two passes on nonrototilled-nonbedded-nonrolled soil	2.0
Brillian planter one pass on rototilled-nonbedded-rolled soil	3.5
Brillian planter one pass on rototilled-bedded-rolled soil	5.0
Brillian planter one pass on nonrototilled-bedded-rolled soil	3.0
Brillian planter one pass on nonrototilled-nonbedded-rolled soil	2.5
Case IH planter one pass on rototilled-nonbedded-rolled soil	2.0
Case IH planter one pass on rototilled-bedded-rolled soil	1.5
Case IH planter one pass on nonrototilled-bedded-rolled soil	1.0
Case IH planter one pass on nonrototilled-nonbedded-rolled soil	2.0
Case IH planter one pass on rototilled-nonbedded-nonrolled soil	1.0
Case IH planter one pass on rototilled-bedded-nonrolled soil	1.0
Case IH planter one pass on nonrototilled-bedded-nonrolled soil	1.0
Case IH planter one pass on nonrototilled-nonbedded-nonrolled soil	1.5

[z] Treatments included two types of planters, first the Brillian cultiplanter utilized two ways, first as a one pass planting (one pass) and second as one empty pass followed by a planting pass (two passes). The second planter was a Case IH planter utilized two ways, first as a one pass planting (one pass) and second as two planting passes (two passes).

[y] Plant stand ratings=1-5 scale, 1 poor stand, 5=best.

Table 2. Spring 2005 Spinach Planting Methods Trial, Hydro, Oklahoma. Plant Stand Ratings.

Treatments[z]	**Plant stand ratings**[y]
Brillian planter one pass on rototilled-nonbedded-nonrolled soil	2.5
Brillian planter one pass on rototilled-bedded-nonrolled soil	4.0
Brillian planter one pass on nonrototilled-bedded-nonrolled soil	3.0
Brillian planter one pass on nonrototilled-nonbedded-nonrolled soil	5.0
Brillian planter two passes on rototilled-nonbedded-nonrolled soil	3.0
Brillian planter two passes on rototilled-bedded-nonrolled soil	4.5
Brillian planter two passes on nonrototilled-bedded-nonrolled soil	3.5
Brillian planter two passes on nonrototilled-nonbedded-nonrolled soil	4.5
Brillian planter one pass on rototilled-nonbedded-rolled soil	2.5
Brillian planter one pass on rototilled-bedded-rolled soil	5.0
Brillian planter one pass on nonrototilled-bedded-rolled soil	4.0
Brillian planter one pass on nonrototilled-nonbedded-rolled soil	3.0
Case IH planter one pass on rototilled-nonbedded-rolled soil	3.5
Case IH planter one pass on rototilled-bedded-rolled soil	4.5
Case IH planter one pass on nonrototilled-bedded-rolled soil	3.5
Case IH planter one pass on nonrototilled-nonbedded-rolled soil	2.5
Case IH planter two passes on rototilled-nonbedded-rolled soil	3.0
Case IH planter two passes on rototilled-bedded-rolled soil	4.0
Case IH planter two passes on nonrototilled-bedded-rolled soil	3.5
Case IH planter two passes on nonrototilled-nonbedded-rolled soil	2.5
Case IH planter one pass on rototilled-nonbedded-nonrolled soil	4.0
Case IH planter one pass on rototilled-bedded-nonrolled soil	5.0
Case IH planter one pass on nonrototilled-bedded-nonrolled soil	4.5
Case IH planter one pass on nonrototilled-nonbedded-nonrolled soil	2.5

[z] Treatments included two types of planters, first the Brillian cultiplanter utilized two ways, first as a one pass planting (one pass) and second as one empty pass followed by a planting pass (two passes). The second planter was a Case IH planter utilized two ways, first as a one pass planting (one pass) and second as two planting passes (two passes).

[y] Plant stand ratings=1-5 scale, 1 poor stand, 5=best.

Hoophouse-grown Transplanted Onion Trial

2004-05, Lane, OK

Jim Shrefler, Warren Roberts, Penny Perkins and Tony Goodson

Introduction and Objectives: There continues to be interest in the production of fresh market onions in Oklahoma. Transplant sources available to growers for the typical February-March transplant period are limited to bare rooted transplants that are produced in states having milder winter climates than Oklahoma. Only a limited selection of cultivars are available as bare rooted transplants and some of these are not well suited to Oklahoma growing conditions or production needs. Consequently, there is a need to find an alternative onion transplant source. The objective of this trial was to evaluate the field performance of several onion cultivars when grown using hoophouse-grown transplants.

Materials and Methods: A transplanted onion variety trial was conducted using yellow cultivars. Cultivars were seeded in an unheated hoop-house on November, 2 2004 and transplanted to the field on March, 29 2005. Onions were planted six inches apart in two rows that were spaced 3 feet apart on beds that were spaced 6 feet between centers. Plant density was approximately 29,000 plants per acre. Onions were fertilized based on OSU soil test recommendations. The trial was harvested June, 28 and onion tops were removed. Onions of each cultivar were classified as to diameter of bulbs and total yield was calculated on a per acre weight basis. After yield determinations were completed, onions that were in sound condition were placed in net bags and stored in a cold room at 32-34° F. Stored onions were periodically checked for decay, weighed, and returned to storage.

Results: Onion trial results are shown in Table 1. Varieties differed for bulbs of size categories 3-4 inch and >4 inch but not for smaller sizes. Total yields did not differ across treatments. Weight loss during storage did not differ across treatments. Additional data that was collected includes bolting (seed stalk formation) and bulb decay during storage. Only traces of seed stalk formation were detected. Only traces of bulb decay were observed during storage.

Table 1. Harvest and storage data for the transplanted hoop-house onion variety trial.

	Percent of onions per sample of 20 bulbs by diameter [1]					
Variety	A	B	C	D	Yield / acre (100 lbs units)	Percent weight loss during storage[2]
1015Y	0	13.4	57.7 b	28.8 ab	228	2.5
Candy	1.6	20	65.0 b	13.3 b	195	3.5
Cimarron	17.6	22.6	34.7 c	25.0 ab	190	4.2
Renegade	3.3	8.3	81.6 a	6.6 b	205	1.8
Sequoia	0	7.9	51.5 b	40.6 a	275	1.8
					Not Significant	Not Significant

[1] Bulb diameter size classes: A = 2 inches or smaller, B = 2 to 3 inches, C = 3 to 4 inches and D = greater than 4 inches. Means in a column followed by a common letter are not different based on Duncan Multiple Range test.

[2] Weight loss of a sample stored at approximately 32-34° F from July 5 until December 7.

Snap Bean Cultivar and Seeding Time Study

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, A. Brothers, R. Havener

Materials and Methods: During the spring of 2005 a Snapbean variety trial was conducted to determine the potential of 20 different cultivars for commercial production in Oklahoma planted on a main season planting date and a later alternative date. The first planting was on 4/25/05 and the second on 5/12/05. Plots were direct seeded using a research cone-planter with rows 36 inches apart at a seeding rate of approximately 10 seeds per foot. Weed control was accomplished with 1.2 lbs ai of Dual 8E (metolachlor) applied PRE immediately following planting. Each plot consisted of 1 row 20 feet long, plots were replicated 4 times in a randomized block design. Plots were fertilized with a total of 45 lbs of N per acre spread over two applications. The number of plants/meter were counted, % lodging, yield, and quality data (quality rating, pod sieve size) were recorded at harvest. One meter of row per plot was harvested on 6/23/05 for the April planting and on 7/08/05 for the May planting.

Results and Discussion: Plant stands varied between cultivars for both plantings, but no differences were observed between the two plantings on a cultivar basis (Tables 1 and 2). PSL-75 had the highest number of plants per foot for both planting dates with 12.3 and 11.7 plants per foot for the April and May planting dates, respectively. Lodging did not vary between cultivars in the April planting, but there were differences observed for the May planting and several cultivars varied between the two planting dates. Diplomat and SB 4285 had 2 and 0% lodging, respectively, for the May planting while several cultivars were 10% or higher including Hayden that had 30% lodging.

Yield varied considerably between the first and second plantings with a majority of the earlier planting yielding significantly more than the second (Table 1,2 and Figure 1). Yield was highest in the first harvest for Titan and Hayden that recorded 419 and 413 bu/acre, respectively. Other cultivars ranged in yield from 223 to 386 bu/acre for the first harvest date. Yields for the second harvest were highest for SB4285 and Embassy that had 235 and 218 bu/acre, respectively. Other cultivars recorded yields that ranged from 33 to 196 bu/acre.

Pod length was shortest for PLS-75 and SB4285 in the first harvest (Table 1 and 2). Both cultivars had an average pod length of 2.9 inches compared to an average of 4.3 inches for the remaining cultivars. PLS-83 had the longest pod length (4.9 inches) in the second test. Six cultivars had pod lengths that were shorter than PLS-83, they included PLS-75, PLS-118, I GL 00, Dart-Slurry, Hystyle-Slurry, and Diplomat which ranged from 3.0 to 4.2 inches in length.

The percentage of beans within a specific sieve size varied considerably between the five sizes recorded in both tests (Table 3). To help reduce confusion from a large amount of data, size 3 and 4 were combined and a percentage by weight for this combination was determined and analyzed. The percentage of sieve sizes 3 + 4 varied significantly for cultivars in the first harvest on 6/23/05. GR-1-04 had 90% of its yield in the 3 +4 size class whereas PLS-83, PLS-75, and Hayden all had 45% or less of their yield the 3 + 4 sizes. No differences were recorded in the 3 + 4 size class in the second harvest on 7/08/05.

Conclusions: A majority of cultivars in the study performed well in the first planting and several have potential in that time slot, but yields in particular were reduced dramatically in the second planting. This effect was more than likely due to higher temperatures encountered in the later planting and the subsequent reduced pod-set. Although yields were down considerably in the second planting, there were larger differences between yields in this planting. The two cultivars that had the highest yields in the second planting were SB 4285 and Embassy, these two had yields that were reduced 30 to 33% from the first planting compared to 71, 78, and 89% reductions for Titan, Hayden, and I GL 00, respectively. Based on the results of this study, the authors would encourage producers to review the yield and quality data to help them in their cultivar decisions. Furthermore we would advise them that this is only one season’s data and testing should be repeated another season to provide a more complete set of information to base cultivar decisions on.

Table 1. Snapbean variety trial, Bixby, Oklahoma. planted 4/25/05-harvested 6/23/05, plants/ft, lodging, yield, pod quality ratings, and pod length.

Variety	Source	No. plants/ft	% lodging[z]	Yield (bu/ac)[y]	Pod quality[x]	Pod length(in)
GR-1-04	Pureline	9.0 abcd[w]	3 a	354 abc	3.2 c	4.3 a
PLS-83	Pureline	4.1 e	3 a	277 cd	3.2 c	4.9 a
PLS-75	Pureline	12.3 a	5 a	223 d	3.3 c	2.9 b
PLS-118	Pureline	6.2 de	5 a	263 cd	3.8 abc	4.4 a
I GL 00	Pureline	10.3 abc	7 a	288 bcd	4.4 ab	4.3 a
Dart-Slurry	Harris Moran	10.9 ab	3 a	356 abc	3.8 abc	3.9 a
Hystyle-Slurry	Harris Moran	9.5 abcd	3 a	355 abc	3.5 bc	4.1 a
Envy-Slurry	Harris Moran	8.6 abcd	7 a	358 abc	3.8 abc	4.5 a
Caprice-Slurry	Harris Moran	8.6 abcd	5 a	305 abcd	4.7 a	4.4 a
Trueblue-Slurry	Harris Moran	7.6 bcde	5 a	361 abc	3.7 bc	4.3 a
Titan	Asgrow/Seminis	6.1 de	5 a	419 a	4.3 ab	4.5 a
Ulysses	Asgrow/Seminis	7.4 bcde	5 a	335 abcd	3.2 c	4.4 a
Tapia	Asgrow/Seminis	6.5 cde	8 a	386 abc	3.7 bc	4.4 a
Ebro	Asgrow/Seminis	6.4 cde	5 a	349 abcd	3.8 abc	4.4 a
15340771	Asgrow/Seminis	6.6 cde	11 a	306 abcd	3.8 abc	4.4 a
Hayden	Syngenta	7.0 cde	12 a	413 ab	3.0 c	4.6 a
Diplomat	Syngenta	7.9 bcd	2 a	290 abcd	4.7 a	3.9 a
SB4282	Syngenta	5.8 de	5 a	258 cd	3.5 bc	4.3 a
SB4285	Syngenta	6.7 cde	2 a	334 abcd	3.3 c	2.9 b
Embassy	Syngenta	8.3 bcd	2 a	323 abcd	3.7 bc	4.2 a

[z] %Lodging=percent plants that have fallen over i.e. lodged.

[y] Yield= bushels per acre, one bushel = 30 lbs.

[x] Pod quality=1-5 rating, 1=poor, 5=excellent.

[w] Numbers followed by the same letter are not significantly different based upon Duncan's multiple range test with P=0.05.

Table 2. Snapbean variety trial, Bixby, Oklahoma. Planted 5/12/05-harvested 7/08/05, plants/ft, lodging, yield, pod quality ratings, and pod length.

Variety	**Source**	**No. plants/ft**	**% lodging**[z]	**Yield (bu/ac)**[y]	**Pod quality**[x]	**Pod length(in)**
GR-1-04	Pureline	7.9 bc[w]	13 bcd	137 abcd	3.0 bcde	4.3 abc
PLS-83	Pureline	2.7 d	7 bcd	99 cde	2.3 def	4.9 a
PLS-75	Pureline	11.7 a	7 bcd	79 de	1.8 f	3.0 d
PLS-118	Pureline	5.0 cd	3 bcd	80 de	1.8 f	3.4 d
I GL 00	Pureline	7.9 bc	8 bcd	33 e	2.7 cdef	4.0 c
Dart-Slurry	Harris Moran	7.6 bc	10 bcd	131 abcd	4.0 a	4.2 bc
Hystyle-Slurry	Harris Moran	6.3 bc	8 bcd	120 bcde	3.2 abcd	4.2 bc
Envy-Slurry	Harris Moran	6.8 bc	8 bcd	125 bcde	3.3 abc	4.3 abc
Caprice-Slurry	Harris Moran	8.6 b	5 bcd	148 abcd	4.0 a	4.3 abc
Trueblue-Slurry	Harris Moran	6.7 bc	13 bcd	164 abcd	3.3 abc	4.6 abc
Titan	Asgrow/Seminis	6.1 bc	13 bcd	93 cde	3.3 abc	4.6 abc
Ulysses	Asgrow/Seminis	7.7 bc	8 bcd	175 abcd	3.2 abcd	4.4 abc
Tapia	Asgrow/Seminis	6.4 bc	15 bc	196 abc	2.3 def	4.6 abc
Ebro	Asgrow/Seminis	5.0 cd	17 b	191 abc	2.2 ef	4.7 ab
15340771	Asgrow/Seminis	5.6 bcd	15 bc	190 abc	3.5 abc	4.7 ab
Hayden	Syngenta	6.1 bc	30 a	121 bcde	2.7 cdef	4.6 abc
Diplomat	Syngenta	6.5 bc	2 cd	91 cde	3.7 ab	4.2 bc
SB4282	Syngenta	5.6 bcd	13 bcd	136 abcd	2.8 bcde	4.6 abc
SB4285	Syngenta	8.0 bc	0 d	235 a	3.5 abc	4.5 abc
Embassy	Syngenta	7.7 bc	7 bcd	218 ab	3.2 abcd	4.6 abc

[z]%Lodging=percent plants that have fallen over i.e. lodged.

[y]Yield= bushels per acre, one bushel = 30 lbs.

[x]Pod quality=1-5 rating, 1=poor, 5=excellent.

[w]Numbers followed by the same letter are not significantly different based upon Duncan's multiple range test with P=0.05.

Table 3. Snap Bean Variety Trial, Bixby, Oklahoma. Pod sieve sizes for harvests on 6/23/05 and 7/08/05.

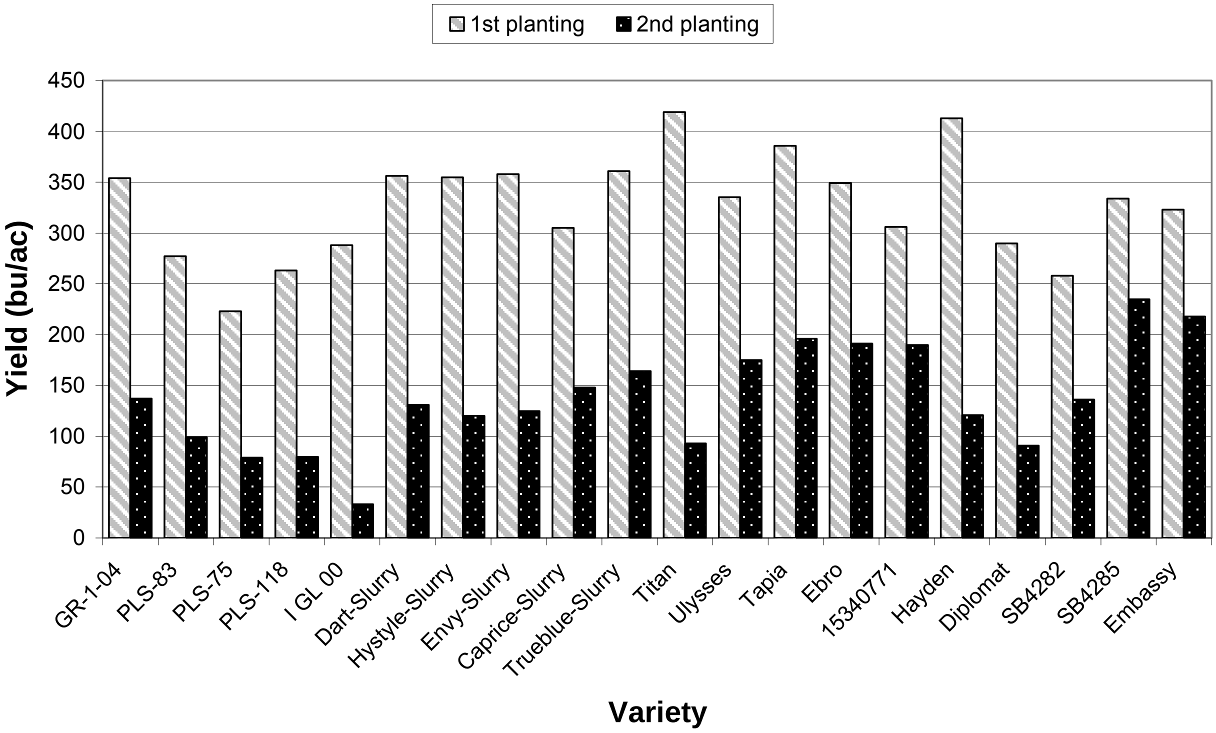
		Sieve size on 6/23/05 (% by wt.)[z]						**Sieve size on 7/08/05 (% by wt.)**[y]					
Variety	**Source**	**1**	**2**	**3**	**4**	**5**	**3 + 4**	**1**	**2**	**3**	**4**	**5**	**3 + 4**
GR-1-04	Pureline	1	3	34	56	6	90 a[x]	0	28	46	26	0	72 a
PLS-83	Pureline	1	4	17	25	53	42 cd	17	10	38	24	11	62 a
PLS-75	Pureline	6	53	41	0	0	41 d	1	23	64	6	6	71 a
PLS-118	Pureline	Flat											
I GL 00	Pureline	8	11	40	37	4	77 ab	5	31	60	3	1	63 a
Dart-Slurry	Harris Moran	1	7	58	30	4	88 ab	2	17	63	17	1	80 a
Hystyle-Slurry	Harris Moran	2	10	42	37	9	79 ab	10	15	50	18	7	68 a
Envy-Slurry	Harris Moran	2	7	22	47	22	69 abc	12	16	30	23	19	54 a
Caprice-Slurry	Harris Moran	2	6	35	40	17	75 ab	0	20	61	16	3	77 a
Trueblue-Slurry	Harris Moran	0	5	23	37	35	60 bcd	19	9	26	29	17	56 a
Titan	Asgrow/Seminis	1	9	50	28	12	78 ab	12	6	54	24	4	78 a
Ulysses	Asgrow/Seminis	1	4	17	52	26	70 abc	10	26	27	29	8	57 a
Tapia	Asgrow/Seminis	Flat											
Ebro	Asgrow/Seminis	Flat											
15340771	Asgrow/Seminis	1	9	47	38	5	85 ab	11	14	53	14	7	68 a
Hayden	Syngenta	1	2	8	37	52	45 cd	11	12	29	19	29	49 a
Diplomat	Syngenta	8	24	33	28	7	61 abcd	5	20	55	18	2	73 a
SB4282	Syngenta	4	5	24	46	21	70 abc	8	27	35	15	15	51 a
SB4285	Syngenta	1	7	33	42	17	75 ab	11	13	45	26	5	71 a
Embassy	Syngenta	1	5	35	44	15	79 ab	8	18	37	25	12	62 a

[z] Sieve size for 6/23/05 was planted on 4/25/05.

[y] Sieve size for 7/08/05 was planted on 5/12/05.

[x] Numbers followed by the same letter are not significantly different based upon Duncan's multiple range test with P=0.05.

Figure 1. 2005 Snap Bean Variety Trial Yield Comparisons



Snap Bean Variety Trial

Spring 2005, Shawnee, Oklahoma

L. Brandenberger, L. K. Wells, B.A. Kahn, and J.L. Benton

Materials and Methods: A snap bean variety trial was carried out to determine how six different varieties would perform in the Shawnee area. The demonstration was organized as a randomized block design utilizing four replications. Each plot consisted of two rows on 24 inch centers with plot lengths being 20 feet. Plots were direct seeded on 4/27/05 at the Shawnee Feed Center farm at a rate of 10 seeds per row-foot. Immediately following planting Dual Magnum (S-metolachlor) was applied over the soil surface as a PRE application at 1.25 lbs ai/acre. Crop water needs were supplied through a drip irrigation system on a weekly basis. Nitrogen for crop growth was supplied by use of urea (46-0-0) at a rate of 50 lbs N/acre applied to the soil surface in two split applications. Cucumber beetle and other insects were controlled by applications of Sevin dust (carbaryl). Plots were harvested on 6/29/05 and harvest data included yield, number of plants per foot, and pod length.

Results and Discussion: No differences were recorded for yield which ranged between 4173 and 6717 pounds of beans per acre. The number of plants per foot of row did not vary. Pod length was longest for Roma II, Tapia, and Embro which had 4.4, 4.4, and 4.5 inch average pod lengths, respectively, compared to 3.9 and 4.0, respectively, for Stayton and Diplomat.

Acknowledgements: The authors wish to thank Shawnee Mills Inc. for making their land available for this trial. We are particularly thankful to Brent Thompson of the Shawnee Feed Center for his support and assistance in making this trial successful.

Table 1. Spring 2005 Snap Bean Demonstration, Shawnee[z] .

Variety	Company/source	Yield (lbs/acre)	No. plants/ft.	Pod Length (in.)
Roma II	Rogers	6521 a[y]	6 a	4.4 a
Stayton	Rogers	4173 a	14 a	3.9 c
Diplomat	Rogers	5586 a	10 a	4.0 bc
Tapia	Seminis	6695 a	8 a	4.4 a
Embro	Seminis	6717 a	8 a	4.5 a
Titan	Seminis	5630 a	7 a	4.3 ab

[z] Seeded April 27, 2005; Plot size: 20’ x 2’ spacing (1 rows/plot, 4 plots each variety.) All harvested 6/29/05.

[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.

Spinach Variety Trial

Spring 2005, Shawnee, Oklahoma

L. Brandenberger, L. K. Wells, and J.L. Benton

Materials and Methods: A spinach variety trial was carried out to determine yield potential and bolting resistance of five different varieties in the Shawnee area. The trial was organized as a randomized block design utilizing four replications. Each plot consisted of two rows on 15 inch centers with plot lengths being 20 feet. Plots were direct seeded on 4/05/05 at the Shawnee Feed Center farm at a rate of 20 seeds per row-foot. Dual Magnum (S-metolachlor) was applied over the soil surface as a PRE application at 0.5 lbs ai/acre on 4/06/05. Crop water needs were supplied through a drip irrigation system on a weekly basis. Nitrogen for crop growth was supplied by use of urea (46-0-0) at a rate of 60 lbs N/acre applied to the soil surface in two split applications. Cucumber beetle and other insects were controlled by applications of Sevin dust (carbaryl). Plots were harvested on 6/02/05 and harvest data included yield and ratings for bolting (flowering).

Results and Discussion: Yields were highest for Bolero and F-415 which produced 6486 and 4472 pounds/acre, respectively. Other varieties including Baker, Olympia, and Padre had yields of 3930, 2168, and 3988 pounds/acre, respectively. Bolting was only observed in F-415 which recorded 11% bolting.

Conclusions: Yields in the trial were considerably lower than would be commercially accepted. This was primarily due to the trial being initiated late in the season, since spinach for spring production is normally planted much earlier. That said, Bolero was the highest yielding spinach in the trial and it did not bolt. Bolting is a major quality concern for spinach grown both for fresh market and for processing. Because the trial was planted late in the season (longer days cause spinach to bolt) it provided an excellent opportunity to observe these spinach varieties for bolting resistance.

Acknowledgements: The authors wish to thank Shawnee Mills Inc. for making their land available for this trial. We are particularly thankful to Brent Thompson of the Shawnee Feed Center for his support and assistance in making this trial successful.

Table 1. Spring 2005 Spinach variety trial, Shawnee, Oklahoma[z].

Variety	Company/source	Yield (lbs/acre)	Bolting
Baker	Alf Christianson	3930 b[y]	0 b
Bolero	Petoseed	6486 a	0 b
F-415	Alf Christianson	4472 ab	11 a
Olympia	Alf Christianson	2168 b	0 b
Padre	Asgrow	3988 b	0 b

[z] Seeded April 5, 2005; Plot size: 20’ long 2 rows/plot spacing 15” apart All harvested 6/2/05.

[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.

Southern Cooperative Cowpea Trial

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, A. Brothers, R. Havener

Materials and Methods: The Southern Cooperative trials are an ongoing effort by scientists at 5 Land Grant Universities and the U.S.D.A to provide cowpea performance data from a wide variety of production environments. The Bixby trial provides Oklahoma producers with information on crop maturity and yield potential of breeding lines that may possibly become available in the near future. Plots consisted of one row 20 feet long with 36 inches between rows. Seed were spaced 8 to 10 seed per foot and were planted on 5/27/05. Immediately following planting all plots received a preemergence application of Dual Magnum at 1.0 lb ai/acre tank-mixed with Pursuit at 0.063 lb ai/acre followed by an overhead irrigation of 0.5 inches of water. Supplemental water was supplied through overhead irrigation. Plots were fertilized on 6/10/05 with 30lbs N/acre. The trial included 4 replications for the 14 replicated lines and 2 replications for the 10 observational lines (Tables 1, 2). Plots were rated for percent dry pods and growth habit on 8/12/05. The trial was machine harvested on 8/31/05 and dry and imbibed yields were recorded subsequently. Data in the replicated trial were analyzed using Duncan's multiple range test with comparisons made between varieties within a pea type (blackeye, cream, pinkeye types were compared only to other peas within that given type) no comparisons were made in the observational trial due to only 2 replications being utilized.

Results and Discussion: Differences in percent dry pods reflect different rates of maturing between breeding lines in the trials. No differences in the percentage of dry pods were recorded for peas in the replicated trial (Table 1). In the observational trial, the percentage of dry pods varied between 55 and 90% in the blackeyes, 38 to 90% in the creams, and 55 to 83% in the pinkeyes (Table 2). Growth habit ratings provide an indication of how erect or prostrate a variety's growth was. Growth habit ratings were different for each of the three types in the replicated trial. The blackeye US-1071 had a 4.1 growth habit rating indicating a more prostrate growth habit than either AR 00-178 or ARK Blackeye # 1 that had 2.1 and 1.9 ratings, respectively. Cream type US-1080 at 4.3 was more prostrate than Early Acre. Pinkeyes AR 01-1293 and Coronet had growth habit ratings of 4.1 and 3.4, respectively, and were considerably more prostrate in growth than TX 2044-5-1 PEgc, TX 2036-4-1 PE, and LA 96-30, that had ratings <1.9. AR 01-874 had a growth habit rating of 4.0. Growth habit ratings for the observational trial ranged between 1.0 to 2.8 for blackeyes, 1.8 to 2.8 for the creams, and 2.8 for both pinkeyes. Percent moisture of the harvested peas is also an indicator of maturity. In the blackeyes US-1071 had the highest percentage of moisture at 16.8% compared to AR 00-178 and ARK Blackeye # 1 at 11.7 and 12.1%, respectively. No differences were observed in the cream types for percent moisture. Pinkeye AR 01-1293 had 13.9% moisture and was higher in moisture than five other pinkeye cultivars. AR 01-874 had 16.1% moisture at harvest. Percent moisture ranged between 10.8 to 13.8% for blackeyes in the observational trial, 10.0 to 15.8% for the creams, and 12.8 to 13.3% for the pinkeyes. Imbibed yields were highest for AR 00-178 and ARK Blackeye # 1 for the blackeye replicated trial, these recorded 1660 and 1700 lbs/acre yields, respectively. Cream types US-1080 and Early Acre had imbibed yields of 1312 and 1103 lbs/acre, respectively. AR 01-1293 and TX 2028-1-3 PEgc were the highest yielding pinkeyes with yields of 1355 and 1362 lbs/acre imbibed yield, respectively. AR 01-874 had an imbibed yield of 1564 lbs/acre. In the observational trial, AR 01-1704 and ARK Blackeye # 1 were the highest yielding blackeyes with 1474 and 1285 lbs/acre imbibed yield. AR 01-1781 was the highest yielding cream and AR 01-821 the highest yielding pinkeye.

Conclusions: Factors that should be considered when selecting a particular cowpea cultivar include plant growth habit, time to maturity, and of course, yield. Growth habit has a direct bearing on the ability to harvest the crop, both by machine and by hand. Cultivars that are more erect, particularly with pods set in the upper portion of the plant are essential for machine harvest, but are also desirable for hand harvesting of fresh market peas. Several cultivars that exhibited a more erect growth habit included AR 00-178, ARK Blackeye # 1, TX 2044-5-1 PEgc, TX 2036-4-1 PE, LA96-30, AR 01-1704, TX 2028-2-1 BEgc, LA 95-18, and Early Acre. The percentage of dry pods and the percentage of moisture in the harvested pea is an indicator of maturity with earlier maturing cultivars having a higher percentage of dry pods and a lower percentage of moisture at harvest. Several cultivars had 10 to 12% moisture at harvest and should be considered earlier maturing than those in the 15 to 17% moisture range. Yields varied considerably in the trial, but in general were low. Plot combine adjustments will hopefully rectify problems that were experienced during the 2005 season. Generally the blackeyed types were higher yielding with both AR 00-178 and ARK Blackeye # 1 having the highest yields in the trial. High yielding pinkeyes included AR 01-1293 and TX 2028-1-3 PEgc.

Table 1. Spring 2005 Cowpea Trial, Bixby, OK. Replicated Trial.

Variety	Source	% Dry Pods[z]	Growth habit[y]	% Moisture[x]	Shelled yield lbs./acre	
					Dry[w]	Imbibed[v]
Blackeye types						
US-1071	USDA	71 a[u]	4.1 a	16.8 a	537 b	966 b
AR00-178	U of Arkansas	80 a	2.1 b	11.7 b	784 a	1660 a
ARK Blackeye #1	Industry Standard	80 a	1.9 b	12.1 b	833 a	1700 a
Cream types						
US-1080	USDA	55 a	4.3 a	13.6 a	688 a	1312 a
Early Acre	Industry Standard	59 a	3.1 b	13.0 a	590 a	1103 a
Pinkeye types						
AR01-1293	U of Arkansas	80 a	4.1 a	13.9 a	692 a	1355 a
TX2044-5-1PEgc	Texas A & M	91 a	1.9 cd	11.1 bc	378 bc	782 ab
TX2028-1-3PEgc	Texas A & M	86 a	2.6 bcd	11.7 bc	681 a	1362 a
TX2036-4-1PE	Texas A & M	86 a	1.8 d	10.1 c	215 c	434 b
LA95-17	Louisiana State	73 a	2.6 bcd	12.4 ab	452 abc	1020 ab
LA96-10	Louisiana State	80 a	2.9 bc	10.5 bc	316 bc	629 b
LA96-30	Louisiana State	83 a	1.8 d	12.0 abc	485 ab	1007 ab
Coronet	Industry Standard	84 a	3.4 ab	11.4 bc	456 abc	860 ab
Other types *(Red Holstein)*						
AR01-874	U of Arkansas	64	4.0	16.1	773	1564

[z] Dry Pods=estimated percent maturity of pods on 8/12/05.
[y] Growth habit=Rating scale of 1-5, 1=erect, 5=prostrate.
[x] Moisture=percent moisture on 8/31/05.
[w] Dry shelled wt.=mechanically harvested on 8/31/05 yield in lbs./acre.
[v] Imbibed wt.=Imbibed weight in lbs./acre.
[u] Numbers for each type of cowpea 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. Spring 2005 Cowpea Trial, Bixby, OK. Observational Trial.

Variety	Source	% Dry pods[z]	Growth Habit[y]	% Moisture[x]	Shelled yield lbs./acre	
					Dry[w]	Imbibed[v]
Blackeye types						
AR01-1704	U of Arkansas	80	1.8	12.5	799	1474
AR01-1764	U of Arkansas	55	2.8	13.8	381	674
TX2028-2-1BEgc	Texas A & M	90	1.5	10.8	555	1014
ARK Blackeye #1	Industry Standard	78	1.0	12.2	708	1285
Cream types						
AR01-1781	U of Arkansas	38	2.8	15.8	712	1313
LA92-11	Louisiana State	83	2.3	10.0	399	699
LA 95-18	Louisiana State	90	1.8	10.6	378	704
Early Acre	Industry Standard	90	1.8	11.4	399	704
Pinkeye types						
AR01-821	U of Arkansas	55	2.8	12.8	733	1324
Coronet	Industry Standard	83	2.8	13.3	436	766

[z] Pods=estimated percent dry pods 8/12/05,
[y] Growth habit= Rating scale of 1-5, 1=erect, 5=prostrate.
[x] Moisture=percent moisture on 8/31/05.
[w] Dry shelled wt.=mechanically harvested on 8/31/05 yield in lbs./acre.
[v] Imbibed wt.=Imbibed weight in lbs./acre.

Sweet Corn Variety Trial

Spring 2005, Bixby, Oklahoma

Brian Kahn, Lynda Wells, Robert Havener, and Amy Brothers

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 18 varieties (yellow or bicolor) for yield, earliness, and overall quality. Varieties were grouped as se or sh_2 for isolation purposes.

Materials and Methods: Plots were direct seeded on April 28. 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. Types were separated into two groups, with sh_2 types in one area of the field and se and mixed hybrids in the other area. Plots were sprayed with S-metolachlor herbicide on April 29, at the rate of ½ pint/acre. Plots were thinned to 20 plants per row on May 16. Fertilizer was applied two times, April 28 at 50 lbs. N/acre and May 31 at 60 lbs. N/acre. Insecticide applications began on June 7 (just before silking) and continued throughout the harvest period. Plant vigor ratings also were taken on June 7. Supplemental water was applied with overhead irrigation. Each variety was harvested one time at its peak maturity.

Results and Summary: Results are shown on the following page. Standards of comparison were 'Incredible' in the se group and 'GSS 0966' in the sh_2 group. 'Incredible' had good early vigor and produced more tonnage of marketable ears than the other se group entries. 'BSS 0977' and 'GSS 0966' had good early vigor, but were significantly more vigorous compared to only five sh_2 entries: 'Mirai 002', 'Optimum', 'Supersweet Jubilee Plus', 'Holiday', and 'Mirai 308BC'. Within the Mirai^{TM} entries, 'Mirai 131Y' and 'Mirai 301BC' were more vigorous than 'Mirai 002' and 'Mirai 308BC'. However, the latter two cultivars eventually produced average to above average yields. There were no significant differences in tonnage of marketable ears within the sh_2 group, but three entries produced fewer marketable sacks/A than 'GSS 0966': 'Winstar', 'Mirai 131Y', and 'Mirai 334BC'.

One objective of this trial was to compare several Mirai^{TM} cultivars with other sweet corns. Mirai^{TM} cultivars are marketed as having particularly good eating quality. Taste is very subjective; however, several people in our research group tested Mirai^{TM} cultivars against others harvested on the same days, and most felt that the eating quality was very good. 'Mirai 130Y' and 'Mirai 131Y' did not have particularly attractive shucked ears, but this is not uncommon with early corns. By the same token, earworm damage was above average on four of the six Mirai^{TM} entries. 'Mirai 334BC' in particular was noted as having poor tip cover, and it had the highest cull production in the trial. Recommendations cannot be made after just one study. We saw nothing about the Mirai^{TM} cultivars that would cause us to discourage a trial by interested Oklahoma growers. We would, however, encourage growers to follow a good corn earworm management program and to carefully follow guidelines provided by Centest, including attention to stand establishment.

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

Table 1. Spring 2005 Sweet Corn Variety Trial, Bixby[z] .

Variety[y]	Company/ source	Genetics	Market yield (sacks/A)[x]	Yield (tons/A)		Number days to harvest	In-shuck rating[w]	Shucked rating[w]	Avg ear diam. (inches)	Avg ear length (inches)	Corn earworm damage[v]
				Market	Culls						
Group: se											
Incredible	Crookham	yellow	377	7.3	0.5	73	2.0	1.5	1.8	7.9	2.0
BC 0805	Syngenta	Attribute® bicolor	291	5.4	0.3	77	1.7	1.2	1.8	8.3	1.2
Cameo	Crookham	bicolor	287	5.1	0.3	71	1.2	1.5	1.9	8.1	1.7
Applause	Crookham	yellow	262	3.5	0.1	67	1.2	2.0	1.6	7.3	2.0
Honey Treat	Syngenta	TripleSweet® yellow	232	3.6	0.5	67	1.8	2.3	1.6	8.0	2.0
		Mean	290	5.0	0.3	71	1.6	1.7	1.7	7.9	1.8
		LSD $_{0.05}$	NS	1.8	NS	--	0.3	NS	0.09	0.3	0.4
Group: sh2											
Optimum	Crookham	Augmented bicolor	400	5.7	0.9	67	1.0	2.0	1.7	7.0	2.3
BSS 0977	Syngenta	Attribute® bicolor	387	5.8	0.3	73	1.2	1.5	1.7	6.9	1.2
GSS 0966	Syngenta	Attribute® yellow	365	5.7	0.3	73	1.2	1.3	1.7	7.1	1.3
Mirai 130Y	Centest	yellow	359	5.9	0.3	67	1.7	2.5	1.7	7.8	2.0
Mirai 002	Centest	yellow	351	6.0	0.4	73	1.5	1.3	1.9	7.8	2.8
Mirai 308BC	Centest	bicolor	340	5.2	0.6	71	1.8	1.7	1.8	7.3	2.3
XTH 1283	SeedWay	yellow	338	5.6	0.2	71	1.0	1.7	1.7	7.3	2.0
Holiday	Crookham	Augmented bicolor	320	6.1	0.8	77	1.5	2.0	1.9	8.5	2.0
Mirai 301BC	Centest	bicolor	316	5.9	0.8	71	1.8	1.0	2.0	7.5	2.2
Supersweet Jubilee Plus	Syngenta	yellow	312	5.3	0.7	73	2.0	2.0	1.7	8.8	2.5
Winstar	Syngenta	yellow	291	5.6	0.7	73	1.0	2.3	1.8	8.2	2.0
Mirai 131Y	Centest	yellow	283	5.1	1.0	67	2.5	2.5	1.7	8.2	3.7
Mirai 334BC	Centest	bicolor	226	4.0	1.5	67	1.8	1.8	1.8	7.9	2.8
		Mean	330	5.5	0.6	71	1.5	1.8	1.8	7.7	2.2
		LSD $_{0.05}$	65	NS	0.5	--	0.4	0.8	0.09	0.5	0.5

[z] Seeded April 28, 2005; Plot size: 1.8m x 6.0m (2 rows/plot, 3 plots each variety, plots thinned to 20 plants/row.) Harvested 7/01/05 to 7/11/05

[y] Variety lines are sorted by group.

[x] One sack = 60 ears

[w] Rating: 1=best, 5=poorest

[v] Rating: 1=no damage, 2=earworm damage <½” from tip, 3=earworm damage <1” from tip, 4=earworm damage <1½” from tip, 5=earworm damage >1½” from tip.

[v] Earworm control: Sevin WP, Asana & Lannate were applied 5 times between silking & harvest to entire planting..

Sweet Corn Variety Demonstration

Spring 2005, Shawnee, Oklahoma

L. Brandenberger, L. K. Wells, B.A. Kahn, and J.L. Benton

Materials and Methods: A sweet corn variety demonstration was carried out to introduce local producers to new types of sweet corns, including sweetness enhanced and BT types. The demonstration was organized as a randomized block design utilizing four replications. Each plot consisted of two rows on 24 inch centers with plot lengths being 20 feet. Each variety in the demonstration had white kernels, sh2 genetics for enhanced sweetness and one BT corn (WSS 0987) was also included (Table 1). Plots were direct seeded on 4/27/05 at the Shawnee Feed Center farm. Immediately following planting Dual Magnum (S-metolachlor) was applied over the soil surface as a PRE application at 1.25 lbs ai/acre. All plots were subsequently thinned to one plant per row-foot following emergence of the seedlings. Sandea (halosulfuron) was applied as a POST treatment for control of nutsedge after crop emergence and thinning at a rate of 0.024 lbs ai/acre. Crop water needs were supplied through a drip irrigation system on a weekly basis. Nitrogen for crop growth was supplied by use of urea (46-0-0) at a rate of 70 lbs N/acre applied to the soil surface in two split applications. Corn earworm was controlled by applications of Sevin dust (carbaryl).

Results and Discussion: Marketable yields ranged from 131 to 269 sacks/acre with WSS 0987 producing significantly higher yields than WSS 3681 (Table 1). In-shuck ratings for ear quality were lowest (best) for WSS 0987 which had a rating of 1.0 compared to 2.5 and 4.5 for Whistler and WSS 3681, respectively. Shucked ratings for ear quality were lowest (best) for WSS 0987, but no significant differences were observed. No differences were observed for average ear diameter. WSS 3681 had the longest ears at 8.8 inches compared to 7.0 and 7.5 for WSS 0987 and Whistler, respectively. Corn earworm damage was significantly less for WSS 0987 compared to WSS 3681. Corn earworm damage ratings were 1.2, 2.5, and 4.2, respectively, for WSS 0987, Whistler, and WSS 3681.

Conclusions: Although the demonstration was treated for control of corn earworm there were differences in the amount of damage observed. WSS 0987 which is a BT corn did have less damage than either of the other two varieties in the trial and had significantly less than WSS 3681. Yields were highest for WSS 0987 as was the quality of the ears when measured by the in-shuck and shucked ratings.

Acknowledgements: The authors wish to thank Shawnee Mills Inc. for making their land available for this demonstration. We are particularly thankful to Brent Thompson of the Shawnee Feed Center for his support and assistance in making this demonstration successful.

Table 1. Spring 2005 Sweet Corn Demonstration, Shawnee^z.

Variety^y	Company source	Genetics	Market yield (sacks/A)^x	Yield (tons/A)		Number days to harvest	In-shuck rating^w	Shucked rating^w	Avg ear diam. (inches)	Avg ear length (inches)	Corn earworm damage^v
				Market	Culls						
White Kernel type											
WSS 0987	Rogers	sh2 Attribute®	269	3.9	0.03	76	1.0	1.7	1.6	7.0	1.2
Whistler	Rogers	sh2	199	2.8	0.16	76	2.5	2.2	1.6	7.5	2.5
WSS 3681	Rogers	sh2	131	1.9	0.16	76	4.5	2.7	1.6	8.8	4.2
		Mean	200	2.9	0.1	76	2.7	2.2	1.6	7.7	2.6
		LSD $_{0.05}$	107	1.4	NS	--	0.8	NS	NS	0.5	0.7

^{z}Seeded April 27, 2005; Plot size: 20' x 4' spacing (2 rows/plot, 4 plots each variety, plots thinned to 20 plants/plot.) All harvested 7/12/05.

^{y}Variety lines are white kernel type.

^{x}One sack = 60 ears

^{w}Rating: 1=best, 5=poorest

^{v}Rating: 1=no damage, 2=earworm damage <½" from tip, 3=earworm damage <1" from tip, 4=earworm damage <1½" from tip, 5=earworm damage >1½" from tip.

^{v}Earworm control: Sevin applied 3 times between silking & harvest..

Summer Savory yield trials

2005 Season, Bixby Oklahoma

N. Maness, D. Chrz, L. Brandenberger, R. Havener, A. Brothers

Materials and Methods: Two summer savory varieties ('Aromata' and 'Common') were evaluated in 2005 as a new herb crop for Oklahoma. All seeds were obtained from Johnny's seed company. Two sets of plots were direct seeded with a Monosem air planter in beds of 4 rows, 12 inches apart at a total plot length of 200 feet on April 21. One set of plots were treated with 10 lb/ac ai Dacthal as herbicide on April 22 using a tractor mounted 12 foot broadcast sprayer calibrated to deliver 25 gallons of spray per acre. The other set of plots were not treated with herbicide. Soil tests indicated adequate phosphorus and potassium, but very low nitrogen. Nitrogen was applied as urea at a rate of 40 lb N/ac just after planting. Plots were irrigated with 0.5 inch of overhead irrigation following herbicide application. Plots were topdressed with nitrogen from urea at a rate of 40 lb N/ac on May 17. By May 22 substantial crop injury in terms of failure to emerge (40 to 50 percent stand reduction, compared to no herbicide plots) was noted in the herbicide treated plots and they were abandoned. Harvests for the remaining plots were initiated on July 12 and continued until September 20, for a total of 4 harvests. Plots were abandoned after the September 20 harvest due to severe die-back, especially noted in the 'Aromata' plots (60 to 70 % plant death after September 20 for 'Aromata', compared to approximately 50 % plant death for 'Common'). After each harvest, plots were topdressed with nitrogen from urea at a rate of 30 lbs N/ac. A Kincaid plot harvester, equipped with a 4.5 ft sickle-style cutting bar, a bat system for moving harvested material onto a 2.2 ft conveyer system which emptied into pre-weighed harvest lugs, was utilized to harvest all plots. Cutting height was set at 6 inches. During harvest 10 to 15 pounds of sample from each plot was transported to a cooler at 45 F and held prior to transport to Stillwater lab facilities on ice for drying. Just prior to drying, summer savory was washed to remove soil and other debris, spin-dried in a greens washer, weighed and placed onto cheesecloth. The cheesecloth was then tied to contain the samples and dried for five days at 74 to 80 F in a Proctor-Shwartz forced air drier. Moisture content was determined for all samples.

Conclusions: The crop damage observed for the Dacthal herbicide-treated plots was not as severe as was noted for basil plots, but we judged reduction in stand to be severe enough for us to abondon these plots for yield determination. Dactal, at the 10 lbs ai/ac rate, can not be recommended for use on summer savory. It should be noted that the rate tried (10 lbs ai/ac) was at the high end of recommended rates for onions and other vegetable crops. Summer savory stand establishment was variable and yield information on a fresh basis (Table 1) and on a dry basis (Table 2) has been corrected to eliminate plant skips in the plots. Harvests were timed relative to plant growth (at least 2 inches growth above the cutting floor) and yields were calculated based on the correction referred to above, with 12 inch between row spacing. 'Common' out yielded 'Aromata' by at least double on a fresh (Table 1) or an air dry basis (Table 2). It was noted that 'Common' produced longer woody stems with less dense leaves than 'Aromata', perhaps leading to a less intense odor from 'Common' versus 'Aromata'. We noted that washing should be accomplished just prior to drying or other use for summer savory, and that leaf discoloration caused by washing and after prolonged storage was worse for 'Aromata' compared to 'Common'. When storage was required, temperature should be 32 to 38 F and herbs should be stored dry under high humidity – under this condition, only minor deterioration was noted after up to 2 weeks in storage. Summer savory may have good yield potential for Oklahoma production. We are in the process of chemical evaluation to assess its value as a new extraction crop. In May 2005 we also established plots of winter savory (genus and species is Satureja montana, as opposed to Satureja hortensis for summer savory) in a perennial herb block at Bixby. The winter savory is reported to be more pungent, and may have potential as a perennial herb crop. We will assess winter survival of this crop and commence harvest and evaluations during the 2006 season.

Table 1. 2005 Cumulative Summer Savory Fresh Yields in Bixby, OK

Harvest #	Harvest Date	Aromata	Common
1	12-July	2002	2958
2	2-Aug	2783	5398
3	30-Aug	6335	15996
4	20-Sep	9822	24651

Table 2. 2005 Cumulative Summer Savory Air Dry Yields in Bixby, OK

Harvest #	Harvest Date	Aromata	Common
1	12-July	312	430
2	2-Aug	480	845
3	30-Aug	1043	2439
4	20-Sep	1848	4057

Organic Tomato Cultivar Evaluations

2005, Lane Agricultural Center, Lane, Oklahoma

Warren Roberts, Jonathan Edelson, Jim Shrefler, Merritt Taylor, Benny Bruton

Eighteen cultivars of tomato were grown in 2005 at the Lane Agricultural Center in Lane, Oklahoma. All practices used in the study were according to the guidelines of the National Organic Program. Poultry litter was applied in the fall of 2004. Crimson clover and turnips were used in combination as a cover crop during the 2004-2005 winter. Poultry litter was again added in the spring of 2005, prior to planting the tomatoes. Tomatoes were planted on May 9, 2005. There were four replications of each cultivar. Rows were 9 feet apart and plants were 1.5 feet apart within the row. Tomatoes were staked by either the stake and weave system (for determinates) or over-head single-wire trellis (for indeterminates). Tomatoes were harvested on July 11, July 19, July 27, August 1, and August 8. Tomatoes were graded as either marketable fruit or cull fruit. Culls were categorized as being rejected because of blossom end rot (BER), insect damage, or pathogenic disease damage.

Results are listed in the table below. “Mrktable tons/acre” is the marketable weight in tons per acre for the entire season. “Mrktable fruit/plant” is the number of marketable fruit per plant. “BER” is the number of fruit per plant that were showing symptoms of blossom end rot. “Insect” is the number of fruit per plant that showed evidence of insect damage. “Disease” is the number of fruit per plant that showed evidence of disease. “Fruit wt” is the average weight of each individual fruit, in pounds.

This is the second year of this study. Yields were generally higher this year than they were in 2004. The summer of 2005 was much drier than was 2004, which caused fewer problems with foliar diseases in 2005 than in the previous year. Major damage was caused by vegetable weevils just after the tomatoes were planted. All plants were destroyed by the weevils within 5 days after planting. The tomatoes were replanted on May 9. The results listed here are from the second planting.

		Mrktable	fruit/plant				Fruit wt
Cultivar	**Seed source**	**tons/acre**	**Mrktable**	**BER**	**Insect**	**Disease**	**(lbs)**
Sunny	Tomato Growers Supply	14.9	23	2	3	4	0.37
Solar Set	Tomato Growers Supply	13.7	20	1	2	3	0.44
Classica	Totally Tomato	13.6	45	2	4	7	0.26
Sun Leaper	Tomato Growers Supply	11.4	16	1	3	3	0.45
Mountain Fresh	DeWitt Seed	11.2	16	1	2	4	0.39
Florida 91	Tomato Growers Supply	10.9	14	1	3	2	0.48
Florida 47	DeWitt Seed	10.6	17	1	9	3	0.41
BNH-444	Johnny Seeds	10.2	14	1	5	7	0.45
Amelia	DeWitt Seed	10.2	14	1	2	3	0.47
Celebrity	DeWitt Seed	9.5	14	0	2	7	0.42
Mountain Spring	DeWitt Seed	9.1	16	0	2	3	0.38
Sun Master	Tomato Growers Supply	8.9	15	1	2	6	0.40
Mountain Delight	DeWitt Seed	6.7	10	1	2	4	0.40
Peron	Tomato Growers Supply	6.5	12	1	1	3	0.33
Champion	Tomato Growers Supply	3.0	6	5	2	4	0.36
Amana Orange	Peaceful Valley Farm Supply	2.8	3	1	1	1	0.71
Snow White	Tomato Growers Supply	2.7	36	2	2	4	0.04
Sioux	Tomato Growers Supply	1.6	3	2	0	5	0.38

Watermelon Nutritional Study

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, A. Brothers, R. Havener

Materials and Methods: The objective of this study was to compare the performance of watermelon crops using a conventional fertility program to one using Stoller fertility products. The study included four treatments comprised of a standard fertility program and three treatments using Stoller Root Feed II, Root Feed Supplement, and Sugar Mover products. All treatments utilizing Stoller products were applied weekly for ten weeks beginning in July and finishing in October. The conventional program had 30 lbs of actual nitrogen/acre applied on 8/04/05 utilizing urea (46-0-0) with the same amount also applied to the Stoller product plots. Stoller treatments included: Root Feed II applied at 5 gallons/acre; Root Feed II at 5 gallons/acre + Root Feed Supplement at 1 pint/acre; Root Feed II at 5 gallons/acre + Root Feed Supplement at 1 pint/acre + Sugar Mover at 1 pint/acre applied through the drip system. Plots were replicated four times and arranged in a randomized block design that utilized separate drip irrigation lines for each treatment. The study was initiated on 6/02/05 by direct seeding all plots to Crimson Sweet watermelon. Immediately following seeding the entire test area received a preemergence tank-mix of Command 3ME (Clomazone) at 0.15 lbs ai/acre +0.56 lb ai/acre of Curbit (ethalfluralin) + Sandea (halosulfuron) at 0.024 lb ai/acre. A layby application of Sandea at 0.016 followed a final cultivation on 7/18/05. Preventative fungicide applications were begun on 7/18/05 and continued on a weekly basis until 9/29/05. Fungicide applications included Bravo (Chlorothalonil) alternated with Quardris (azoxystrobin). Recorded data included individual fruit weights on 9/02/05, 9/09/05, 9/16/05, 9/26/05, 10/03/05, and 10/10/05 and percent soluble solids for individual fruits on 9/26/05 and 10/03/05.

Results and Discussion: No differences were observed between the treatments and the standard fertility program for yield or soluble solids (Table 1). Overall yield ranged from 7932 to 9900 lbs/acre of watermelon fruit. Average fruit size ranged from 11.8 to 13.1 lbs/fruit. Soluble solids ranged from 6.1 to 7.9%.

Table 1. Watermelon nutritional study. Bixby, Oklahoma. Summer 2005

	Yield/acre[z]			**Percent**	**Average**	**Soluble**
Treatment	**Early mkt**[y]	**Total mkt**[x]	**Number**	**Early**	**fruit size**[w]	**solids**[v]
Non Treated Check	2970 a[u]	9227 a	686 a	44 a	11.8 a	7.7 a
Root Feed II @ 5 gal/ac/week	3256 a	9387 a	666 a	40 a	12.2 a	7.9 a
Root Feed II @ 5 gal/ac/week, Root Feed Supplement @ 1pt/ac/week	4170 a	7932 a	585 a	56 a	13.1 a	6.1 a
Root Feed II @ 5 gal/ac/week, Root Feed Supplement @ 1pt/ac/week, Sugar Mover @ 1pt/ac/week	3617 a	9900 a	787 a	47 a	12.4 a	7.2 a

[z] Yield/acre=weight in pounds and number of fruit / acre.

[y] Early mkt=harvest dates 9/2/05, 9/9/05, 9/16/05

[x] Total mkt=all 6 harvest dates.

[w] Average fruit size=pounds /acre

[v] Soluble solids=percent soluble solids using a refractometer

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

Disease Management

Effects of Cultivar and Fungicide Program

On Pod Decay (Cottony Leak) of Snap Bean, Bixby - 2005

John Damicone and Wesley Scruggs, Entomology and Plant Pathology

Objective: Pod decay is an increasing disease problem in the production of snap beans for processing in Oklahoma and surrounding states. Lower pods, particularly those in contact with the soil, develop a wet rot with profuse growth of white, fluffy mold (mycelium). The disease appears to increase within the canopy through direct contact of diseased pods with adjacent, healthy pods and leaves. Plants in areas with dense foliar growth appear to be most severely affected. Pod decay from Pythium aphanidermatum, the cause of "cottony leak" on numerous vegetable crops, has been a primary cause of pod decay in previous field trials. In general, fungicides have not provided good control of pod decay. The objective of this study was to screen various snap bean cultivars for their reaction to pod decay in field plots where P. aphanidermatum has been a historical problem. While true resistance to a general pathogen like Pythium may not be available, cultivars with an upright growth habit may permit plants to escape the disease. Fungicide deposition to the lower pods may also be improved with such cultivars. Therefore, cultivars were evaluated both with and without a fungicide program for pod decay. The trial was first done in 2004 and was repeated in 2005.

Materials and Methods: The trial was conducted at the Oklahoma Vegetable Research Station in Bixby where pod decay has been a previous problem. Granular fertilizer (32-80-0 lb/A N-P-K) was incorporated into the soil prior to planting on 20 Apr at a rate of 9 seeds/ft. The herbicide Dual Magnum II 7.64E at 1.33 pt/A was broadcast immediately after planting for weed control. Plots were top-dressed with 46-0-0 lb/A N-P-K as urea on 3 May and 2 June. Plots were irrigated as necessary with overhead sprinkler irrigation. The experimental design was a split-plot with four randomized complete blocks. Main plots consisted of four, 20-ft-long rows of each cultivar spaced 3 ft apart. Sub plots consisted of two rows left untreated, and two rows treated with Ridomil/Copper. Ridomil Copper was applied as a directed spray through three flat-fan nozzles (8002vk) per row using a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 34 gal/A at 40 psi. The first application was made on 2 June when pods first developed, and two additional applications were made on 9 June and 16 June.

Cultivars were evaluated for lodging, canopy size, and height of the lowest pods on 22 June. Each cultivar was harvested on 22 June by cutting plants from a typical 1-m row segment within each main plot and hand-picking the pods. Pods were weighed and graded. All cultivars were graded by removing the largest seed from ten large pods, and measuring their total length with a bean gauge. Cultivars with round pods also were graded by determining the percentage of pods from a 500 g sample at each sieve size. Because some grade samples indicated immaturity, plots of the cultivars PLS 118, PLS 75, and Navarro were harvested again on 30 June. However yields declined for each on this date so data from the first harvest are presented. Symptoms of pod decay never developed in this trial, but Cercospora leaf spot developed and plots were rates for this foliar disease by estimating the percentage of leaflets with symptoms and defoliation in three sections of row per sub plot on 22 June.

Results: Plant stand and early-season vigor was excellent. However, late in the season plants turned dark green, developed crinkled leaves with a strong downward curl, and stopped growing. Cucumber mosaic virus was suspected, but plants tested negative. Nearby plots and weedy vegetation did not show signs of herbicide injury. A small part of another snap bean trial on the station developed similar symptoms. As a result, differences in the height and appearance of cultivars were not evident compared to 2004. Lodging was generally low and plant canopies did not develop into the row middles (Table 1). Yields were more variable and lower than in 2004, and statistical differences between cultivars were not evident (Table 1). Cottony leak did not develop in this trial. However, Cercospora leaf spot developed to moderate levels causing some defoliation by harvest (Table 2). The cultivars Tapia, Ebro, Bogota, and Moncayo had higher levels of Cercospora leaf spot compared to other cultivars. Iglo, PLS 118, and Nelson had the lowest levels of Cercospora leaf spot (Table 2). The Ridomil/Copper fungicide program did not reduce levels of Cecrospora leaf spot. Grades of R00.35558, SB 4261, Magnum, and Bogota indicated that these cultivars were over-mature at harvest (Table 3).

Conclusions: Because pod decay did not develop in this trial, it was not possible to confirm differences in cultivar reaction to the disease that were observed in 2004. Further testing will bee needed to substantiate the 2004 results.

Acknowledgements: The financial support and donation of seeds by Allen Canning Company, Harris/Moran Seeds, Syngenta/Rogers Seeds, Seminis Seeds, and Pure Line Seeds is greatly appreciated.

Table 1. Plant characteristics and yield of snap bean cultivars evaluated for reaction to pod decay, Bixby - 2005.

Cultivar	**Pod type**	**Lodging (1-10)**[1]	**Canopy (1-4)**[2]	**Pod height (1-5)**[3]	**Yield (cwt/A)**[4]
Igloo	round	3.5	2.5	2.2	94.3
PLS 118	flat	4.0	2.7	3.5	107.3
Roma II	flat	4.5	2.2	1.7	119.7
PLS 75	round	2.0	1.0	1.7	88.1
R00.35558	round	3.0	2.0	1.7	121.7
Tapia	flat	2.2	2.0	3.2	122.3
Ebro	flat	1.0	1.0	3.0	98.9
Bogota	flat	1.5	1.5	3.0	106.4
Magnum	flat	1.0	1.7	2.2	101.3
Cerler	flat	2.0	2.0	2.7	102.2
Moncayo	flat	5.7	2.2	4.2	110.0
SB 4261	round	3.7	2.0	2.2	104.2
Primo	flat	3.7	2.0	2.0	116.8
Romano 942	flat	3.5	2.2	3.5	87.0
Navarro	flat	4.2	2.2	2.7	124.8
Nelson	round	3.7	2.7	2.0	107.3
LSD (P=0.05)[5]		1.9	0.9	1.1	NS

[1] 1 = 0% lodged, 10 = 100% lodged on 22 June.

[2] 1 = least dense, 4 = most dense on 22 June.

[3] Height of oldest pods, 1 = low, 5 = high on 22 June

[4] Plots were hand harvested by pulling 1 m of row in the check (no fungicide) sub-plots on 22 June.

[5] Least significant difference, NS=treatment effect not significant.

Table 2. Effects of cultivar and fungicide program evaluated for control of pod decay on Cercospora leaf spot and defoliation, Bixby - 2005.

Cultivar	**Pod type**	**Cercospora (%)[1]**			**Defoliation (%)[2]**		
		check[3]	**R/C[4]**	**mean[5]**	**check**	**R/C**	**mean**
Igloo	round	15	13	14 h	2	1	1 f
PLS 118	flat	20	18	19 gh	2	2	2 f
Roma II	flat	23	23	23 efg	2	2	2 f
PLS 75	round	21	28	24 efg	1	2	2 f
R00.35558	round	26	20	23 efg	7	3	5 def
Tapia	flat	52	36	44 c	7	8	7 cde
Ebro	flat	55	55	55 b	12	11	12 bc
Bogota	flat	68	68	68 a	24	25	25 a
Magnum	flat	32	32	32 de	8	11	10 bcd
Cerler	flat	35	37	36 cd	7	5	6 def
Moncayo	flat	40	45	42 c	9	13	11 bc
SB 4261	round	35	38	37 cd	13	16	14 b
Primo	flat	27	26	27 efg	2	3	3 ef
Romano 942	flat	27	30	28 def	3	3	3 ef
Navarro	flat	17	32	24 efg	5	4	5 ef
Nelson	round	22	21	22 fgh	3	3	3 ef
mean[6]		32 a	33 a		7 a	7 a	
LSD (P=0.05)[7]				9			5

[1] Percentage of leaves with Cercospora leaf spot and defoliated from three sections of row in each sub-plot on 22 June.

[2] Percentage of leaves defoliated from three sections of row in each sub-plot on 22 June.

[3] Check = no fungicide.

[4] R/C = Ridomil/Copper 70W at 2.5 lb/A on 2 June, 9 June, and 16 June.

[5] Average over check and Ridomil/Copper treatments. Means followed by the same letter are not statistically different.

[6] Average over cultivars. Means followed by the same letter are not statistically different.

[7] Least significant difference.

Table 3. Grade characteristics of snap bean cultivars evaluated for reaction to pod decay, Bixby - 2005

		Sieve size (%)[1]				
Cultivar	**Pod type**	**1**	**2**	**3**	**4**	**5**
Igloo	round	4.1	10.0	13.4	47.6	25.0
PLS 75	round	4.9	70.4	22.6	2.0	0.0
R00.35558	round	1.7	3.1	9.8	32.0	53.3
SB 4261	round	1.0	1.0	1.4	7.0	89.6
Nelson	round	3.9	11.8	25.3	45.2	13.7
				Seed size (mm)[2]		
Igloo	round			116.2		
PLS 118	flat			80.0		
Roma II	flat			115.0		
PLS 75	round			97.5		
R00.35558	round			122.5		
Tapia	flat			103.0		
Ebro	flat			115.2		
Bogota	flat			137.7		
Magnum	flat			155.2		
Cerler	flat			110.2		
Moncayo	flat			115.0		
SB 4261	round			157.5		
Primo	flat			115.2		
Romano 942	flat			125.2		
Navarro	flat			100.0		
Nelson	round			110.0		

[1] Percentage of pods in each sieve size from a 500 g sample.

[2] Total length of the largest seed from each of 10 large pods. Average of two 10-pod samples per cultivar.

Evaluation of Fungicides for Control of Spinach Anthracnose

Stillwater, 2005

John Damicone and Wesley Scruggs, Entomology and Plant Pathology

Introduction and Objective: White rust is the most important foliar disease of spinach in Oklahoma. However, anthracnose, caused by the fungus Colletotrichum dematium, has been occasionally observed as a minor leaf disease. In the Fall of 2004, anthracnose was a severe problem in some commercial spinach fields in eastern Oklahoma that had received fungicide sprays for white rust. The objective of this trial was to evaluate fungicides registered for use on spinach for control of anthracnose.

Materials and Methods: The trial was conducted at the Oklahoma State University Plant Pathology Research Farm in Stillwater in a field of Norge loam previously cropped to spinach. Granular fertilizer (75-0-0 lb/A N-P-K) was incorporated into the soil prior to seeding on 28 Mar. The herbicide Dual Magnum II 7.6E at 0.67 pt/A was broadcast immediately after seeding. Plots were top-dressed with additional granular fertilizer (50-0-0 lb/A N-P-K) on 27 Apr. Plots consisted of 4-row beds, 20-ft long, with rows spaced 15 in. apart. An isolate of the pathogen recovered from a commercial spinach fields in the fall of 2004 was grown for 3 weeks on moistened, double-autoclaved oat kernels at room temperature. The inoculum was broadcast at a rate of 100 ml/plot on 29 April, just prior to the first fungicide application. The experimental design was a randomized complete block with four blocks separated by a 5-ft-wide fallow buffer. Treatments were broadcast through flat-fan nozzles (8002vk) spaced 18 inches apart with a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 25 gal/A at 40 psi. Treatments were applied on 7-day intervals beginning at the first true-leaf stage. Plots were lightly irrigated twice per day until a stand was established. Rainfall during the cropping period totaled 0.4 inches in Apr and 3.4 inches in May. Following inoculation, plots received an additional 3 inches of water in 7 applications of sprinkler irrigation to promote crop and disease development. Disease incidence (percentage of leaves with anthracnose) and severity (percentage of leaf area with anthracnose) were assessed on 27 May. Six, 1-ft row segments were harvested arbitrarily from the middle two rows of each plot. The harvested leaves were bulked, mixed, and disease severity was visually estimated on 30 blindly sampled leaves.

Results: Rainfall during April and May was ca. 5 inches below the 30-year average while average daily temperature for April and May were near normal. Rain received during May along with irrigation promoted anthracnose development as the disease developed to severe levels by harvest. None of the treatments reduced levels of anthracnose compared to the untreated check.

Conclusions: Azoxystrobin (Amistar, Quadris), and pyraclostrobin (Cabrio) are broad-spectrum fungicides that control anthracnose diseases on other crops such as watermelon. Their lack of effectiveness in this trial was not expected. The trial will be repeated in 2006 to verify these results and test additional fungicides.

Acknowledgements: Financial support from Syngenta Crop Protection is greatly appreciated. The valuable assistance of Rocky Walker and Brian Heid, OSU Plant Pathology Farm, in the establishment and maintenance of the trial at Stillwater is acknowledged.

Table 1. Evaluation of fungicides for control of anthracnose on spinach ('Melody'), Stillwater - 2005.

	Anthracnose (%)	
Treatment and rate/A (Timing[1])	**leaves w/ spots**	**leaf area w/ anthracnose**
Untreated check	58.3	32.7
Amistar 80DF 4 oz (1-4)	55.8	21.5
Quadris 2.08F 12.3 fl oz (1-4)	60.8	21.5
Cabrio 20EG 0.75 lb (1-4)	57.5	21.7
Kocide 101 2 lb (1-4)	62.5	26.9
Ranman 400F 2.75 fl oz + Sylwett L-77 (1-4)	64.2	28.5
Aliette 80WG 3 lb (1-4)	59.1	24.2
Ridomil Gold/Copper 2.5 lb (1-4)	61.6	25.7
LSD(P≤0.05)[2]	NS[3]	NS

[1] Application numbers (1-4) correspond to the spray dates of 1=29 Apr, 2=6 May, 3=12 May, and 4=20 May.

[2] Fisher's least significant difference.

[3] Treatment effect not significant at P≤0.05.

Evaluation of Fungicide Programs for Control of Spinach White Rust

Stillwater, 2005

John Damicone and Wesley Scruggs, Entomology and Plant Pathology

Introduction and Objective: White rust, caused by the fungus Albugo occidentalis, is the most important foliar disease of spinach in Oklahoma. Multiple fungicide applications are generally required to effectively manage white rust. Quadris and Amistar (azoxystrobin) are the primary fungicide used to manage white rust. Cabrio (pyraclostrobin) was registered for use on spinach in 2005 and is highly effective against white rust. However, these group 11 (strobulurin) fungicides have been prone to resistance problems with a few diseases of other crops. Therefore, resistance management guidelines have been developed and labelled which require the alternation of Quadris and Cabrio with fungicides that have a different mode of action. Unfortunately, there are few fungicides registered for use on spinach with non-group 11 modes of action. An objective of this study was to evaluate fungicide programs for white rust that use resistance management strategies. Ridomil/Copper and Aliette, registerd for use on spinach, and Ranman an experimental fungicide, were evaluated in alternation with Quadris, Amistar, and Cabrio. A second objective was to evaluate the experimental fungicides, Reason (group 11) and Previcur Flex (group 28) and a tank mix of Procure (group 4) + Acrobat (group 15). A weather-based advisory program for white rust was released on-line in 2005 at http://agweather.mesonet.org/. A third objective was to evaluate spray programs with Quadris and Cabrio in alternation with non-group 11 fungicides using the advisory program in comparison to calendar (7-day) programs.

Materials and Methods: The trial was conducted at the Oklahoma State University Plant Pathology Research Farm in Stillwater in a field of Norge loam with a history of white rust and previously cropped to spinach. Granular fertilizer (75-0-0 lb/A N-P-K) was incorporated into the soil prior to seeding on 4 Mar. The herbicide Dual Magnum II 7.6E at 0.67 pt/A was broadcast immediately after seeding. Plots were top-dressed with additional granular fertilizer (50-0-0 lb/A N-P-K) on 15 Apr. Plots consisted of 4-row beds, 20-ft long, with rows spaced 15 in. apart. The experimental design was a randomized complete block with four blocks separated by a 5-ft-wide fallow buffer. Treatments were broadcast through flat-fan nozzles (8002vk) spaced 18 inches apart with a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 25 gal/A at 40 psi. Treatments were applied on 7-day intervals beginning at the first true-leaf stage or when recommended by the weather-based advisory program for spinach white rust (http://agweather.mesonet.org/) using a weather station within 0.5 miles of the test site. Plots were lightly irrigated twice per day until a stand was established. Rainfall from planting to harvest totaled 0.69 inches in March, 0.39 inches in Apr and 0.01 inches in May. Following stand establishment, plots received an additional 4 inches of water in 15 applications of sprinkler irrigation to promote crop and disease development. Disease incidence (percentage of leaves with rust) and severity (percentage of leaf area with rust) were assessed on 12 May. Six, 1-ft row segments were harvested arbitrarily from the middle two rows of each plot. The harvested leaves were bulked, mixed, and disease severity was visually estimated on 30 blindly sampled leaves.

Results: Rainfall during March and April was ca. 5 inches below the 30-year average, and average daily temperature for March and April was near the 30-year average. The advisory program, which uses temperature and the duration of high relative to determine the need for fungicide applications, recommended only one application. Rain received during May along with irrigation promoted white rust development. Symptoms appeared late in the trial, but the disease reached severe levels in the untreated check compared to previous trials at this site. All of the fungicide programs except Acrobat+Procure reduced disease incidence and severity compared to the untreated check. Calendar (7-day) programs with Cabrio, Quadris, Amistar, and Reason; and the advisory program with Cabrio provided good disease control. Previcur Flex and Acrobat + Procure were the least effective treatments. The azoxystrobin formulation Amistar and Quadris performed similarly.

Conclusions: Azoxystrobin (Amistar, Quadris), and pyraclostrobin (Cabrio) can be effectively alternated with the registered fungicides Aliette and Ridomil/Copper, and Ranman should it be registered for use on spinach in the future, to comply with resistance management guidelines on their labels. Reason is highly effective on white rust but it is a group 11 that would not be appropriate for use where Cabrio or Quadris are used. Disease control with the advisory program, while only receiving on application' was comparable to respective fungicide applied four thimes on a 7-day schedule.

Acknowledgements: Financial support from Syngenta Crop Protection is greatly appreciated. The valuable assistance of Rocky Walker and Brian Heid, OSU Plant Pathology Farm, in the establishment and maintenance of the trial at Stillwater is acknowledged.

Table 1. Evaluation of fungicide programs for control of white rust on spinach (‘Melody’), Stillwater - 2005.

	White rust (%)	
Treatment and rate/A (Timing[1])	**leaves w/rust**	**leaf area w/ rust**
Untreated check	86.6 a[2]	26.65 a
Amistar 80DF 4 oz (1,3) Ridomil Gold Copper 65W 2.5 lb (2) Aliette 80WG 3 lb (4)	5.8 d	0.17 b
Quadris 2.08F 12.3 fl oz (1,3) Ridomil Gold Copper 65W 2.5 lb (2) Aliette 80WG 3 lb (4)	11.6 d	0.36 b
Cabrio 20EG 0.75 lb (1,3) Ridomil Gold Copper 65W 2.5 lb (2) Aliette 80WG 3 lb (4)	0.0 d	0.00 b
Cabrio 20EG 0.5 lb (1,3) Ridomil Gold Copper 65W 2.5 lb (2) Aliette 80WG 3 lb (4)	4.1 d	0.07 b
Quadris 2.08F 12.3 fl oz (1,3) Ranman 400F 2.75 fl oz + Sylwett L-77 2.0 fl oz (2,4)	5.0 d	0.21 b
Cabrio 20EG 0.75 lb (1,3) Ranman 400F 2.75 fl oz + Sylwett L-77 2.0 fl oz (2,4)	1.6 d	0.08 b
Quadris 2.08F 12.3 fl oz (A1)	32.5 bc	2.65 b
Cabrio 20EG 0.75 lb (A1)	2.5 d	0.07 b
Quadris 2.08F 12.3 fl oz (1-4)	15.8 cd	1.49 b
Cabrio 20EG 0.75 lb (1-4)	0.0 d	0.00 b
Reason 4.13SC 6.2 fl oz (1-4)	0.8 d	0.02 b
Previcur Flex 6L 2.0 fl oz (1-4)	48.3 b	5.03 b
Acrobat 50W 6.4 fl oz + Procure 50W 6 oz (1-4)	44.2 b	16.13 a
LSD(P≤0.05)	20.8	10.29

[1] Application numbers (1-4) correspond to the calendar spray dates of 1=14 Apr, 2=21 Apr, 3=29 Apr, and 4=6 May. Application A1 corresponds to the advisory program spray date of 19 Apr.

[2] Means in a column followed by the same letter are not significantly different according to Fisher’s least significant difference (LSD) test.

Evaluation of Fungicide Programs for Control of Foliar Diseases of Watermelon

Stillwater, 2005

John Damicone and Wesley Scruggs, Entomology and Plant Pathology

Introduction and Objective: Powdery mildew, caused by the fungus Sphaerotheca fuliginea, is a common foliar disease of cucurbits and is increasing in importance on watermelon. The disease is favored by a dense plant canopy, cloudy weather, and high relative humidity. Rain is not necessary for powdery mildew. The disease causes defoliation and may reduce yield by reducing fruit quality and number. Because resistant varieties are not available, fungicide programs are necessary for control. The objective of this trial was to evaluate different formulations and rates of the fungicide Procure for control of powdery mildew. Sulfur has also proven to be highly effective against powdery mildew in previous trials and is relatively inexpensive. However, concerns about injury to the foliage and melons, and off-odors in melon loads have limited its use. Therefore, a range of rates of sulfur (Microthiol Disperss) were evaluated for both disease control and injury to plants and melons.

Materials and Methods: The trial was located at the Agronomy Research Station in Perkins. Granular fertilizer (62-31-31 lb/A N-P-K) was incorporated prior to direct seeding the variety ‘Delta’ on 27 June at a rate of 3 seeds per ft. The herbicides Curbit 3E at 3.4 pt/A and Sandia 75WG at 0.75 oz/A were broadcast after planting to control weeds. Plots were single, 25-ft-long rows spaced 15 ft apart. Plots were then thinned to a 2-ft within row spacing. Squash bugs were controlled with Ambush 2E at 12.8 oz/A on 12 Aug and 26 Aug. Treatments were arranged in a randomized complete block design with four replications. Fungicides were broadcast through flat-fan nozzles (8002vk) spaced 18 inches apart using a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 24 gal/A at 40 psi. Fungicides were applied six times on 7-day intervals beginning at flowering on 12 Aug. After emergence, plots received four applications of sprinkler irrigation that totaled 8 inches of water from 15 July to 6 Sep. Disease was assessed by visually estimating the percentage of leaves with symptoms and defoliated in three areas of each plot. Yield of marketable melons weighing 14 or more lb was taken on 21 Sep and 5 Oct. Each harvested melon was rated for color on a 0 to 3 scale where 0=faded cull melon and 3=dark green.

Results: Powdery mildew did not develop in the trial. Cercospora leaf spot (Cercospora citrullina) developed late in the season and was the primary disease in this trial. Untreated check plots were 50% defoliated following the last harvest. All of the treatments reduced disease and defoliation compared to the untreated check (Table 1). Because the fungicides evaluated are mostly specific for powdery mildew, none of the treatments provided a high level of disease control. The Nova/Flint program provided the best control. There was considerable variation in yield. Yield of marketable melons and culls due to color did not differ among treatments (Table 1). Overall, melon color was good and treatments did not significantly affect melon color by causing sun-burn like symptoms. While the 10 lb/A Microthiol treatment numerically had the lowest color rating and the highest cull yield, most of the off color melons came from one plot.

Conclusions: Cercospora leaf spot is a generally considered a minor disease of watermelon. However the disease does cause late season defoliation a may reduce yields where vine health is important for prolonged harvest. Because the fungicides evaluated are mostly specific for powdery mildew, none of the treatments provided a high level of disease control. Sulfur treatments using Microthiol did not cause any obvious burn of the vines or melons under the conditions of this trial. Daily high temperatures on the spray dates ranged from 93 to 97°F.

Acknowledgements: The assistance of Andrew Shaw, and Rocky Walker and Brian Heid at the OSU Entomology and Plant Pathology Farm in the establishment and maintenance of this trial at Stillwater is acknowledged.

Table 1. Effects of fungicide programs on control of foliar diseases (mainly Cercospora leaf spot) and yield and quality of watermelon ('Delta'), Perkins - 2005.

Treatment and rate/A (timing)[1]	Foliar disease (%)[2]	Defoliation (%)[3]	Yield (cwt/A)[4]	Cull yield[5] (cwt/A)	Color (0-3)[6]
Procure 50WS 6 oz (1-6)	9.1 b	23.7 b	335.7	11.5	2.4
Procure 50WS 8 oz (1-6)	6.1 bc	19.6 b	261.2	28.5	2.4
Procure 480SC 6 fl oz (1-6)	4.0 c	25.0 b	273.8	21.0	2.5
Procure 480SC 8 fl oz (1-6)	3.9 c	22.5 b	324.3	5.6	2.7
Nova 40W 4 oz (1,3,5) Flint 50WG 1.5 oz (2,4,6)	3.5 c	14.6 b	325.5	6.1	2.5
Microthiol Disperss 4 lb (1-6)	6.0 bc	24.2 b	242.4	15.5	2.5
Microthiol Disperss 6 lb (1-6)	7.6 b	18.8 b	266.4	37.0	2.3
Microthiol Disperss 8 lb (1-6)	3.3 c	18.7 b	251.4	21.0	2.3
Microthiol Disperss 10 lb (1-6)	7.5 b	23.7 b	191.6	92.9	2.1
check	12.9 a	55.4 a	226.3	21.6	2.4
LSD (P=0.05)[7]	3.5	16.0	NS	NS	NS

[1] Timing numbers 1 to 6 corresponds to the spray dates of 1=12 Aug, 2=19 Aug, 3=26 Aug, 4=2 Sep, 5=9 Sep, and 6=16 Sep.

[2] Leaves with symptoms of foliar disease (mainly Cercospora leaf spot) on 19 Sep.

[3] Leaves defoliated on 6 Oct.

[4] Marketable melons weighing 14 or more lbs taken on 21 Sep and 5 Oct.

[5] Yield of melons weighing 14 or more lbs unmarketable because of color (color rating=0)

[6] Melon color where 0=faded, 3=dark green.

[7] Least significant difference. Means in a coulum followed by the same letter are not statistically different.

Watermelon Foliar Fungicide Timing Trial

Lane, Oklahoma

Jim Shrefler, Benny Bruton, John Damicone, and Tony Goodson

Introduction: Foliar diseases can pose a serious threat to watermelon production in Oklahoma. Any one of several diseases including Anthracnose, Downy Mildew and Powdery Mildew can result in yield and fruit quality loss when foliage is damaged. Anthracnose can cause direct crop quality loss due to fruit infection. Effective fungicides are available for the control of these diseases. However, growers are faced with the challenge of determining when to apply fungicides to obtain maximum effectiveness. Several options available for determining fungicide application timing include using preset schedules (for example, weekly), applying based on general weather forecasts, or applying when disease symptoms appear. Each of these has benefits and downsides. The last, although often used, is a particularly poor choice because the efficacy of most fungicides is greatest when used as a preventive practice, rather than as a "cure". An additional option is the use of an anthracnose forecaster that was developed as an aid for determining fungicide application timing in watermelon. The forecaster is available on the Oklahoma Mesonet. It is currently suggested that the forecaster be used on a trial basis until its dependability can be verified. One concern is that the forecaster is specific for anthracnose. Consequently, forecasts obtained with the forecaster do not consider the infection of watermelon by other diseases. This trial was conducted to compare the efficacy of two broad spectrum fungicide treatments using application timings based on preset schedules and the anthracnose forecaster.

Materials and Methods: The trial was conducted at Lane, Oklahoma at the Wes Watkins Agricultural Research and Extension Center on a sandy loam soil. Beds four feet in width were constructed on 12-foot centers. A single row of watermelon (XT 100) was direct seeded June 20, 2005 at the center of each bed. Sandea herbicide applied at 0.75 oz per treated acre and Curbit applied at 2 pints per treated acre were applied to the beds after planting . Crop stand was thinned to 2 plants per 2 feet of row.

Experimental treatments included an untreated check and fungicide treatments of 1. a tank mix of Dithane 75DF and Topsin 70WP and 2. Bravo Weatherstick. Each of these was applied using two decision-making options: 1. apply at first flowering and then weekly thereafter or 2. apply at first flowering and then based on recommendation by the Mesonet anthracnose forecaster. For all applications, Dithane was used at 2 lbs. product per treated acre, Topsin at ½ lb. and Bravo Weatherstick at 1.5 pints. All applications were made using 21 gallons per acre of spray mixture. The sprayer consisted of a tractor mounted boom fitted with 8003 flat fan nozzles, spaced 20 inches on a straight boom, which were connected to a closed tank system that uses pressurized air to deliver the spray mixture. Spray mixtures were prepared in either 3 or 5 gallon tanks and agitated immediately before spray application. Fungicide application was initiated when staminate flowers first became evident on approximately 50% of the plants. Initial fungicide applications were made on July 26. Subsequent applications to the weekly treatments were applied on 8-4, 8-10, 8-17, 8-25, 8-31, and 9-9 , and to the forecaster treatments on 8-8, 8-20, and 8-31.

The experimental design was a randomized complete block with four replications. Individual plots consisted of a 40 foot long section of a single watermelon row. Treatment applications covered an expanse of 24 feet that was centered on the plot row. The tractor on which the spray boom was mounted traveled with wheels centered on the border row and did not drive over the vines. Visual evaluations of disease symptoms on watermelon foliage were made on 8-24, 9-1, 9-19 and 10-3. Marketable size fruits were harvested and weighed on 8-29, 9-2, 9-8, 9-16 and 9-22.

Results and Discussion: Visual symptoms of foliar disease became evident at about Aug. 20. On Sept. 19 symptoms were most severe in untreated watermelon for the crown area and the overall canopy (Table 1). There were no significant differences between treatments on August 29 and Sept. 1. Defoliation was more severe in the weekly Bravo treatment than in the weekly Dithane plus Topsin treatment.

Leaf samples were collected from each plot on October 3 and evaluated for the presence of symptoms of specific foliar diseases (Table 2). Diseases observed included powdery mildew, gummy stem blight, alternaria, and cercospora. Each of these diseases was detected on leaves of each of the treatments. In the case of cercospora, there was more disease present on the untreated watermelon leaves than for the other treatments.

All mature watermelon fruit were harvested on August 29, and September 2, 8 and 16. All remaining watermelon (to as low as 5 lbs) were harvested on September 22. Total yields and yields for individual harvest dates are presented in Table 3. No significant differences were found between treatments for any of the harvest dates or for total harvested yield.

Disease development in this trial was gradual. Although disease severity was not great until the latter days of the crop cycle, the results demonstrate the effectiveness of fungicides for protecting watermelon foliage from foliar diseases. The diseases detected did not include anthracnose, the disease for which the Mesonet Anthracnose Model was developed. Even so, using the Anthracnose Model resulted in making half as many fungicide applications compared to the weekly scheduled applications.

The authors acknowledge the contribution of seed by Sugar Creek Seed and the technical support of John Johnson, Tony Goodson, Wyatt O'Hern, Buddy Faulkenberry, and Amy Helms.

Table 1. Visual evaluation of foliar disease in the watermelon foliar fungicide timing trial at Lane, Oklahoma.

		Visual Disease Evaluation[1]				
Fungicide Treatment	**Application timing**	**% diseased crown[2]**	**% diseased[3]**	**% damage**	**% defoliated[4]**	**% leaves with lesions[5]**
		8-24	**8-24**	**9-1**	**9-19**	**9-19**
Untreated	-	17	14	16	52 a	57 a
Dithane + Topsin	Weekly	10	8	14	26 c	34 b
Dithane + Topsin	Forecaster	17	10	12	28 cb	29 b
Bravo	Weekly	12	7.5	14	38 b	38 b
Bravo	Forecaster	12	11.7	12	32 cb	29 b
lsd @ 0.05		NS	NS	NS	11.6	11.2

[1] Visual evaluations where 0 = no disease or defoliation and 100 = all leaves affected.
[2] Portion of leaves within 2 feet of plant crown having lesions.
[3] Portion of leaves of entire plant with lesions.
[4] Portion of foliage lost from a complete canopy.
[5] Portion of leaves that have lesions present.

Table 2. Visual evaluation of specific foliar diseases on leaves collected on October 3 in the watermelon foliar fungicide timing trial at Lane, Oklahoma.

		Visual Disease Evaluation[1]			
Fungicide Treatment	**Application timing**	**Powdery Mildew**	**Gummy Stem Blight**	**Alternaria**	**Cercospora**
Untreated	-	3	2.5	1.2	2.6 a
Dithane + Topsin	Weekly	1.6	1.5	1.6	1.2 b
Dithane + Topsin	Forecaster	2	1.7	1.6	1.2 b
Bravo	Weekly	3.2	1.6	2.0	1.2 b
Bravo	Forecaster	2.8	1.8	2.2	1.3 b
lsd @ 0.05		NS	NS	NS	0.52

[1] Visual evaluations made on 5 symptomatic leaves where 1 = no disease and 5 = entire leaf affected.

Table 3. Fruit yield in the 2005 watermelon foliar fungicide timing trial at Lane.

Fungicide Treatment	**Application Timing**	**Yield (lbs. per acre)[1]**					
		total	**8-29**	**9-2**	**9-8**	**9-16**	**9-22**
Untreated	---	69409	8645	14215	17872	16456	12220
Dithane + Topsin	Weekly	75166	5955	17208	10173	20812	21019
Dithane + Topsin	Forecaster	61795	5936	14816	9539	12894	18611
Bravo	Weekly	66177	12056	11484	13776	16591	11906
Bravo	Forecaster	62433	7010	11182	10474	21606	12161
lsd @ 0.05		NS	NS	NS	NS	NS	NS

[1] All fruit of marketable size at 8-29, 9-2, 9-8, and 9-16. Lowest individual fruit weight at 9-22 was 5 lbs.

Insect Management

Controlling Onion Thrips on Onion, 2005

J.V. Edelson C. Mackey

Onion thrips (OT): *Thrips tabaci* (Lindeman)

Insecticides were evaluated for controlling OT on onions. Onion sets were transplanted 4 Apr at the Wes Watkins AREC, Lane, OK. The experimental design was a CRB with 12 treatments and five replicate blocks with plots having two three-ft rows and 15 ft alleys between plots. Plots were treated 17 and 25 May using an ATV-mounted sprayer with a single nozzle over the top of each row and nozzles on drops to each side of the row of plants. The sprayer was operated at 45 psi and delivered 20 gpa. Five plants per plot were visually inspected on 30 May and 2 Jun. Data were analyzed as total number of OT larvae and adults using ANOVA and treatment effects compared using a LSD test.

Thrips were abundant in the spring of 2005. Treatments with Ammo, Capture, and GF-317 reduced populations in comparison to the untreated plots 5 days after the second application of insecticides. Plots treated with Ammo, Lannate, Capture, Actara, Novaluron, Knack and GF-317 had significantly fewer OT per five plants than the untreated plots at seven days after the second application of insecticides.

Table 1.

		Mean no. OT per five plants	
Treatment	**Rate / acre**	**30 May**	**2 June**
Ammo	0.1 lb ai / acre	53.0 cd	93.0 cd
Lannate	1.0 lb ai / acre	81.2 bcd	129.6 bc
Capture	0.1 lb ai / acre	42.4 d	94.4 cd
Actara	0.06 lb ai / acre	96.8 abcd	126.2 bc
Dinotefuron	7.1 oz / acre	132.2 ab	169.4 ab
Novaluron	0.08 lb ai / acre	123.2 abc	122.8 bc
Knack	10 fl oz / acre	140.6 ab	125.6 bc
Pyramite	13 oz / acre	135.0 ab	200.6 a
Entrust	2.5 oz / acre	147.4 ab	159.6 ab
GF-317	0.5 oz AI / acre	47.0 d	51.4 d
Take-Down	1.0 % solution	166.4 a	156.2 ab
Untreated	-	137.8 ab	201.8 a

Mean number of OT per five plants in a column followed by different letters are significantly different, LSD, P=0.1.

Comparison of Nicotinoid Insecticides for Controlling Harlequin Bug on Collards, 2005

J.V. Edelson C. Mackey

Harlequin bug (HB): *Murgantia histrionica* (Hahn)

Nicotinoid and reduced risk insecticides were evaluated for controlling HB on collards. Collard seeds were planted 12 Apr at the Wes Watkins AREC, Lane, OK. The experimental design was a CRB with nine treatments and five replicate blocks with plots on 6 ft row spacing and two rows of plants 10 inches apart in each plot, 20 ft long and with 15 ft alleys between plots. Plots were treated 23 May, 16 and 20 Jun using an ATV mounted sprayer powered by CO_2. The boom was 6 ft wide and was equipped with hollow cone nozzles. The boom had a single nozzle over the top and a drop nozzle to each side of the row. It had an output of 40 gpa @ 45 psi. Surveys were conducted 23 and 28 Jun by visually examining five plants in each plot for insects and number of adult and nymph HB were recorded. Data were summarized and analyzed using ANOVA and treatment effects compared using a LSD test.

HB adults and nymphs were abundant in 2005. Populations in plots treated with Assail, Actara, Calypso, Provado and Aza-Direct were reduced in numbers in comparison to the untreated plots. The nicotinoid insecticides including Actara, Calypso and Provado resulted in the greatest reductions in population abundance.

Table 1.

		HB/5 plants
Treatment	**Rate / acre**	**Jun 23**
Assail	0.1 lb ai / acre	12.8 bc
FL1785	0.088 lb ai / acre	43.6 a
Actara	4 oz / acre	0.6 c
Calypso	0.1 lb ai / acre	2.4 c
Provado	3.75 fl oz / acre	1.6 c
Fulfill	2.75 oz / acre	35.2 ab
Aza-Direct	2 pints/acre	13.8 bc
Take-Down	1% Solution	17.6 abc
Untreated	-	44.8 a

Mean values in a column followed by different letters are significantly different, LSD, P=0.1.

Comparison of Pyrethroid Insecticides for Controlling Harlequin Bug on Collards, 2005

J.V. Edelson C. Mackey

Harlequin bug (HB): *Murgantia histrionica* (Hahn)

Pyrethroid and reduced risk insecticides were evaluated for controlling HB and collards. Collard seeds were planted 12 Apr at the Wes Watkins AREC, Lane, OK. The experimental design was a CRB with 16 treatments and five replicate blocks with plots on 6 ft row spacing and two rows of plants 10 inches apart in each plot, 20 ft long and with 15 ft alleys between plots. Plots were treated 24 May and 17 and 21 Jun using an ATV mounted sprayer with a single nozzle over the top of each row and nozzles on drops to each side of the row of plants. The sprayer was operated at 40 psi and delivered 20 gpa. Five plants per plot were surveyed. Data were summarized and analyzed as total number of HB nymphs and adults using ANOVA and treatment effects compared using a LSD test.

HB adults and nymphs were abundant in 2005. Populations of HB in plots treated with all insecticides except Knack, Entrust, Aza-Direct and Spintor on 24 Jun were reduced in comparison to the untreated plots. Mustang, Capture, Warrior, Baythroid and Dinotefuran, and Novaluron provided the best control in terms of reductions in numbers on both 24 and 29 Jun. The pyrethroid insecticides as a group provided the greatest reduction in numbers of HB.

Table 1.

		HB per five plants	
Treatment	**Rate / acre**	**24 Jun**	**29 Jun**
Mustang	0.025 lb ai / acre	0.0 d	0.0 e
Capture	6.4 fl oz / acre	0.2 d	0.2 e
Warrior	3.84 fl oz / acre	0.2 d	2.2 e
Baythroid	2.8 fl oz / acre	1.0 d	1.4 e
Danitol	0.3 lb ai / acre	0.2 d	1.0 e
Proclaim	4.8 oz / acre	4.8 d	22.6 cde
Intrepid	0.2 lb ai / acre	8.8 cd	23.2 cde
Dinotefuran	6.4 oz / acre	0.4 d	3.2 e
Novaluron	0.8 lb ai / acre	2.4 d	12.8 de
Knack	10 fl oz / acre	53.6 a	79.6 a
Spintor	6 fl oz / acre	28.4 bc	65.0 ab
Aza-Direct	2 pints/acre	28.8 bc	22.6 cde
Take-Down	1% solution	6.0 cd	22.0 cde
Dipel DF	2 lbs/acre	6.4 cd	47.4 bc
Entrust 80%	2 oz/acre	17.2 bcd	42.0 bcd
Untreatred		32.2 ab	39.8 bcd

Mean values in a column followed by different letters are significantly different, LSD, P=0.1.

Controlling Corn Earworm on Sweet Corn, 2005

J.V. Edelson and C. Mackey

Corn Earworm (CEW): *Helicoverpa zea* (Boddie)

Insecticides labeled for use in organic production systems were compared along with a synthetic pyrethroid insecticide and a B.t. transgenic cultivar, 'Attribute', for controlling CEW on sweet corn. Sweet corn was planted to a field at the Wes Watkins AREC, Lane, OK on 25 May. Rows were set at 36 inch intervals and seed planted at six inch intervals with a Monosem precision planter. The experimental design was a CRB with seven treatments and six replicate blocks. Plots were four rows wide by 40 ft long. Insecticide treatment plots were sprayed on 18, 20, 22, 25, 27 and 29 Jul using a tractor mounted hydraulic sprayer. The sprayer had a 12 ft wide boom with 8 nozzles mounted to spray over the top of the plants. The sprayer output was 20 gpa at 45 psi. Ears were harvested 2 Aug by picking 25 mature ears from each plot. The ears were shucked and examined for larvae present and damage. The ears with damage were rated on a percent damaged scale of 0%, 1-25%, 26-50%, 51-75% or 76-100% damage. Data were summarized and analyzed using ANOVA and a LSD test to make comparisons among treatments.

Corn earworm larvae were abundant. The only treatment resulting in significant reductions of CEW larval abundance was production using the B.t. transgenic cultivar, 'Attribute', which had fewer larvae and less damage per ear than plants treated with any of the insecticides and the untreated plants.

Table 1.

Treatment	rate/acre	Larvae/ear	% of ear damaged
Attribute	-	0.5 d	3.4 d
Take Down	1% solution	1.5 ab	15.9 c
Capture	0.1 lb ai/ acre	1.1 bc	15.6 c
Aza-Direct	2 pints / acre	1.4 a	22.6 ab
Dipel DF	2 lbs actual / acre	1.2 ab	24.7 a
Entrust	2 oz actual / acre	0.9 c	17.3 c
Untreated	-	1.1 bc	20.0 bc

Numbers in a column are significantly different if not followed by the same letter, LSD, P=0.1.

Weed Management

Corn Gluten Meal Application Equipment: Formulations, Rates, and Banding Evaluations

Charles L. Webber III[1], James W. Shrefler[2]

Introduction and Objective: Previous research has determined that corn gluten meal (CGM) produces an inhibitory effect and reduces root formation in several weed species. The weed control properties of CGM justify further evaluation of the material on additional weed and vegetable species. One limitation to further evaluation of CGM in field vegetable production is the difficulty in achieving a uniform application to the soil surface. The use of equipment to mechanically apply CGM would avoid the difficulty involved with manual application of CGM. Suitable equipment would also enable evaluation of the potential benefits of banded applications for weed control efficacy and crop safety of direct seeded vegetables. The objective of this research was to develop and test equipment that would permit either solid (broadcast) or banded application of corn gluten meal.

Materials and Methods: An applicator was assembled using various machinery components for the purpose of uniformly applying corn gluten meal to the soil surface in either a solid (broadcast) or banded pattern. A fertilizer box (Gandy[3,4], model 901-4) measuring 11.8 inches wide by 9 inches at the top, and 14 inches tall, tapering to a rounded point at the bottom was used as the holding container and meter device for the CGM. The fertilizer box had an approximate capacity of 20 lb of CGM with a 2-inch wide, 4-bladed, horizontal rotating agitator at the tapered bottom of the container. Located beneath the rotating agitator blade on the 9 inch base were four circular outlets 2.4 inches apart with an inside diameter of 0.6 inches and an outside diameter of 0.75 inches. Although a sliding metering device could be used to reduce the size of the outlets to decrease the application volume, the applicator openings were unobstructed to maximize the application volume.

A 12-volt motor (White's Inc.[5], Model # 9-077746) with a 60-tooth gear, chain drove a 12-tooth gear attached to the agitator to produce a 24 rpm (revolutions per minute) rotation of the agitator. Tubing with an inside diameter of 0.75 inches was attached to fertilizer box outlets and connected to the inlets of fan shaped gravity-fed row banding applicators (Grandy[3], Ro-Bander). The equipment was set up in two different application configurations--a solid (broadcast) and a banded application. The solid application configuration employed three 10-inch row-band applicators placed side by side to achieve a solid 30-inch wide application. As a result of using three application heads, only three fertilizer box outlets were used to meter the CGM. The fourth outlet was blocked. The banded application configuration employed four 7-inch row-band applicators in sets of two placed side by side, with a 3-inch gap in the row center, between the two sets of row-band applicators. The use of four 7-inch row-band applicators allowed the use of all four fertilizer box outlets. The fertilizer box, 12-volt motor, and row-band applicators were then attached to a 3-point tractor hitch and tool bar for calibration and field evaluation.

Field evaluations were conducted during the 2004 and 2005 growing seasons on 32-inch wide raised beds at Lane, OK. The equipment was evaluated using two CGM formulations (powdered and granulated), three application rates (5, 10, and 15 lb/100 ft^2), and two application configurations (solid and banded) (Tables 1 and 2). Within formulation and application configurations, tractor speed was varied to achieve the desired application rates (Table 3).

Results and Discussions: Differences between CGM formulations affected the flow rate within each application configuration and between application configurations (Table 2). The granulated formulation flowed at a faster rate than the powdered formulation, and the banded configuration flowed faster than the solid application. The granulated formulation flowed easier, without clumping, and therefore faster than the powdered formulation. Independent of formulation, the use of four application box outlets for the banded configuration resulted in a greater application rate than the use of three application box outlets for the solid distribution. It was determined that the CGM powder used with the solid application configuration was inconsistent and unreliable and thus not feasible for use with the same equipment without further modification. Therefore, the field evaluation of the equipment did not include the use of the CGM powder applied using the solid application configuration.

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3 Gandy Company, 528 Gandrud Road, Owatonna, MN 55060-0528

4 The mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

5 White's Inc., P.O. Box 2344, Houston, TX 77252.

Field evaluations determined that the equipment setup with the CGM granulated formulation resulted in the most reliable and precise delivery of the three application rates (5, 10, and 15 lb/100 ft^2) for both application configurations compared to the powdered CGM formulation applied in the banded configuration. The powdered formation did not flow as easily and consistently through the application system. To improve this facet of powdered CGM delivery, the equipment could be modified by increasing the size of the outlets for the application box, by increasing the internal diameter of the tubing connected to the outlets, or by adding a device to tap or further agitate the powder as it flows from the outlets through the tubing to be dispersed by the row-band applicators. Indeed, during the field evaluations, manual tapping of the row-band applicators did help the flow of the powdered material through the system.

The precise placement of the powder for the banded configuration was further hampered by wind gusts that tended to blow the CGM powder away from the targeted soil surface and into the desired CGM-free strip intended for vegetable direct seeding. This inadvertent misplacement of the CGM powder had the potential to interfere with direct seeded vegetable survival planted between the banded applications. Potential solutions to decrease wind interference include attaching small wind shields to each row-band applicator, attaching small shields only on the sides nearest the desired CGM-free area, attaching large wind shields on either side of the equipment as a whole, or completely enclosing the group of row-band applicators in a shielded system. During field evaluations, the use of an 18 inch x 18 inch wind shield attached to each side of the equipment at ground level decreased wind interference of powder application. The use of individual shields on the row-band applicators nearest the CGM-free center strip also decreased the misplacement of the powder CGM.

Conclusions: These evaluations demonstrated the feasibility of using equipment, rather than manual applications, to apply corn gluten meal to raised beds for organic weed control purposes. A number of equipment alterations will increase the efficiency and potential usefulness of mechanical applications of corn gluten meal. Future equipment developments and evaluations should focus on increasing the application rate to decrease the time to apply corn gluten meal to a field. The granulated formulation worked well at all application rates and application configurations. The powdered corn gluten meal did not flow easily, and its delivery was inconsistent and unreliable when used in the solid application configuration. If research determines equivalent weed control efficacy between the two corn gluten meal formulations, the granulation formulation would be the suggested formulation to use in this equipment.

Acknowledgments: We thank Otis (Buddy) L. Faulkenberry III for his designing, assembling, calibrating, and field-testing the corn gluten meal application equipment.

Table 1. Conversion table for corn gluten meal applications.

Pounds per 100 Square Feet	Ounces per Square Foot	Pounds per Acre	Grams per Square Meter
lb/100 ft2	oz/sq ft2	lb/a	g/m2
5	0.825	2,250	250
10	1.65	4,500	500
15	2.475	6,750	750

Table 2. Application parameters for corn gluten meal formulations, three application rates, and two application configurations.

Corn Gluten Meal Formulation	Application Configuration	Flow Rate	Outlets/Heads Used	Individual Head Width	Application Width	Non-Applied Strip Width
		g/min	#	in	in	in
Granulated	Banded	1720	4	7	28	3
Granulated	Solid	1418	3	10	30	0
Powdered	Banded	1132	4	7	28	3
Powdered[y]	Solid	-----	-----	-----	30	0

[y] The “Powdered Solid” configuration was inconsistent and unreliable, and therefore its use was not feasible without further equipment modifications.

Table 3. Tractor speeds for application formulation and configuration combinations.

Corn Gluten Meal Formulation	**Application Configuration**	**Tractor Speed[z] for Application Rates**		
		5 lb/100 ft^2	**10 lb/100 ft^2**	**15 lb/100 ft^2**
		mph	mph	mph
Granulated	Banded	0.32	0.16	0.11
Granulated	Solid	0.26	0.13	0.09
Powdered	Banded	0.21	0.10	0.07
Powdered[y]	Solid	----	-----	-----

[z] Tractor speeds were rounded to the nearest 0.01 mph

[y] The “Powdered Solid” configuration was inconsistent and unreliable, and therefore its use was not feasible without further equipment modifications.

Corn Gluten Meal as a Herbicide in Non-Pungent Jalapeño Peppers

Charles L. Webber III[1], Vincent M. Russo[2], James W. Shrefler[3]

Introduction: Corn gluten meal (CGM) has been identified as a potential organic preemergence and preplant-incorporated herbicide. It is an environmentally friendly material that has a demonstrated ability to decrease seedling development and plant survival by inhibiting root and shoot development. The lack of weed control increases the time and difficulty of harvesting vegetable crops, and can result in a near or total yield loss. Additional research is required to determine the affective use of CGM in controlling weeds in vegetable crops.

Non-pungent jalapeño peppers are used for making commercial picante sauces (salsas). The non-pungent jalapeños do not contain a significant amount of capsaicin that is the primary source of "heat" for normally pungent jalapeños. Otherwise, the non-pungent jalapeño peppers do produce the required jalapeño flavor along with the appropriate texture necessary for picante sauce. Capsaicin is added during the picante production process to acquire the various levels of pungency (i.e. high, medium, and low). Because the pungency of normal jalapeño peppers may differ, the addition of prescribed amounts of capsaicin to the non-pungent jalapeño material increases the consistency relative to pungency of commercial picante sauces. The objective of this research was to determine the impact of corn gluten meal applications on non-pungent jalapeño pepper yields.

Materials and Methods: A factorial field study was conducted during the summer of 2005 on 36-inch wide raised beds at Lane, OK with two incorporation treatments (incorporated and non-incorporated), and two application rates (7.5 and 15 lb/100 ft^2). The experiment included a weedy (no weed control) and a weed-free (hand weeded) check for each incorporation treatment.

Prior to making planting beds the soil was fertilized with 300 lb/ac of 17-17-17. The CGM was applied by hand on May 5, 2005. The CGM applications were then either incorporated into the top 1 to 2 inches of the soil surface with a rolling cultivator or left undisturbed on the soil surface. Pace 105 non-pungent jalapeño peppers were transplanted on May 6, 2005 with a 1.5-ft spacing between plants within the rows. Pace 105 is a propriety seed provided by Campbell Seed.

The plants were harvested on July 20, 2005, 75 days after transplanting. Ten plants in a single row in sequence were cut at the ground level and striped of all peppers. The peppers were then sorted into marketable and non-marketable, counted and weighed. Peppers were considered non-marketable when they had defects related to decay, insect, or worm damage, or the peppers were less than two inches long.

Results and Discussion: Although there were initial reductions in weed densities as a result of CGM applications, there were no observable reductions in weed densities or differences at harvest compared to the weedy check treatments. Marketable and non-marketable pepper yields and numbers reflected the final weed densities with no significant differences between the CGM treatments and the weedy checks. Pepper yields and number were always significantly greater for the weed-free treatments compared to the other weed control treatments. Marketable yields were also greater for the weed-free, non-incorporated treatment, compared to weed-free, incorporated, treatment. This difference most likely reflects the importance of having a firm bed surface for placing transplants and maintaining bed integrity after transplanting.

Conclusions: The research demonstrated the need for additional weed control beyond that provided by CGM applications to prevent totally unsatisfactory yield reductions in non-pungent jalapeño peppers.

Acknowledgements: The authors appreciate the work of Buddy Faulkenberry, Tim Abney, and Tony Goodson for field preparations, planting, harvesting, and data collection.

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Table 1. Effect of weed control treatments on non-pungent jalapeño yields at Lane, OK in 2005.

Trt #	Organic Weed Control (Treatments)	Rate lb/100 ft^2	Corn Gluten Meal Incorporation Method	Marketable* t/ac	Marketable* peppers/ac	Non-Marketable t/ac	Non-Marketable peppers/ac
1	Weedy Check	----	No-Incorporation	0.19 c**	10,890 b	0.08 b	5,808 b
2	Corn Gluten Meal	7.5	No-Incorporation	0.47 c	20,570 b	0.14 b	10,648 b
3	Corn Gluten Meal	15.0	No-Incorporation	0.76 c	31,460 b	0.14 b	10,406 b
4	Weed-Free	----	No-Incorporation	7.02 a	192,632 a	1.41 a	76,956 a
5	Weedy Check	----	Incorporation	0.16 c	8,228 b	0.08 b	5,808 b
6	Corn Gluten Meal	7.5	Incorporation	0.65 c	29,766 b	0.19 b	10,164 b
7	Corn Gluten Meal	15.0	Incorporation	0.54 c	25,410 b	0.09 b	9,438 b
8	Weed-Free	----	Incorporation	5.67 b	201,102 a	1.34 a	75,262 a
			LSD (0.05) =	1.19	44,702	0.43	19,774

* = Yields are based on 10 harvested plants.

** = Values within columns with the same letters are not significantly different (0.05).

Factors affecting Weed Control with Pelargonic Acid

Charles L. Webber III[1], James W. Shrefler[2]

Introduction and Objective: Pelargonic acid is a fatty acid naturally occurring in many plants and animals, and present in many foods we consume. Producers and researchers are interested in pelargonic acid as a broad-spectrum post-emergence or burn-down herbicide. The objective of this research was to determine the effect of pelargonic acid (nonanoic acid) concentration, adjuvants, and application timing on weed control efficacy as a burn-down herbicide.

Materials and Methods: Field research with pelargonic acid was conducted in southeast Oklahoma (Lane, OK, Atoka County) during the 2005 growing season. One month prior to spraying the weed control treatments, the land was cultivated to kill the existing weeds and provide a uniform seed bed for new weed growth. The factorial weed control treatments included three application concentrations of Scythe (57.0% pelargonic acid) applied at 3, 6.5, and 10%, three adjuvants (none, orange oil, and non-ionic surfactant), and two application dates. All herbicide treatments were applied with an application volume of 100 gpa to seedling weeds.

Results and Discussion: The experiment had a high weed density with multiple species of grass and broadleaf weeds. Weed control across species increased as the herbicide concentrations increased from 0 to 10%. At all concentrations applied, pelargonic acid produced greater weed control for a longer time period for the broadleaf weeds than the grass weeds. Visual damage to the weeds was often apparent within a few hours after application. There was a significant increase in weed control when applied to the younger weeds. In this research, pelargonic acid was effective in controlling both broadleaf and grass weeds as a burn-down herbicide, although crabgrass was tougher to control. Additional research will investigate pelargonic acid application methods and weed control efficacy in relationship to controlling additional weed species, and integrating its use into cropping systems.

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Influence of Application Volume and Adjuvants on Weed Control with Vinegar

Charles L. Webber III[1], James W. Shrefler[2]

Introduction and Objective: Vinegar is a solution containing acetic acid, an organic acid produced though the natural fermentation of plant materials containing sugars. Vinegar has been identified as a potential organic herbicide, yet more information is needed to determine influence of application volume and use of additives (adjuvants) on weed control. Acetic acid acts as a contact herbicide, injuring and killing plants by first destroying the cell membranes, which then causes the rapid desiccation of the plant tissues. Household vinegar typically contains 5% acetic acid. Vinegars with acetic acid concentrations of 11% or greater are available commercially, these products can burn the skin and cause serious to severe eye injury, including blindness. The objective of this research was to determine the effect of application volumes and adjuvants on weed control efficacy using vinegar with a 20% acetic acid concentration.

Materials and Methods: Field research with vinegar was conducted in southeast Oklahoma (Lane, OK) during the 2005 growing season. The factorial experimental design included vinegar at three sprayer application volumes (20, 80, and 160 gpa), three adjuvants (none, orange oil, and non-ionic surfactant), and two weedy-checks. Visual weed cover and control ratings were collected throughout the experiment.

Results and Discussion: The experiment had very high weed densities with multiple species of grass and broadleaf weeds. Vinegar was more effective in controlling broadleafs than in controlling of grasses. When averaged across adjuvants (none, orange oil, and non-ionic surfactant) weed control increased as application volumes increased from 20 to 160 gpa. Additional research will integrated the use of vinegar within vegetable production systems.

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Impact of Preplant Incorporated Herbicides on Non-Pungent Jalapeño Pepper Yields

Charles L. Webber III[1], Vincent M. Russo[2], James W. Shrefler[3]

Introduction: Producer surveys often rank weed competition as their most serious concern in maximizing vegetable yields. Non-pungent jalapeño peppers have a potential for outstanding yields in Oklahoma. Non-pungent jalapeño peppers are used for making commercial picante sauces (salsas). Non-pungent jalapeños do not contain a significant amount of capsaicin which is the primary source of "heat" for normally pungent jalapeños. Non-pungent jalapeño peppers do produce the required jalapeño flavor along with the appropriate texture necessary for picante sauce. Capsaicin is added during the picante production process to produce the various levels of pungency (i.e. high, medium, and low). Because the pungency of normal jalapeño peppers may differ, the addition of prescribed amounts of capsaicin to the non-pungent jalapeño material increases the consistency relative to pungency of commercial picante sauces. The lack of weed control increases the time and difficulty of harvesting peppers, and lack of weed control can result in a near or total yield loss. In addition, there is incomplete information on the crop safety of certain herbicides that may not specifically address their use with non-pungent jalapeño peppers. The objective of this research was to determine the weed control efficacy and safety of a combination of preplant incorporated herbicides on transplanted non-pungent jalapeño pepper production.

Materials and Methods: A field study was conducted during the summer of 2005 on 36-inch (91-cm) wide raised beds at Lane, OK. Prior to constructing planting beds the soil was fertilized with 300 lb/ac of 17-17-17. The herbicides[4] in the study included Devrinol[5] (napropramide, 2 lb ai/a), Command (clomazone, 1 lb ai/a), Prefar (bensulide, 6 lb ai/a), and Treflan (trifluralin, 1lb ai/a) used separately, and in combination with one of the other herbicides (Table 1). All herbicides were applied preplant incorporated just prior to transplanting on May 6, 2005. The herbicides were incorporated into the top 1 to 2 inches of the soil surface with a rolling cultivator. The experiment included a weedy (no weed control) and a weed-free (hand weeded) check. Pace 105 non-pungent jalapeño peppers were transplanted on May 6, 2005 with a 1.5-ft spacing between plants within the rows.

Fruit were harvested on July 21, 2005, 76 days after transplanting. Ten plants in a single row in sequence were cut at the ground level and striped of all peppers. The peppers were then sorted into marketable and non-marketable, counted and weighed. The peppers were considered non-marketable when they had defects related to decay, insect, or worm damage, or the peppers were less than two inches long.

Results and Discussion: Plants treated with Command (clomazone, 1 lb ai/a) used by itself produced the greatest yields (7.32 t/a) compared to plants treated with the other herbicides used individually, although it was not significantly greater than Devrinol (napropramide, 2 lb ai/a), 4.11 t/a (Table 1). Four of the five top yielding herbicide treatments included the use of Command (clomazone, 1 lb ai/a). The tank mixture of Devrinol (napropramide, 2 lb ai/a) and Prefar (bensulide, 6 lb ai/a) produced the second greatest yield (7.21 t/a). Herbicide treatments using Prefar (bensulide, 6 lb ai/a) or Treflan (trifluralin, 1lb ai/a) individually or in combination with each other resulted in significantly lower pepper yields, and were not significantly different from the weedy-check yields (1.07 t/a). The weed-free treatment produced 7.8 t/a compared to 86% yield reduction for the weedy check.

Conclusions: These results demonstrated that Command (clomazone, 1 lb ai/a) used individually, or in combination with certain other herbicides, can maintain non-pungent jalapeño yields equivalent to weed-free levels. Devrinol (napropramide, 2 lb ai/a) also prevented significant yield loses due to weeds when applied in conjunction with Prefar (bensulide, 6 lb ai/a). The research will be repeated during the 2006 growing season.

Acknowledgements: The authors appreciate the work of Buddy Faulkenberry, Tim Abney, and Tony Goodson for field preparations, planting, harvesting, and data collection.

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[4] Always consult the herbicide label to determine application rate, methods, and crops approved for the herbicide.

[5] The mention of a trade or brand name is not a recommendation or endorsement for its use.

Table 1. Effect of preemergence herbicide applications on non-pungent jalapeño yields at Lane, OK in 2005.

					Marketable*		**Non-Marketable**	
Trt	**#1 Preemergence Herbicide**	**Rate**	**#2 Preemergence Herbicide**	**Rate**	**Yield**	**Peppers**	**Yield**	**Peppers**
#	Brand Name (Chem. Name)	lb ai/ac	Brand Name (Chem. Name)	lb ai/ac	t/ac	x1000/ac	t/ac	x1000/ac
1	Devrinol (napropramide)	2.0	----	----	4.11 a-e**	113 b-e	0.52 ab	25 b-e
2	Devrinol (napropramide)	2.0	Command (clomazone)	1.0	6.64 a-c	208 ab	0.69 ab	42 bc
3	Devrinol (napropramide)	2.0	Prefar (bensulide)	6.0	7.21 ab	202 ab	0.88 a	34 b-d
4	Devrinol (napropramide)	2.0	Treflan (trifluralin)	1.0	3.56 b-e	114 b-e	0.49 a-c	24 b-c
5	Command (clomazone)	1.0	----	----	7.32 ab	182 a-c	0.51 a-c	43 b-c
6	Command (clomazone)	1.0	Prefar (bensulide)	6.0	6.48 a-c	212 ab	0.47 a-c	45 b
7	Command (clomazone)	1.0	Treflan (trifluralin)	1.0	5.21 a-d	144 b-d	0.46 a-c	27 b-e
8	Prefar (bensulide)	6.0	----	----	0.31 e	12 e	0.06 c	4 e
9	Prefar (bensulide)	6.0	Treflan (trifluralin)	1.0	2.77 c-e	79 c-e	0.52 ab	16 c-e
10	Treflan (trifluralin)	1.0	----	----	1.71 de	47 c-e	0.43 a-c	15 c-e
11	Weedy-Check	----	----	----	1.07 e	31 e	0.37 bc	13 de
12	Weed-Free	----	----	----	7.80 a	280 a	0.67 ab	82 a
			LSD (0.05) =		3.95	111	0.47	28

* = Yields based on 10 harvested plants.

** = Values within the columns with the same letters are not significantly different (0.05).

Spartan Preemergence Trial on Cabbage

Spring 2005, Blaine County, Oklahoma

L. Brandenberger, L. K. Wells, M. Schantz

Materials and Methods: Spartan 4F herbicide is a recently labeled product for use on commercial cabbage for the preemergence control of both broadleaf and grass weeds. A field demonstration was carried out during the spring of 2005 to determine crop safety of this material when used in Oklahoma. Cabbage (Blue Vantage) was direct seeded on 3/23/05 with a Stanhay belt planter as double rows 10 inches apart on 36 inch centers. Nitrogen was applied at a rate of 32 lbs/acre of actual nitrogen during ground preparation followed by split applications during the season for a total of 100 lbs N/acre. Following ground preparation and prior to planting, Treflan (trifluralin) preemergence herbicide was applied at a rate of 1 pint/acre and immediately incorporated. Plots consisted of 2 rows of cabbage 20 feet long. The study included 2 rates of Spartan (sulfentrazone 75%) (Table 1) and an untreated check replicated 4 times in a randomized block design. Treatments were applied on 3/23/05 with a 3 foot wide hand-held spray boom using an overall application rate of 20 gpa. Plots were rated for percent stand and injury on 5/10/05.

Results and Discussion: Cabbage stands were reduced to 57 and 23% by Spartan at 0.094 and 0.14 lbs ai/acre, respectively (Table 1). Plant injury was observed as stunting of the plants and ranged from 53 to 67% for Spartan at 0.094 and 0.14 lb rates, respectively.

Conclusions: Both stand reduction and the amount of injury by Spartan in the trial was considerably more than was expected. The Spartan formulation used in the trial was a 75% dry material not the 4F formulation that is currently labeled. The authors suspect that cabbage may vary in sensitivity to these formulations. Furthermore, rates suggested on the 4F label vary from a low of 0.07 to 0.375 lbs ai/acre based upon soil texture and the percentage of organic matter in the soil, possibly the rates that were used were too high for crop safety in our location. Last, this trial's treatments were applied on soil that had already received Treflan preplant incorporated for weed control and there may be some type of synergistic effect as a result of both herbicides being applied. This said, the authors would recommend that further testing of Spartan on cabbage be completed using the 4F formulation prior to widespread use of this material in Oklahoma.

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

Table 1. Spring 2005 Spartan Herbicide study on cabbage, Hydro, OK

Treatment lbs ai/acre	Company	Percent Stand	Percent Stunt
Untreated check	NA	97 a [z]	0 b
Spartan 0.094	FMC	57 b	53 a
Spartan 0.14	FMC	23 b	67 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.

Screening of Preemergence Herbicides for Use on Cilantro

Spring 2005, Bixby, Oklahoma

L. Brandenberger, N. Maness, L. K. Wells, R. Havener, A. Brothers

Materials and Methods: In spring of 2005 an observational screening study was conducted in cilantro to determine the crop safety of ten preemergence herbicides. Cilantro (Santo) was direct seeded on 4/14/05 in 2 rows 18 inches apart using a Monosem air planter. Plots were fertilized with a total of 70 lbs of N/acre spread over two applications. Each plot consisted of 2 rows 20 feet long with only one plot per treatment for each of the 10 herbicide treatments (Table 1). Treatments included a single rate of Outlook (dimethenamid-P), Pyramin (pyrazon), Nortron (ethofumesate), Define (flufenacet), Lorox (linuron), Dual Magnum (S-metolachlor), Eptam (EPTC), Goltix (metamitron), V10146 (imazosulfuron), Far-Go (triallate), and an untreated check. Applications were made on 4/14/05 immediately following planting. All plots were irrigated with 0.5 inch of overhead irrigation after application. Applications were made with a 3 foot wide hand-held spray boom using an overall application rate of 20 gpa. Plots were rated for injury on 5/26/05.

Conclusions: Several herbicides appear to have potential for use with cilantro. Most injury was observed as crop stunting except for the two compounds that resulted in crop death (Table 1). Dual Magnum and Define have good potential for cilantro as evidenced by their 0% injury ratings. Pyramin and Lorox also exhibited low levels of crop injury, both recording 10%. Eptam, Outlook, Nortron, and Goltix had injury that ranged between 15 to 30%. Cilantro appears to have no tolerance to V10146 and Far-Go, both of which resulted in 100% injury. The authors would recommend that rate studies be conducted with Dual Magnum, Define, Pyramin, Lorox, Eptam, Outlook, Nortron, and Goltix, but that no further work should be undertaken with either V10146 or Far-Go on cilantro.

Table 1. Spring 2005 Cilantro preemergence herbicide screening, Bixby, OK.

Treatment lbs. ai/acre	**Common name**	**Manufacturer**	**% Injury**^{z}
Untreated check	NA	NA	0
Outlook 0.0125	Dimethenamid-P	BASF	20
Pyramin 0.45	Pyrazon	BASF	10
Nortron 1.0	Ethofumesate	Bayer	20
Define 0.075	Flufenacet	Bayer	0
Lorox 0.10	Linuron	Dupont	10
Dual Magnum 0.50	S-Metolachlor	Syngenta	0
Eptam 1.3	S-ethyl dipropylthiocarbamate	Gowan	15
Goltix 2.85	Metametron	Mekhteshim-Agan UK	30
V10146 0.025	Imazosulfuron	Valent	100
Far-GO 1.50	Triallate	Gowan	100

^{z}Injury ratings are one plot observations that were made on cilantro on 5/26/05

Cucurbit Tolerance to Postemergence Herbicides

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells

Materials and Methods: A study was completed in the spring of 2005 to determine crop safety of several postemergence herbicides when utilized for weed control in five different cucurbit crops. Cucumber (Ultra Pak), honeydew (Coreen Meated), pumpkin (Autumn Gold), squash (Dixie), and watermelon (Royal Sweet) were direct seeded on 6/03/05 in single rows 6 feet apart using a Planet Jr. planter unit. The study was arranged in a randomized block design with four replications and included five herbicide treatments (Table 1) including three rates of Targa (quizalofop-P-ethyl), one of Poast (sethoxydim), and one of Select (clethodim) and an untreated check. Treatments were applied on 6/20/05 with a 6 foot wide hand-held spray boom with an overall application rate of 25 gpa. All herbicide treatments included crop oil concentrate at 1% v/v. Plots were rated for crop stunting and for weed control on 6/27/05.

Results and Discussion: Of the five cucurbit crops in the study only pumpkin and squash were adversely affected by the postemergence treatments (Table 1). Pumpkin had 14 to 16% stunting as a result of Targa applications and 10% stunting from Select. Squash stunting ranged from 8 to 14% for Targa. Neither pumpkin or squash were adversely affected by Poast.

Control of crabgrass (Digitaria species) and carpetweed (Mollugo verticillata L.) were recorded in the replicated plots, but only observational plots outside the experimental area were available for observing treatment effects on bermudagrass (Cynodon species) and johnsongrass (Sorghum halepense L.). All treatments including Targa, Select, and Poast provided good control of crabgrass with control ranging from 81 to 88% (Table 2). Only Targa at the 8 and 12 oz rates provided significant control of carpetweed. Carpetweed control by these two treatments was 44 and 55%, respectively. In the observational plots bermudagrass control ranged from 5 to 10%, but control of johnsongrass ranged from 70 to 90%. Johnsongrass control was 70, 80, 80, 90, and 80%, respectively for Targa at 6, 8, and 12oz, Select at 6oz, and Poast at 24oz.

Conclusions: Based upon results from this study it appears that all three herbicides have reasonable levels of crop safety with cucurbits included in the study. Although Targa and to a lesser extent Select damaged pumpkin and squash more than the untreated check, the damage was not excessive (10 to 16%). The crops would likely have recovered and produced yields that would be economically feasible. Each of the herbicides provided good crabgrass control, but Targa also exhibited some potential for the control of carpetweed.

Table 1. Spring 2005 Cucurbit herbicide study, Bixby, OK Percent stunting. Ratings on 6/27/05

Treatment	Percent stunting Cucumber	Honeydew	Pumpkin	Squash	Watermelon
Untreated check	0 a [z]	0 a	0 b	0 c	0 a
Targa @ 6 oz/ac	4 a	2 a	14 a	8 ab	5 a
Targa @ 8 oz/ac	5 a	6 a	16 a	11 ab	11 a
Targa @ 12 oz/ac	8 a	8 a	15 a	14 a	11 a
Select @ 6 oz/ac	1 a	9 a	10 a	5 bc	6 a
Poast @ 24 oz/ac	3 a	1 a	6 ab	5 bc	10 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. Spring 2005 Cucurbit herbicide study, Bixby, OK Percent weed control. Ratings on 6/27/05

	Replicated plots		Observational plots	
Treatment	**Crabgrass**	**Carpetweed**	**Bermuda grass**	**Johnson grass**
Untreated check	0 b [z]	0 c	0	0
Targa @ 6 oz/ac	85 a	16 abc	5	70
Targa @ 8 oz/ac	88 a	44 ab	8	80
Targa @ 12 oz/ac	81 a	55 a	5	80
Select @ 6 oz/ac	84 a	3 bc	10	90
Poast @ 24 oz/ac	88 a	14 abc	10	80

[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.

POST Use of Sandea, Basagran, and Raptor on Drybean

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, R. Havener, A. Brothers

Materials and Methods: A study was conducted during the summer of 2005 to determine crop safety and effectiveness of three postemergence herbicides when utilized for weed control in drybean crops. Drybeans (Pinto III) were direct seeded on 5/24/05 in rows 3 feet apart using a research cone planter in soil that had Dual 8E (metolachlor) applied on 5/04/05 at 2lbs ai/acre. Each plot had 2 rows 20 feet long. The study was arranged in a randomized block design with four replications and included seven herbicide treatments (Table 1) including single rates of Sandea (halosulfuron), Basagran (bentazon), Raptor (imazamox), 4 combinations of Sandea with Basagran and an untreated check. Treatments were applied on 6/20/05 when beans were in the 2 to 3 trifoliate leaf stage of growth. Applications were made with a 6 foot wide hand-held spray boom using an overall application rate of 30 gpa. All herbicide treatments included a non-ionic surfactant at 0.25% v/v. Plots were rated for crop damage and weed control on 7/14/05. Plots were harvested on 10/13/05 by hand removal of plants from both plot rows and threshing with a stationery threshing machine (Kincaid Manufacturing Haven, KS).

Results and Discussion: Crop injury was relatively low for all herbicide treatments, although all treatments had significantly more damage than the untreated check (Table 1). Injury ranged from 5 to 11% and was observed primarily as plant stunting when compared to the untreated check. Sandea at 0.032 lbs ai and Raptor at 0.03 lbs ai recorded 11% damage, while Sandea at 0.032 combined with Basagran at 0.25 lbs ai recorded 5% damage. This was the lowest level of damage observed in the study. No control of carpetweed (Mollugo verticillata L.) was observed (Table 1). The highest level of control for Palmer amaranth (Amaranthus palmeri S. Wats.) was 34% for the Raptor treatment. Sandea at 0.032 combined with Basagran at 0.75 lbs ai had 13% control of Palmer amaranth. Only Sandea at 0.032 combined with Basagran at 0.75 lbs ai provided any significant control of lambsquarter (Chenopodium album L.). It had 43% control of this weed species while all other treatments and the untreated check ranged from 0 to 8% control. No differences were observed for yield in the study (Table 1).

Conclusions: Based upon the results it appears that all herbicide treatments in the study were relatively safe for use on drybeans. It did appear that when Basagran was combined with Sandea that there was a safening effect, but further study would be needed to determine if this effect is indeed real. None of the treatments were successful in controlling carpetweed. Control of both Palmer amaranth and lambsquarter were not high, but Raptor provided the highest level of control for amaranth and Sandea combined with Basagran at 0.75 lbs ai gave the highest level of control for lambsquarter. Although yields were not different the entire study was cultivated and hand weeded to allow the study to be taken to yield. Yields were lower than expected, but this may be due to the cultivar that was used not being well adapted to the test site.

Table 1. Spring 2005 Drybean weed control, Bixby, Oklahoma. Percent injury and percent weed control. Ratings on 7/14/05

		Percent weed control[z]		Yield[y]
Treatment lbs ai/ac	**Percent Injury**	**Palmer amaranth**	**Lambsquarter**	**lbs./acre**
Untreated check	0 c[x]	0 c	0 b	470 a
Sandea .032 + Basagran .125	6 ab	9 b	5 b	343 a
Sandea .032 + Basagran .25	5 b	8 b	6 b	409 a
Sandea .032 + Basagran .5	6 ab	11 b	8 b	331 a
Sandea .032 + Basagran .75	9 ab	13 b	43 a	447 a
Sandea .032	11 a	10 b	3 b	455 a
Basagran .75	6 ab	5 b	n/a	364 a
Raptor .03	11 a	34 a	0 b	330 a

[z] Percent weed control=percentage of weeds controlled compared to the untreated check. Ratings were made for Palmer amaranth, lambsquarter, and carpetweed although carpetweed ratings are not included in the table as they were all zero.

[y] Yield=shelled dry beans in lbs per acre.

[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.

Preemergence Herbicide Demonstration on Pumpkin

Summer 2005, Noble County, Oklahoma

L. Brandenberger, Kurt and Beth Bolay

Materials and Methods: Work was completed during the 2005 season to demonstrate the use of preemergence herbicides for weed control in field pumpkin production. Pumpkins (Cinderella and Aspen) were direct seeded in a heavy clay loam soil on 6/25/05 using three seeds per hill with rows 10 feet apart and hills 10 feet apart in the row. Three herbicides (Table 1) labeled for preemergence control of weeds were applied to separate field areas on 6/28/05. Applications were made using a tractor mounted boom sprayer with seven nozzles and a PTO driven pump at an overall rate of 25 gallons of spray solution per acre. Following application, the field received over-head irrigation to incorporate each of the herbicides. After the harvest season, the producers were interviewed to determine their experiences with the demonstration.

Results and Discussion: In general the producers were pleased with the effect that these materials had on the control of weeds and crop safety. When asked if they would consider using preemergence herbicides in the future they replied yes. Their primary reason for considering their use was related to time spent hand hoeing the crop. They estimated that it required approximately two hours to hoe a 500 foot long row that was 10 feet wide in the untreated areas of the field compared to 30 minutes for the same area that was treated with a preemergence herbicide. When asked to rank the herbicides according to their effectiveness and safety they selected Strategy as the most effective, then Curbit followed by Sandea. Asked whether they are considering purchasing a sprayer to apply herbicides they indicated that serious consideration is being given to that option.

Conclusions: Based upon the experiences of the producers, it appears that using preemergence herbicides for weed control will continue to develop in this operation. Their primary reason for expanding this use appears to be related to labor savings when comparing machine and hand tillage to utilizing preemergence herbicides for weed control.

Acknowledgements: The authors want to thank the Bolay family for their cooperation and support in completing this demonstration.

Table 1. Preemergence herbicides for pumpkin demonstration 2005

Company	Herbicide trade name	Common name	Rate/acre	Pounds ai/acre
UAP Loveland	Curbit	Ethalfluralin	4.0 pints	1.5 lbs
Gowan	Sandea	Halosulfuron	0.5 ounce dry	0.023 lbs
Platte Chemical	Strategy	Ethalfluralin + Clomazone	3.5 pints	0.7 lbs+ 0.22 lbs

Screening of Preemergence Herbicides for Use on Spinach

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, R. Havener, A. Brothers

Materials and Methods: During the spring of 2005 a study was conducted in spinach to determine crop safety and effectiveness of eleven preemergence herbicides. Spinach (Olympia) was direct seeded on 4/14/05 in 2 rows 18 inches apart using a Monosem air planter. Plots were fertilized with a total of 70 lbs of N/acre spread over two applications. Each plot consisted of 2 rows 20 feet long with plots arranged in a randomized block design with four replications including 29 herbicide treatments (Table 2). Treatments included multiple rates of Outlook (dimethenamid-P), Pyramin (pyrazon), Nortron (ethofumesate), Define (flufenacet), Lorox (linuron), Dual Magnum (S-metolachlor), Eptam (EPTC), Goltix (metamitron), V10146 (imazosulfuron), Command 3ME (clomazone), Far-Go (triallate), (Table 1) and an untreated check. Applications were made on 4/14/05 immediately following planting. All plots were irrigated with 0.5 inch of overhead irrigation after application. Applications were made with a 3 foot wide hand-held spray boom using an overall application rate of 20 gpa. Plots were rated for percent stand, stunting and the number of weeds per plot were recorded on 5/23/05. Plots were harvested on 6/03/05 and fresh weights were recorded.

Results and Discussion: Percent stand was lowest for treatments that included Goltix, V10146 and lower for Eptam at 2.6 lbs ai/acre compared to the untreated check (Table 2). Goltix had stands that ranged from 8 to 80%, V10146 had stands that ranged from 21 to 42%, and Eptam at 2.6 lbs had 41% emergence. Stunting varied considerably for treatments in the study ranging from 6 to 95%. The highest level of stunting was observed for V10146 (90-95%), Goltix (28-88%), and the higher rates of Nortron and Eptam (51 and 55% respectively).

The average number of weeds per plot varied for crabgrass with V10146 at 0.1 lbs ai/acre having 25 crabgrass plants/plot (Table 2). This was significantly higher than other treatments and the untreated check.

Yield was highest for Far-Go at 1.25 lbs ai/acre and Outlook at 0.25 lbs ai/acre (Table 2). These treatments had 2202 and 2136 lbs/acre yields, respectively. Treatments with the lowest yields included Goltix at 5.7 and 11.4 lbs ai/acre and all rates of V10146, these treatments ranged from 0 to 11 lbs yield per acre.

Conclusions: Based on the results of this study, there are several herbicides that appear to have potential for use with spinach. Both Far-Go and Outlook treatments had the highest yields in the study, although further work would be needed to determine the most appropriate rates for these materials. Goltix at 5.7 lbs and higher and all rates of V10146 were very damaging to spinach in the study. An indication of this was noted in past studies, but this year's work examined lower rates for these compounds with the hope of finding a rate low enough for crop safety, unfortunately that was not the case. Weed control in the study varied little between treatments, but part of this may be a result of the use of natural weed populations rather than having weed species planted into plots. Yields were considerably lower than is economically acceptable, but the study was initiated late in the season which would account for this.

Table 1. Spring 2005 Preemergenence herbicides, Bixby, OK.

Common Name	**Trade Name**	**Manufacturer**
Clomazone	Command 3ME	FMC
Dimethenamid-P	Outlook	BASF
Pyrazon	Pyramin	BASF
Ethofumesate	Nortron	Bayer
Flufenacet	Define	Bayer
Linuron	Lorox	Dupont
S-Metolachlor	Dual Magnum	Syngenta
Mesotrione	Callisto	Syngenta
Metametron	Goltix	Makhteshim-Agan UK
V10146	imazosulfuron	Valent
Thiobencarb	Bolero	Valent
S-ethyl dipropylthiocarbamate	Eptam	Gowan
Triallate	Far-Go	Gowan

Table 2. Spinach Preemergence weed control, Bixby, OK.

	Percent		**Avg. number weeds/treatment** [z]				
Treatment lbs. ai/acre	**Stand**	**Stunt**	**Palmer amaranth**	**Lambs-quarter**	**Henbit**	**Crabgrass**	**Yield (lbs/ac)**
Untreated check	96 a[y]	0 i	3 bc	3 a	1 a	11 b	1461 abc
Outlook 0.0625	79 a	10 fghi	0 c	5 a	0 a	3 b	1074 abc
Outlook 0.125	95 a	7 hi	0 c	8 a	0 a	0 b	1660 ab
Outlook 0.25	60 abcd	28 efg	0 c	3 a	0 a	0 b	2136 a
Pyramin 0.45	81 a	15 efghi	4 bc	2 a	1 a	2 b	1727 ab
Pyramin 0.90	86 a	16 efghi	1 bc	1 a	0 a	7 b	2169 a
Pyramin 1.8	79 a	15 efghi	2 bc	4 a	0 a	5 b	1118 abc
Nortron 1.0	85 a	31 e	2 bc	8 a	1 a	1 b	1151 abc
Nortron 2.0	63 abc	51 d	0 c	4 a	0 a	0 b	531 bc
Define 0.075	90 a	9 fghi	4 bc	17 a	0 a	1 b	1450 abc
Define 0.15	85 a	26 efgh	0 c	0 a	0 a	0 b	1129 abc
Define 0.30	88 a	18 efghi	0 c	0 a	0 a	0 b	1594 ab
Lorox 0.10	90 a	11 efghi	2 bc	1 a	3 a	2 b	376 bc
Lorox 0.20	75 ab	29 ef	1 c	3 a	2 a	1 b	1240 abc
Dual Magnum 0.50	86 a	8 ghi	3 bc	7 a	0 a	0 b	1428 abc
Dual Magnum 1.0	66 abc	18 efghi	0 c	3 a	0 a	0 b	1273 abc
Eptam 1.3	65 abc	23 efgh	3 bc	10 a	1 a	5 b	1129 abc
Eptam 2.6	41 bcde	55 cd	1 c	3 a	1 a	0 b	896 abc
Goltix 2.85	80 a	28 efg	0 c	0 a	0 a	1 b	1372 abc
Goltix 5.7	29 de	71 bc	0 c	0 a	0 a	0 b	11 c
Goltix 11.4	8 e	88 ab	0 c	0 a	0 a	0 b	0 c
V10146 0.025	35 cde	90 a	2 c	1 a	0 a	13 b	0 c
V10146 0.05	42 bcde	94 a	0 c	2 a	0 a	5 b	0 c
V10146 0.10	22 e	94 a	0 c	2 a	0 a	25 a	0 c
V10146 0.20	21 e	95 a	0 c	0 a	0 a	8 b	0 c
Command 0.025	88 a	6 hi	7 ab	1 a	5 a	1 b	1649 ab
Command 0.05	70 ab	14 efghi	4 bc	n/a n/a	1 a	2 b	885 abc
Command 0.10	68 abc	21 efgh	10 a	1 a	0 a	1 b	963 abc
Far-GO 1.25	79 a	13 efghi	4 bc	4 a	1 a	9 b	2202 a
Far-GO 1.50	74 ab	29 ef	2 bc	5 a	2 a	3 b	1040 abc

[z] Actual number of weed species per plot, plots are based on 2 rows, 20' long replicated 4 times. Palmer amaranth (*Amaranthus palmeri* S. Wats.), Lambsquarter (*Chenopodium album* L.), Henbit (*Lamium amplexicaule* L.), Crabgrass (*Digitaria* sp.).

[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.

Screening of Postemergence Herbicides for Use on Spinach

Spring 2005, Bixby, Oklahoma

L. Brandenberger, L. K. Wells, R. Havener, A. Brothers

Materials and Methods: During the spring of 2005 a study was conducted in spinach to determine crop safety and effectiveness of six postemergence herbicides. Spinach (Olympia) was direct seeded on 4/14/05 in 2 rows 18 inches apart using a Monosem air planter. Plots received 0.5 lbs ai/acre of Dual 8E as a PRE application immediately following planting and were irrigated with 0.5 inch of overhead irrigation after application. Plots were fertilized with a total of 70 lbs of N/acre spread over two applications. Each plot consisted of 2 rows 20 feet long with plots arranged in a randomized block design with four replications including 15 herbicide treatments (Table 1). Treatments included multiple rates of Pyramin (pyrazon), Facet (quinclorac), SpinAid (phenmedipham), Progress (phenmedipham + desmedipham + ethofumesate), Callisto (mesotrione), Goltix (metamitron), and an untreated check. POST applications were made on 5/19/05 when plants were in the 4 to 7 true leaf stage of growth. All herbicide treatments also included a non-ionic surfactant at 0.25% v/v. Applications were made with a 3 foot wide hand-held spray boom using an overall application rate of 30 gpa. Plots were rated for percent injury on 5/31/05. Plots were harvested on 6/03/05 and fresh weights were recorded.

Results and Discussion: The lowest amount of injury from POST applications included Facet at 0.125 and 0.250 lbs ai/acre and Progress at 0.3 lbs ai/acre (Table 2). None of these treatments varied significantly from the untreated check and recorded 4, 5, and 10% injury, respectively. The highest amount of injury recorded was for treatments that contained Goltix. Goltix had 51, 69, and 78% injury, respectively, at 2.1, 3.2, and 4.3 lbs ai/acre.

Yield was highest for Facet at 0.125 lbs ai/acre (Table 2). Facet had 2501 and 1649 lbs/acre fresh yield for the 0.125 and 0.25 lbs ai/acre rates, respectively. Treatments that had significantly lower yields than the untreated check included all rates of Callisto and Goltix at 2.1 and 4.3 lbs ai/acre. Yields for these treatments ranged from 0 to 498 lbs/acre fresh weight.

Conclusions: Treatments that included Facet, Progress, Pyramin, and SpinAid did recover from injury and had yields that were not different from the untreated check. Of these treatments, Facet and Progress appear to have the most potential for use in postemergence weed control in spinach, although further study would be needed to determine how they would perform in different seasons. Both Callisto and Goltix were included in previous studies as POST treatments. During this and the previous study they caused severe injury to spinach. For this reason the authors would not recommend further work with these products for weed control in spinach.

Table 1. Spring 2005 Spinach postemergence herbicides, Bixby, OK. Treatment materials.

Common Name	Trade Name	Manufacturer
Pyrazon	Pyramin	BASF
Quinclorac	Facet	BASF
Phenmedipham	SpinAid	Bayer
Phen/desmedipham & ethofumesate	Progress	Bayer
Mesotrione	Callisto	Syngenta
Metametron	Goltix	Makhteshim-Agan UK

Table 2. Spring 2005 Spinach postemergence weed control, Bixby, OK.

Treatment lbs. ai/acre	**Percent Injury** [z]	**Yield (lbs./acre)**
Untreated check	0 f [y]	1959 ab
Pyramin 1.8	23 cd	1151 abcd
Pyramin 2.7	30 c	1217 abcd
Pyramin 3.6	35 c	1162 abcd
Facet 0.125	4 ef	2501 a
Facet 0.25	5 ef	1649 abc
SpinAid 0.5	20 cde	1472 abc
SpinAid 1.0	23 cd	874 bcd
Progress 0.3	10 def	1572 abc
Progress 0.6	18 cde	1428 abcd
Callisto 0.0235	25 cd	0 d
Callisto 0.047	31 c	0 d
Callisto 0.094	31 c	221 cd
Goltix 2.1	51 b	498 cd
Goltix 3.2	69 a	896 bcd
Goltix 4.3	78 a	221 cd

[z] Percent Injury=estimated percent injury to crop.

[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.

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