Partners in Progress
OILSEED

Oilseed Research at OSU 2012

Supported by the

Oklahoma Oilseed Commission

Oklahoma State University
Division of Agricultural Sciences
and Natural Resources
Oklahoma Agricultural Experiment Station
Oklahoma Cooperative Extension Service

In cooperation with
U.S. Department of Agriculture -
Agricultural Research Service

P-1037

Partners in Progress
OILSEED

Partners in Progress
OILSEED

Oilseed Research at OSU 2012

Supported by the

Oklahoma Oilseed Commission

Oklahoma State University
Division of Agricultural Sciences and Natural Resources
Oklahoma Agricultural Experiment Station
Oklahoma Cooperative Extension Service

In cooperation with
U.S. Department of Agriculture - Agricultural Research Service

P-1037

Printed on recycled paper using soy-based ink.

This report of the Oklahoma Agricultural Experiment Station is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of $1,424.46 for 250 copies. 0812 GH & TE.

Table of Contents

Partners in Progress OILSEED

Foreword

We have had a partnership with the Oklahoma Oilseed Commission (OOC) and the oilseed producers of this state. There have been good times and bad times in terms of state budget restraints, shifts in oilseed production locations in the state and changes in the federal peanut program. Together, we have survived and are looking forward to a brighter future.

Our *2011 Partners in Progress - Oilseed* report serves as a means to highlight significant accomplishments in research and Extension programs that have been supported in partnership with the OOC.

With all of the work that has been accomplished, it is important to recognize that much more research and Extension programming needs to be done to keep our oilseed producers competitive and in business. Therefore, our work must be focused to solve meaningful issue-based problems facing the oilseed producers in Oklahoma.

This report is one means of being accountable for the funds we have received and communicating the latest results of our programs to oilseed producers as rapidly as possible.

Jonathan Edelson,
Interim Associate Director
Oklahoma Agricultural Experiment Station
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Oklahoma State University Division of Agricultural Sciences and Natural Resources Mission Statement

The Mission of the Oklahoma State University Division of Agricultural Sciences and Natural Resources is to discover, develop, disseminate, and preserve knowledge needed to enhance the productivity, profitability, and sustainability of agriculture; conserve and improve natural resources; improve the health and well-being of all segments of our society; and to instill in its students the intellectual curiosity, discernment, knowledge, and skills needed for their individual development and contribution to society.

New crop, new partnership

Partners in Progress OILSEED

Over the past several decades, improvements in agricultural productivity have resulted in abundant and affordable food and fiber throughout most of the developed world. Without doubt, agricultural research and education have been the foundation of this progress.

During the past three years, Oklahoma's principle field crops had an average annual value of almost $1.4 Billion at the farm gate. In achieving this high water mark, Oklahoma's agricultural producers certainly have been the beneficiaries of the work and success of dedicated research and Extension professionals at Oklahoma State University.

Long time research partnerships between Oklahoma State University and the state's commodity groups including those for wheat, peanuts, soybeans, and cotton have resulted in the development and use of new technologies beneficial to agricultural producers. These partnerships have contributed to improving the state's economy as well.

Agricultural producers have themselves invested directly in the research programs so vital to their farming success. Growers, through their commodity organizations, have provided effective input in identifying research priorities, have provided locally generated funding and assisted in securing outside resources, and have contributed to the relationships necessary for sustained success.

Looking for A New Crop

Oklahoma's soil and climatic conditions limit cropping options for much of the state with the result being that crop plantings are dominated by winter wheat. Decades of wheat production with little or no crop rotation have resulted in many fields being infested with weeds that are difficult and expensive to control.

Several years ago, OSU researchers began searching for a rotation crop to help mitigate the weed, insect, and disease problems resulting from years of continuous wheat production. However, the successful introduction and subsequent widespread adoption of a new field crop in Oklahoma is a rare occurrence and frankly, something that hasn't happened lately. A review of the field crops grown in Oklahoma in the last several years reveals that except for some changes in acres planted, the list of crops planted has changed little compared to the crops being grown five or six decades ago.

A New Crop, A New Partnership

After several years of research, OSU researchers identified canola as a crop with the potential to work in rotation with wheat. The results of this work were shared with producers through field days, field demonstrations, and educational meetings. The state's first significant canola plantings were made in 2009 when a little over 42,000 acres were seeded. This was followed by planting of 80,000 acres in 2010 and 150,000 acres in 2011. Even with some really difficult weather during each of those years, canola demonstrated its potential to be a dependable crop for Oklahoma.

In 2010, the Oklahoma Oilseed Commission was formed to represent the interests of the state's canola and sunflower growers and industry members. Like its predecessor commodity organizations, the Oklahoma Oilseed Commission is committed to being an effective research and Extension partner with Oklahoma State University.

With funds collected from grower assessments, the Oklahoma Oilseed Commission made its first financial contribution to OSU research in 2011 and the results of that work are contained in the following pages. This, of course, is only the beginning of what is expected to be a long and productive relationship between oilseed growers and the university.

Much is still to be learned about growing canola in Oklahoma. Research and Extension programs provide critical knowledge that creates economic opportunities for producers. To make progress with this crop, growers understand that that they need the results that come from the objective and timely research conducted by their land grant university. They are proud to partner with Oklahoma State University in this effort and therefore to be Partners in Progress.

Ron Sholar
Executive Director
Oklahoma Oilseed Commission

Impact of In-Furrow Diammonium Phosphate on Canola Production

D. B. Arnall
Department of Plant and Soil Sciences
Oklahoma State University

This study was established in fall 2011 to evaluate the impact of diammonium phosphate (DAP) or 18-46-0, place with the seed in-furrow on canola stand, yield and quality. As many of the Oklahoma winter wheat producers have adopted the practice of growing winter canola, many have passed practices from the wheat crop to the canola crop. This may work, however, there is the potential for increase failures. Two sites were selected that would typically receive some form of phosphorus fertilizer. The first location, Lahoma, had a soil test phosphorus (P) level of 30, while the second location, Perkins, had a soil pH of 4.7. Lahoma was managed under conventional tillage and Perkins was managed as a No-till production system. Throughout the season the plots were sensed with GreenSeeker® to record plant biomass, vigor and stand. At maturity the plots were swathed before harvesting with a plot combine. Subsamples were analyzed for oil content and quality (Table 1).

Table 1. Treatment structure applied at both locations.

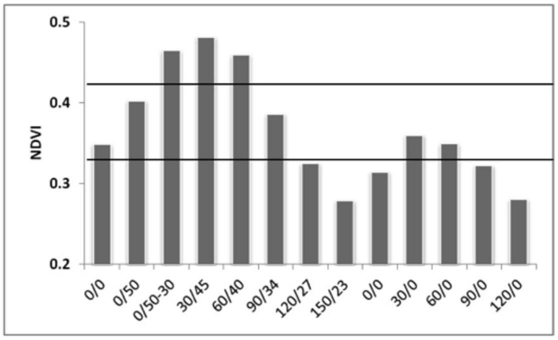
Trt	Lbs DAP w/seed	Lbs N/P with seed	N pre-plant broadcast	Top-dress N
1	0	0/0		
2	0	0/0	50	75
3	0	0/0	50 N / 30 P	75
4	30	5.4/13.8	44.6	75
5	60	10.8/27.6	39.2	75
6	90	16.2/41.4	33.8	75
7	120	21.6/55.2	27.4	75
8	150	27/69	23	75
9	0	0/0	0	125
10	30	5.4/13.8	0	119.6
11	60	10.8/27.6	0	114.2
12	90	16.2/41.4	0	108.8
13	120	21.6/55.2	0	103.4

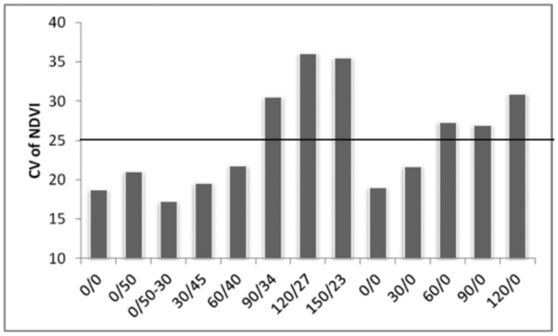
Results

Lahoma 2010-2011

The Lahoma site was planted into good moisture and quick stand establishment. Figure 1 shows the normalized difference vegetation index (NDVI) readings collected from a GreenSeeker® sensor in February. The NDVI is strongly correlated with surface biomass. In this you can see that treatments 3, 4 and 5 have the greatest amount of growth. These are the treatments that received DAP and additional P at planting. Treatments 6 to 13 have diminished growth due to one of two factors, reduced stand from DAP or lack of sufficient nitrogen (N) to maintain winter growth. Figure 2 demonstrates the Coefficient of Variation (CV) of the NDVI's readings, which is highly correlated with stand. The higher the CV, the poorer the stands, in this case 6 to 8 and 11 to 13 have a CV that would be considered about the threshold. These values are significantly higher than the rest. The rate of DAP with seed had the strongest influence on the CV of NDVI readings.

In terms of yield, Figure 4 shows the only significantly different treatment was the check, no N or P applied. All other treatments had statistically similar yields. The highest yielding plot, however, was the treatment that received 50 lbs N and 30 lbs of P_2O_5 broadcast incorporated. This same treatment had significantly higher oil content (Figure 5) than the majority of plots. The lowest oil yielding treatment was the one that received zero phosphorus.





Figures 1 (above) and 2 (below). GreenSeeker® NDVI readings and the CV of those readings collected from the Lahoma plots February 2011. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

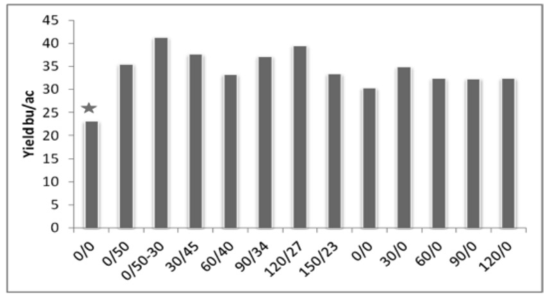


Figure 4. Grain yields from the Lahoma location. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

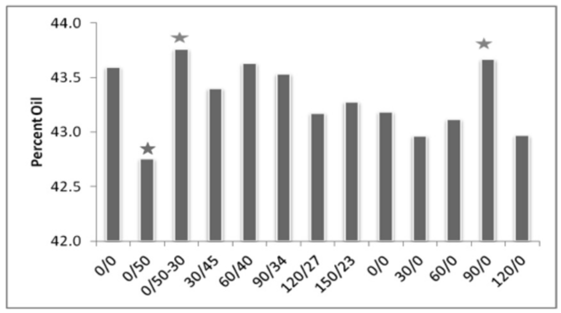


Figure 5. Oil content measured in grain from the Lahoma location. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

What do the stars represent?

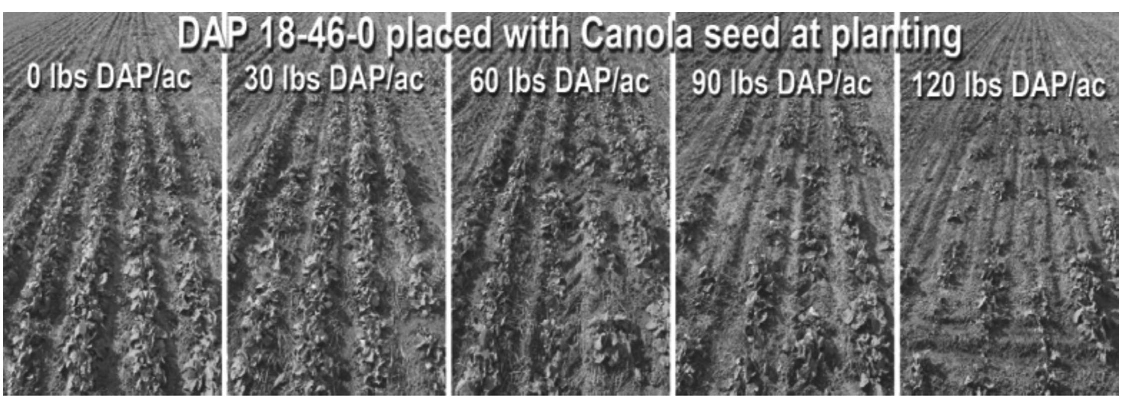
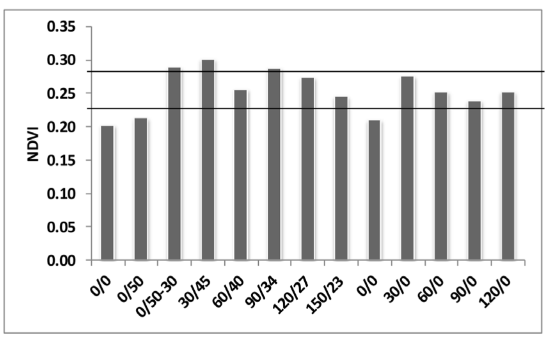
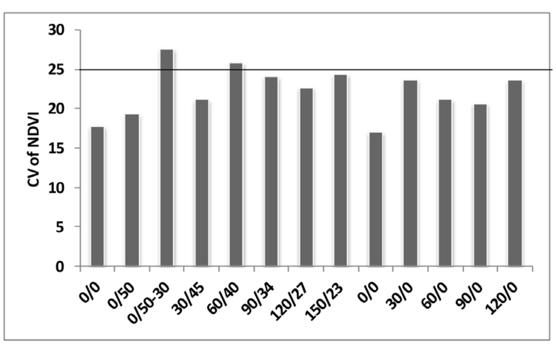


Figure 3. Visual from the Lahoma locations showing impact of DAP place in-furrow with canola seed.

Perkins 2010-2011

The Perkins location was drilled with a conventional drill into a young no-till field with marginal moisture. Emergence was delayed by three weeks, one week following a significant rain. Yields were significantly lower than Lahoma due to a poor distribution and timing of rainfall. Figures 6 and 7 show the NDVI readings collected from a GreenSeeker® in Febuary. Note the values are significantly lower than Lahoma, demonstrating the reduced growth experienced at this site. Similar patterns were seen at Perkins in which treatments 3 and 4 had more growth. Unlike Lahoma, treatments 6 and 7 also had higher NDVIs relative to the other treatments. Also, unlike Lahoma, the CV of treatment 3 was the highest, likely due to the small size of plants sensed. Figure 9 displays the grain yield from Perkins with a range of 4 bu/A to 12 bu/A. There was some shattering that occurred between swathing and harvest. This likely would account for an increase of 15 percent to 20 percent. The yield results showed treatment 9 was significantly lower than the rest, and treatment 3, once again, had numerically the highest yield. Similar to Lahoma the treatments receiving no P and 100 percent of the N at topdress, had the lowest oil content.





Figures 6 (above) and 7 (below). GreenSeeker® NDVI readings and the CV of those readings collected from the Perkins plots February 2011. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

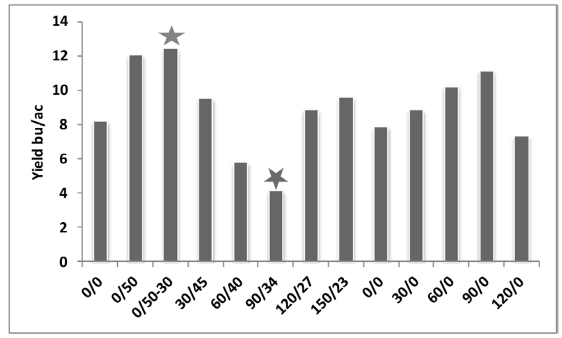


Figure 8. Grain yields from the Perkins location. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

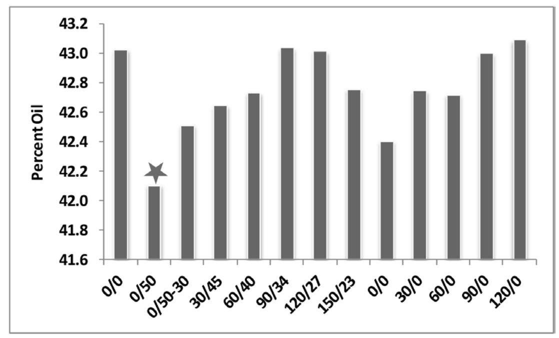


Figure 9. Oil content measured in grain from the Perkins location. Values along the x axis signify lbs of DAP/A placed with seed/lbs of N applied at pre-plant.

Conclusion

The first year of research shows that DAP placed with seed will impact crop stand when rates exceed 60 lbs of material per acre, which is 10.8 lbs of N per acre. However, at Lahoma, due to favorable growing conditions, the loss of stand did not impact final yield. The data also shows that delaying the majority of the N until topdress was not favorable and yields were lost. The best yielding practice in terms of stand yield and oil was the broadcast application of N and P at planting. In both situations where either soil test P indicated deficiencies or soil pH was below optimum, the absence of fertilizer P decreased oil content. With an additional year of research, we should be able to define the impact of in-furrow DAP on yield and quality and what is the impact of delaying N until top-dress.

Biology and Management of Blackleg Disease on Winter Canola

J.P. Damicone and T.J. Pierson
Department of Entomology and Plant Pathology
Oklahoma State University

C.B. Godsey
Department of Plant and Soil Sciences
Oklahoma State University

M.J. Stamm
Agronomy Department
Kansas State University

2012 progress made possible through OOC support

- **Blackleg (*Leptosphaeria maculans*) developed in all of the trials, but the leaf spot phase of the disease did not develop until spring, resulting in late disease development.**
- **The fungicides Quadris® and Proline® reduced levels of blackleg, but yield increases from fungicides were not statistically significant.**
- **Currently grown, Roundup® ready canola varieties had similar levels of blackleg, but the variety classified as susceptible had lower yields compared to resistant entries.**
- **Yield loss from blackleg in the susceptible variety was 0.5 percent for every percentage increase in diseased plants, and 15 percent for every 0-5 increment in internal stem decay.**
- **Differences in levels of blackleg and yield were identified in the field screening of more than 100 varieties and breeding lines, although disease pressure was low.**

Five field trials were conducted during the 2012 cropping season. The trials focused on determining yield losses to the disease, evaluating fungicides for disease control, and screening canola varieties and breeding lines for disease resistance. Weather was generally favorable for crop development during the cropping season. Rainfall was nearly normal over the cropping period and temperatures were above normal from November to harvest. As a result of the warm conditions, the crop was mature earlier than normal. Only a few leaf spots appeared in the fall, but leaf spot was widespread in the spring during budding and flowering stages following 10 inches of rainfall March and April. Plant growth was excessive and all plots lodged at Stillwater. Lodging was an intermittent problem at Lake Carl Blackwell. Excessive grazing of plots by deer and aphid damage also increased plot variability and appeared to reduce yields and levels of disease at Lake Carl Blackwell.

Fungicide Trials at Stillwater

The trials were located at the Entomology and Plant Pathology Research Farm in Stillwater in a field of Norge loam previously cropped to wheat. Plots were seeded with DKW 46-15 at 5 lbs/A with a grain drill September 27, 2011, and were topdressed with granular fertilizer N-P-K (92-0-0 lb/A) March 2, 2012. The herbicide Roundup® Pro 4L at 1.5 pt/A was applied post-emergence October 31, 2011 and March 14, 2012 for weed control. Plots consisted of seven 25-ft-long rows spaced 7.5 in. apart. The experimental design was a randomized complete block with four replications separated by a 10-ft-wide fallow buffer. Plots were inoculated with blackleg disease (*Leptosphaeria maculans*) by spreading oat kernels (100 ml) colonized by the fungus and canola stubble (1 handful) from an infested field along the center of each plot at the early rosette stage October 26, 2011. Fungicides were broadcast through flat-fan nozzles (Tee-Jet 8002vk) spaced 18 in. apart using a CO_2-pressurized wheelbarrow sprayer. The sprayer was calibrated to deliver 25 gal/A at 40 psi. Plots were swathed into windrows May 9, 2012 prior to harvest with a small plot combine on May 17, 2012. Yields were adjusted to 10 percent moisture. Blackleg was assessed on the stubble after swathing. Disease incidence (the percentage of plants with blackleg cankers) and severity (the level of internal stem decay) were assessed by uprooting plants and examining cross sections of lower stems of 15 plants/plot.

Evaluation of fungicides for control of blackleg of winter canola

Fungicides representing different mode of action groups were applied in the fall and evaluated for protecting against severe stem canker development in the spring. Treatments were applied at early rosette (2 to 4 leaves) and at mid-rosette (6 to 8 leaves) growth stages. Stem cankers developed on most plants by harvest (Table 2). However, severity ratings were low to moderate and most cankers did not completely girdle the plants. Quadris®

Table 2. Evaluation of fungicides for control of blackleg on canola.

Treatment and rate/A[z]	*Blackleg*		*Yield*
	Incidence (%)[y]	*Severity (0-5)*[x]	*(lbs/A)*
Nontreated check	97 ab[w]	2.5 a	1,285
Quadris® 2.08F 6.2 fl oz	80 cd	1.7 bc	1,444
Endura® 70WG 5 oz	86 abc	2.0 abc	1,412
Caramba® 0.75F 1.33 pt	100 a	1.9 abc	1,448
Proline® 4F 5.7 fl oz	69 d	0.9 d	1,416
Folicur® 3.6F 7.2 fl oz	94 abc	2.3 ab	1,388
Topsin® 70W 1.0 lb	84 bc	1.5 cd	1,279
Priaxor® 4.17F 4 fl oz	98 ab	2.0 abc	1,427
ProPhyt® 4.2L 2 pt	85 bc	1.7 bc	1,292
Quilt® 1.66F 14 fl oz	93 abc	2.0 abc	1,385
LSD (*P*=0.05)[v]	14	0.7	NS

[z] Applications were made at growth stages early rosette (2 to 4 leaf stage) October 21, 2010, and at mid-rosette (4-6 leaves) November 5, 2011.
[y] Percentage of stems with blackleg May 11, 2011.
[x] Internal stem decay from blackleg May 11, 2011 on 0 to 5 scale where 0=no disease, 1=25 percent of the stem with decay, 2=50 percent of the stem with decay, 3=75 percent of the stem with decay, 4=100 percent of the stem with decay, 5=dead plant.
[w] Values in a column followed by the same letter are not significantly different.
[v] Least significant difference; NS=treatment effect not significant at P=0.05.

and Proline® were the only treatments that reduced both disease incidence and severity compared to the nontreated check. Yields did not differ among treatments because of the delayed disease development.

Evaluation of application timing on control of blackleg of winter canola with fungicides

Fungicides registered for use on canola (Caramba is registered as Quash) were applied at various timings in the fall and early winter with the objective of protecting against severe stem canker development in the spring. Treatments were applied once at early rosette (2 to 4 leaves) and mid rosette (6 to 8 leaves), twice at early rosette and mid rosette, and twice at mid rosette and late rosette (10 to 12 leaves) growth stages. Stem cankers developed on most plants by harvest. However, severity ratings were low to moderate and most did not completely girdle the plants. There were trends for reduced levels of severity for treatments that received two fungicide applications, but differences in level of disease did not statistically differ among treatments. Yields also did not differ among treatments because of the delayed disease development (Table 3).

Yield loss and variety/breeding line screening at Lake Carl Blackwell

Trials were conducted at the Agronomy Research Station at Lake Carl Blackwell near Stillwater in a field of Port silt loam previously cropped to canola. Entries were seeded at a rate of 5 lbs/A with a grain drill. Plots were top dressed with granular fertilizer N-P-K (92-0-0 lb/A) March 2, 2012. The percentage of plot lodging was estimated May 4, 2012. Plots were swathed May 8, 2012 and harvested with a small-plot combine June 25, 2012. Yields were adjusted to 10 percent moisture. Blackleg was assessed on the stubble after swathing harvest. Disease incidence (the percentage of plants with stem cankers) and severity (the level of internal stem decay) were assessed by uprooting plants and examining cross sections of the lower stem of 15 plants/plot May 16, 2012.

Table 3. Evaluation of application timing on control of blackleg on winter canola.

Treatment and rate/A[z]	*Blackleg*		*Yield*
	Incidence (%)[y]	*Severity (0-5)*[x]	*(lbs/A)*
Nontreated check	85	2.1	1,512
Quadris® 2.08F 6.2 fl oz (ER)	93	2.4	1,246
Quadris® 2.08F 6.2 fl oz (ER, MR)	90	1.9	1,477
Quadris® 2.08F 6.2 fl oz (MR)	80	1.8	1,265
Quadris® 2.08F 6.2 fl oz (MR, LR)	79	1.8	1,307
Caramba® 0.75F 1.33 pt (ER)	94	2.3	1,237
Caramba® 0.75F 1.33 pt (ER, MR)	82	1.6	1,567
Caramba® 0.75F 1.33 pt (MR)	80	2.0	1,469
Caramba® 0.75F 1.33 pt (MR, LR)	75	1.3	1,351
LSD (P=0.05)[w]	NS	NS	NS

[z] Applications were made at growth stages early rosette Oct 25, 2011, at mid-rosette November 10, 2011, and at late rosette January 10, 2012.
[y] Percentage of stems with blackleg after harvest May 15, 2012.
[x] Internal stem decay from blackleg from a 0 to 5 scale where 0=no disease, 1=25 percent of the stem with decay, 2=50 percent of the stem with decay, 3=75 percent of the stem with decay, 4=100 percent of the stem with decay, 5=dead plant.
[w] Least significant difference; NS=treatment effect not significant at P=0.05.

Yield and disease responses of canola varieties to blackleg

Canola varieties representing a range of reactions to blackleg were selected based on results from previous screening trials in Georgia. The varieties HyClass 107W (S; susceptible), DKW 46-15 (MR; moderately resistant), and HyClass 154W (R; resistant) were planted September 30, 2011. The herbicide Roundup® Pro 4L at 1.5 pt/A was applied post-emergence October 31, 2011 and March 27, 2012 for additional weed control. The experimental design was a split plot randomized complete block with four replications separated by a 5-ft-wide fallow buffer. Whole plots were inoculation timed while split plots were te canola varieties. Noninoculated buffer plots planted with DKW 46-15 surrounded whole plots. Split plots consisted of seven 25-ft-long rows spaced 7.5 in. apart. Whole plots were inoculated

WHAT??

Table 3. Disease and yield responses of canola varieties classified as susceptible (S), moderately resistant (MR) to blackleg.

Incoculation timing[1]	*HC 107W (S)*	*DKW46-15 (MR)*	*HC 154W (R)*	*Average*
		Blackleg incidence (%)[2]		
Check	54.7	58.7	52.2	55.2 b[3]
Seedling	70.5	89.0	73.5	77.7 a
Early rosette	69.7	77.7	83.0	76.8 a
Late rosette	60.7	74.2	73.5	69.5 ab
Bolting	66.7	57.2	53.5	59.2 ab
Average	64.5 a	71.4 a	67.1 a	
$LSD_{0.05}$[4]				19.5
		Blackleg severity (0-5)[5]		
Check	1.4	1.1	0.9	1.2 c
Seedling	2.0	2.4	1.9	2.1 a
Early rosette	1.8	2.2	1.5	1.8 ab
Late rosette	1.3	1.5	1.4	1.4 bc
Bolting	1.8	1.0	1.2	1.3 bc
Average	1.6 a	1.6 a	1.4 a	
$LSD_{0.05}$				0.6
		Yield (lb/A)[6]		
Check	1135	1225	1711	1357 a
Seedling	1103	1423	1811	1446 a
Early rosette	1054	1274	1765	1365 a
Late rosette	1090	1307	1596	1331 a
Bolting	779	1180	1432	1131 a
Average	1032 c	1282 b	1663 a	
$LSD_{0.05}$				NS

[1] Inoculation dates were seedling==October 26, 2011, early rosette=November 9, 2011, late rosette=November 23, 2011, and bolting=March 6, 2012.
[2] Percentage of plants with blackleg.
[3] Values in a column or row followed by the same letter are not statistically different according to Fisher's least significant difference Test.
[4] Least significant difference, NS=treatment effect not significant at P=0.05.
[5] Internal stem decay where 0=no disease, 5=stem completely girdled by blackleg.

What do "a,b,c" mean (footnote 3)?
Footnote 6?

with the blackleg disease growing on oat kernels, and with stubble from an infested canola field at seedling (2 to 4 leaves), early rosette (6 to 8 leaves), and late rosette (10 to 12 leaves) growth stages in the fall; and at bolting (first flower bud) in the spring. The dry conditions in the fall limited foliar blackleg development to a few spots in the fall. Leaf spots from blackleg became widespread during March and April budding and flowering stages. In addition to the late disease development, heavy grazing of plots by deer limited plant canopy development, which may have reduced disease development, as well as yield. Cankers developed on basal areas of the stem near the soil line and reached low levels of severity by harvest. Both disease incidence and severity were highesr for the seedling and early rosette inoculation timings compared to the non-inoculated check. Levels of disease did not differ among varieties. Yields differed among varieties but not inoculation timings. Yields were lowest for the susceptible variety. Plot yields were negatively correlated with blackleg severity (r=-0.24, P=0.01), although the relationship was not strong. On the susceptible variety, yield was reduced one-half percent for every percent increase in infected plants, and 15 percent for every increase in stem decay severity from 0 to 5.

Reaction of conventional canola varieties and breeding lines to blackleg

The objective of this study was to evaluate the reaction of conventional non-Roundup® ready canola genotypes to blackleg in comparison to the regional standards of DKW and HyClass cultivars. The herbicide Treflan® 4E at 1.5 pts/A were incorporated into the soil prior to planting October 3, 2011. Plots consisted of four 25-ft-long rows spaced 15 in. apart. The experimental design was a randomized complete block with three replications separated by a 5-ft-wide fallow buffer. Plots were inoculated with blackleg by spreading oat kernels colonized by the fungus (50 ml) and canola stubble (1 handful) from an infested field along the center of each plot at the early rosette stage October 26, 2011. The percentage of plot lodging was estimated May 4, 2012. Blackleg cankers developed on basal areas of the stem near the soil line and reached low levels of severity by harvest (Table 5). The reference cultivars had similar, intermediate levels of disease compared to other entries. The entry 46W94 was most susceptible while the entries Virginia, Rossini, Claremore, HPX-7228, KS4564, Sumner, Baldur, Ulura, MH09H19, Amanda and DKW41-10 were the most resistant. Lodging was less severe than in an adjacent trial. Yields were lower than expected given the good weather conditions. Yields differed among entries and plot yields were negatively correlated with blackleg severity (r=-0.15, P=0.05), although the relationship was not strong.

Reaction of Roundup® ready canola varieties and breeding lines to blackleg

The objective of this study was to evaluate the reaction of Roundup®-ready canola genotypes to blackleg in comparison to the regional standards of DKW and HyClass cultivars. The herbicide Treflan® 4E at 1.5 pts/A was incorporated into the soil prior to planting October 3, 2011, and Roundup® Pro 4L at 1.5 pts/A was applied post-emergence October 31, 2011 and March 27, 2012, for additional weed control. Plots consisted of four 25-ft-long rows spaced 15 in. apart. The experimental design was a randomized complete block with three replications separated by a 5-ft-wide fallow buffer. Plots were inoculated with the blackleg pathogen by spreading oat kernels colonized by the fungus (50 ml) and canola stubble (1 handful) from an infested field along the center of each plot at the early rosette stage October 26, 2011. Blackleg cankers developed on basal areas of the stem near the soil line and reached low levels of severity by harvest (Table

6). The reference cultivars had similar, intermediate levels of disease compared to other entries. The entries 441 and 439 were most susceptible while 377, 381, 427 and 465 were the most resistant. Entries 377, 427 and 465 also had low levels of lodging. Aphid feeding damage contributed to yield variability, and yields were lower than expected given the good growing conditions. Yields differed among entries and plot yields were negatively correlated with blackleg severity (r=-0.19, P=0.01), although the relationship was not strong.

Partners in Progress OILSEED

Table 5. Reaction of conventional winter canola varieties and breeding lines to blackleg.

Entry	Blackleg Incidence (%)[z]	Blackleg Severity (0-5)[y]	Lodging (%)[x]	Yield (lbs/A)
Virginia	40	0.7	7	1,274
VSX-3	35	1.3	17	1,414
Rossini	62	0.4	28	1,521
TCI805	80	1.8	7	966
TCI806	77	1.9	13	1,288
46W94	88	2.3	20	1,371
46W99	66	1.7	18	1,297
Claremore	53	0.8	7	1,002
HPX-7228	42	0.7	12	1,277
HPX-7341	66	1.3	2	1,104
HYClass 115W	82	1.9	20	1,096
HYClass 125W	65	1.5	3	1,031
HYClass 154W	69	1.2	5	1,872
KS4083	67	1.2	8	1,082
KS4428	65	1.2	20	1,436
KS4564	49	0.9	3	1,260
Kiowa	62	1.2	5	1,083
Riley	65	1.0	7	1,440
Sumner	42	0.6	5	1,147
Wichita	72	1.4	10	1,025
Baldur	51	0.9	8	1,466
NPZ0903	49	1.0	15	1,558
NPZ1005	52	1.2	13	1,459
Rumba	68	1.6	7	1,310
Sitro	64	1.1	15	1,335
Ulura	23	0.4	0	1,710
WRH350	48	1.0	3	1,308
Dynastie	61	1.2	12	1,133
Flash	64	1.2	3	1,506
Hornet	77	1.5	7	1,218
Safran	49	1.3	13	1,402
Visby	66	1.6	3	1,226
Chrome	54	1.2	2	1,310
MH07J14	51	0.8	2	1,295
Hybrirock	57	1.0	8	1,664
MH06E10	68	1.2	5	1,490
MH09H19	53	0.9	12	1,394
Amanda	44	0.9	10	907
Durola	70	2.0	23	681
05.UI.5.33.6	72	1.2	7	1,006
06.UIWC.1	72	1.6	23	995
DKW41-10	60	0.9	22	1,296
DKW44-10	72	1.8	33	1,333
DKW46-15	64	1.4	10	1,082
DKW47-15	79	1.4	42	1,017
LSD (P=0.05)[w]	23	0.7	19	498
CV[v]	23	33	103	24

[z] Percentage of plants with blackleg.
[y] Internal stem decay from blackleg from 0 to 5 scale where 0=no disease, 1=25 percent of the stem with decay, 2=50 percent of the stem with decay, 3=75 percent of the stem with decay, 4=100 percent of the stem with decay, 5=dead plant.
[x] Percentage of plot lodged May 4, 2012.
[w] Fisher's least significant difference.
[v] Coefficient of variation.

Table 6. Reaction of Roundup® ready winter canola varieties and breeding lines to blackleg.

Entry	Blackleg Incidence (%)[z]	Blackleg Severity (0-5)[y]	Lodging (%)[x]	Yield (lbs/A)
369	82	1.9	57	832
371	67	1.2	30	1,029
373	69	1.6	27	1,021
375	72	1.7	20	1,328
377	47	0.8	5	1,013
379	72	1.3	23	1,177
381	61	1.0	47	1,322
383	81	1.9	3	1,066
385	65	1.4	28	948
387	87	1.8	23	1,139
389	80	1.8	10	989
390	79	1.9	13	1,140
393	83	1.6	12	1,020
395	73	1.4	47	1,507
397	79	1.7	28	1,092
399	72	1.6	13	806
401	75	1.8	27	1,257
403	75	1.3	28	1,207
405	70	1.5	20	1,381
407	61	1.4	55	1,212
409	62	1.4	25	817
411	79	1.9	38	884
413	78	1.3	32	719
415	77	1.6	47	1,099
417	59	1.1	37	1,162
418	71	1.4	37	966
420	66	1.3	47	1,194
424	88	1.9	62	1,112
425	80	1.8	23	1,232
427	51	1.0	7	1,056
429	83	1.9	30	1,188
431	57	1.2	7	1,047
433	81	1.9	10	1,174
435	70	1.6	17	1,171
437	74	1.7	10	1,209
439	88	2.2	20	542
441	90	2.3	38	290
443	53	1.3	60	1,397
445	56	1.3	20	1,255
447	76	1.6	30	1,494
449	84	1.8	37	1,362
451	78	1.7	30	1,280
453	69	1.6	20	1,389
455	68	1.7	27	1,106
457	80	1.9	33	1,271
459	81	2.3	27	1,158
461	63	1.3	25	1,237
463	69	1.3	13	1,129
465	65	1.1	5	1,192
467	65	1.4	48	1,152
469	61	1.2	57	1,432
471	63	1.1	10	972
473	72	1.9	20	933
475	70	1.6	18	772
477	74	1.8	23	1,125
HyClass 115W	74	1.8	40	1,350
HyClass 154W	68	1.9	40	979
DKW44-10	78	1.7	32	1261
LSD (P=0.05)[w]	22	0.7	29	326
c.v.[v]	19	29	65	18

[z] Percentage of plants with blackleg.
[y] Internal stem decay from blackleg from 0 to 5 scale where 0=no disease, 1=25 percent of the stem with decay, 2=50 percent of the stem with decay, 3=75 percent of the stem with decay, 4=100 percent of the stem with decay, 5=dead plant.
[x] Percentage of plot lodged May 4, 2012.
[w] Fisher's least significant difference.
[v] Coefficient of variation.

Partners in Progress
OILSEED

Determine Control of Foliage-feeding Caterpillars and Incidence of Other Sporadic Insect Pests on Winter Canola

T. Royer and K. Giles
Department of Entomology and Plant Pathology
Oklahoma State University

2012 progress made possible through OOC support

- **Evaluate and demonstrate the efficacy and cost effectiveness of a nonpyrethroid insecticide for diamondback moth (and other foliage-feeding caterpillars) management in canola.**
- **Develop a comprehensive and efficient scouting plan for monitoring all key and occasional insect pests of winter canola in the Southern Plains.**

Objective 1

Data on the yield benefit of nonpyrethroid and available pyrethroid insecticides for diamondback moth was collected from replicated randomized complete block design (RCBD, with 4 reps) plots established in fields in Perkins and Drummond. Fall infestations at both locations allowed for (1) assessment of yield benefit of these insecticides, and (2) comparison of yields from plots sprayed at detection of moth larvae versus plots sprayed after reaching economic thresholds. Infestations were first detected below thresholds (2 to 3/ft row) October 28, 2011 at each location. Populations at Perkins remained below threshold; however, plots were sprayed according to protocol on November 10, 2011. Drummond's canola field was sprayed when moth larvae were first detected, but left experimental plots unsprayed. Populations at Drummond in experimental plots increased above threshold and were then sprayed according to protocol. In mid November, a hard freeze eliminated most resident moth populations. Plots were sampled according to protocol up to 110 days after initial application and harvested May 23, 2012. Analysis of variance between groups (ANOVA) was used to compare yields among treatments in experimental plots.

Yield estimates at the Perkins location were excellent, averaging 2,024 lbs/A but were highly variable. As expected, however, low moth larval populations and high variation among plots at Perkins resulted in no significant differences in yields among insecticide treatments (Table 7).

At the Drummond location, moth larval populations reached economic thresholds, but highly variable yields among insecticide treatments in replicated plots were statistically similar (Table 8).

However, yields appeared to be significantly higher in producer plots sprayed at detection of moth larvae (Table 8). Possibly, the early spray prevented buildup of moth populations, continuous feeding and ultimately resulted in reduced seedling damage in the producer plots. This level of feeding was thought to be insignificant, but if correct, more than 800 bu/A of yield savings occurred in producer plots because of timely insecticide application. Fall thresholds for diamondback moth larvae on seedling canola clearly need additional research before accurate recommendations can be validated.

Objective 2

Ten additional fields were established to monitor seasonal activity of insect pests. Insect pressure was variable this past growing season. Canola aphids (cabbage, green peach and turnip aphids) were virtually nonexistent over much of the canola acreage. The drought probably had some detrimental influence on establishment of aphids in the fall crop. There were scattered reports of army cutworms, but infestations were not widespread. Diamondback moth was present early, but not at visibly significant levels. In late March through April, a flight of variegated cutworm moths infested fields across the state. Some fields were severely infested, while others escaped. This insect proved to be a severe pest; they directly damaged developing seed pods. There were no published treatment thresholds, so thresholds were adapted based on a pest of spring canola in Canada and North Dakota (the bertha armyworm), which has a similar feeding habit for use by growers and consultants. The article was published in the department of plant

Table 7. Replicated diamondback moth insecticide efficacy trials, 2011/2012 (Perkins).

Product (rate)	*Yield (lbs/a)*	*SE*
Coragen® 3.5 oz/A	2,025	415
Coragen® 5.0 oz/A	2,740	335
Brigade® 2.0 oz/A	2,047	437
Brigade® 2.6 oz/A	1,228	250
Mustang® 4.0 oz/A	2,413	398
Proaxis® 1.92 oz/A	1,954	526
Proaxis® 3.84 oz/A	1,921	436
Warrior® 0.96 oz/A	2,447	385
Warrior® 1.92 oz/A	1,531	353
Water	1,932	99

ANOVA ($F = 1.3$, $Df = 9, 30$, $P = 0.273$)

*Lambda cyhalothrin used to suppress other pests as needed.

Table 8. Replicated diamondback moth insecticide efficacy trials, 2011/2012 (Drummond).

Product (rate)	*Yield (lbs/a)*	*SE*
Coragen® 3.5 oz/A	1,273	200
Coragen® 5 oz/A	1,259	125
Brigade® 2.0 oz/A	1,264	98
Brigade® 2.6 oz/A	1,683	555
Mustang® 4 oz/A	1,196	357
Proaxis® 1.92 oz/A	1,094	75
Proaxis® 3.84 oz/A	911	210
Warrior® 0.96 oz/A	1,013	109
Warrior® 1.92 oz/A	1,243	176
Water	1,440	309
*Plots sprayed at detection (Warrior® 1.92 oz/A)	2,057	

ANOVA ($F = 0.7$, $Df = 9, 30$, $P = 0.723$)

*Lambda cyhalothrin used to suppress other pests as needed.

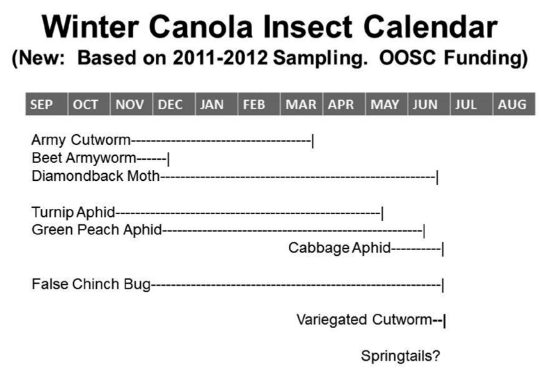
and soil sciences Extension news: http://extensionnews.okstate.edu/archived-articles-1/2012-archived-articles/Variegated%20Cutworms%20in%20canola%20April%202012.pdf

Several phone calls were received from homeowners living in close proximity to canola fields during harvest. They complained of being invaded by what they thought were false chinch bugs, but in most cases, they were actually being invaded by an insect known as a springtail (Figure 10). Reports of hundreds of thousands of springtails were being found in homes, and if they were cleaned out, a new batch arrived the next day (Figure 11). This insect is soil-dwelling and lives on decaying organic matter. If populations build up, when conditions turn dry (like when the crop is harvested), they move to find moisture. It is unknown if this will be a chronic problem, but it is worth noting.

Figure 10. Springtail.

Figure 11. Home infested with springtails.

Below is an updated insect calendar that can be used to help plan for potential insect problems. One future goal is to develop a plan for more effective scouting, especially late in the growing season as the crop begins to flower and fill seed pods.



Timeline for 2011-2012 project:

2011	Sept.	√-Project organizational meeting
	Sept.	√-Establish experimental research plots
	Sept.-Dec.	√-Maintain field plots
	Nov.-Dec.	√-Insecticide applications
2012	Jan.-March	√-Maintain field plots
	March-May	√-Conduct field sampling
	June	√-Harvest
	June-July	√-Summarize and analyze all data and write final report

2011-2012 Winter Canola Demonstration Plots

Partners in Progress
OILSEED

J.A. Bushong, M.C. Boyles and D.B. Arnall
Department of Plant and Soil Sciences
Oklahoma State University

2012 progress made possible through OOC support

- **Ten locations established across western Oklahoma.**
- **Fourteen field yours held in mid-April with more than 275 attendees.**
- **Late spring applied sulfur and boron treatments had no effect on canola seed yield or quality.**

Introduction

The main objective of this project is to encourage grower interest in canola production throughout western Oklahoma where future canola acreage may increase. In order to increase canola acreage in Oklahoma, the need for canola production education is extremely important. Through the use of these demonstration plots, the local producers can make visual comparisons amongst the cultivars throughout the growing season.

The demonstration plots are an excellent way to interact with the local producers and to educate them about various aspects of canola production at the spring field tours. The locations of the demonstration plots, as well as a few of the OSU performance trials, served as destinations for the field tours.

OSU has evaluated fall applied sulfur and early spring boron applications and their impact on canola production. These trials were replicated at two locations in northcentral Oklahoma over two growing seasons. The results from these trials proved that sulfur and boron applications had no effect on canola yield when soil test levels where sufficient. To gather more data over a larger geographical region, late spring applied sulfur and boron treatments were utilized with this project.

Materials and Methods

There were 12 demonstration plots planted in western Oklahoma, of which 10 were utilized throughout the growing season. Four of the locations had one replication, while the other six locations had at least two replications. Due to an insufficient stand, two of the locations were discontinued. The remaining 10 locations were maintained throughout the season. Typical maintenance included fertility and pesticide applications.

Fertility plots were established alongside the cultivar comparison plots. These were added to evaluate the impact of applying late spring sulfur or boron fertility treatments on canola production. Additional HyClass 125 plots were added to the two fertility treatments.

The plots were established on main roads for local growers to visit in their area and visually compare the different cultivars. Signage was posted in early spring to showcase each cultivar and treatment.

The late spring applied sulfur and boron treatments were applied when the canola was at the early to mid-flower growth stage. This stage was recommended on the label for both the sulfur source and the boron source. The sulfur (0.74 lb/A) and boron (0.21 lb/A) were applied at labeled rates.

To add more value to the demonstration plots it was decided to carry out the plots to harvest. Three of the 10 locations were swathed to prepare the crop for harvest. These included the Hobart, Hinton, and Perry locations. All other locations were direct harvested. All plots were harvested using a Wintersteiger plot combine.

The HyClass 125, HyClass 125 with sulfur, and the HyClass 125 with boron harvest samples were analyzed using a near infrared (NIR) machine to determine oil quality. The NIR machine tests each sample for moisture content, protein, oil content, ash, chlorophyll, palmitate, oleate, stearate, linoleate, linolenate, eicosenoate and glucosolinolate.

Results and Discussion

The main highlight of these demonstration plots was showcasing them during the field tours conducted on April 9-12 and April 17, 2012. There were 14 destinations that were visited over a five-day period. There were about 275 producers who attended. The program lasted about 90 minues at each destination. An OOC update as well as several canola production topics were covered which included fertility, canola in no-till systems, pest management, cultivar characteristics, harvesting options and marketing. Presenters included Ron Sholar (OOC), Brian Arnall (OSU), Josh Bushong (OSU), Tom Royer (OSU), Mark Boyles (OSU), Chad Godsey (OSU), Heath Sanders (PCOM), and Jessica Swain (ADM).

The consensus was the tours were very successful. Many producers were inquisitive and were enthusiastic about the potential of canola production in their operations. Attendance was up about 65 percent from last year.

The yield results varied from location to location. The harvest data was pooled across locations to evaluate the cultivar performances by region and tillage practice. No major significant differences were observed for either comparison. This may have been due to the varying amount of shatter loss observed at some locations (Table 9). Early maturing cultivars often had more shatter loss. Randlett harvest data was excluded from the yield comparisons (Table 11) due to the severe shatter loss.

The spring applied sulfur and boron treatments did not have any effect on the canola seed yield or quality (Table 10). The seed samples were analyzed using an NIR machine that tested several parameters. There were no significant differences among the tested quality parameters.

These demonstration plots will be continued next year. Each location will have at least three replications to ensure better results.

Table 9. Yield (bu/A) results for each location.

	*Duke**	*Hobart: Conv.†*	*Hobart: No-till*†*	*Randlett**	*Comanche*†*	*Chickasha†*	*Hinton*†*	*Okeene**	*Fairview*	*Perry†*	*Garber*†*
DKW 41-10	33.7	33.7	23.6	3.4	27.9	28.3	38.9	10.8	33.5	48.6	14.3
DKW 44-10	34.9	38.2	24.8	5.1	29.1	26.4	37.6	11.0	31.3	62.7	17.5
DKW 46-15	32.2	33.6	25.4	4.0	33.7	22.0	36.9	18.8	38.6	49.0	22.4
DKW 47-15	32.4	34.4	21.7	7.6	32.6	25.1	36.0	35.2	37.4	52.3	25.0
HyClass 110	35.3	35.9	25.0	5.9	29.3	27.6	34.0	38.8	29.9	47.3	18.2
HyClass 115	33.8	37.5	24.9	7.0	33.7	21.5	34.5	44.6	35.2	57.1	20.3
HyClass 125	31.3	35.0	24.3	8.5	31.3	25.8	36.1	40.5	31.5	46.0	22.3
HyClass 154	32.7	34.7	24.7	10.4	34.3	33.1	28.6	33.4	33.2	46.0	21.3
Pinoeer 46W94	---	---	---	---	---	---	---	---	39.4	---	---
Pioneer 46W99	---	---	---	---	---	---	---	---	32.6	---	---
Location Mean	33.3	35.4	24.3	6.5	31.5	26.2	35.3	29.1	34.3	51.1	20.2

All yields adjusted to a 10 percent moisture content basis.
* = No-till locations.

† = Average of two replications at that location. All other locations had only one replication.

<u>Location Notes</u>:
Hobart had minor shatter loss (5 percent to 15 percent) on early maturing varieties.
Randlett had severe hail damage (60 percent to 90 percent) and the early maturing varieties had the most seed loss.
Comanche had minor shatter loss (5 percent to 15 percent) on early maturing varieties.
Okeene had some shatter loss (0 percent to 65 percent) due to strong winds, and early maturing varieties had the most loss.
Garber had low yields due to delayed planting into no-till (thin stand) and had minor hail damage (15%-35%) at early pod development.

What do the letters represent?

Table 10. Spring Applied Sulfur and Boron Results from 10 Locations.

Treatment	*TW (lbs/bu)*	*M (%)*	*OC (%)*	*Yield (bu/A)**
HyClass 125	51.0 a	6.1 a	42.51	28.8 a
HyClass 125 + S	50.4 a	6.2 a	42.46	27.4 a
HyClass 125 + B	50.6 a	6.2 a	42.49	27.4 a
LSD (P=0.05)	0.84	0.28	0.43	1.65
CV	1.76	4.84	1.08	6.28

* = All yields were adjusted to a 10 pecent moisture content basis.
TW = Test Weight, M = Moisture Content, OC = Oil Content.

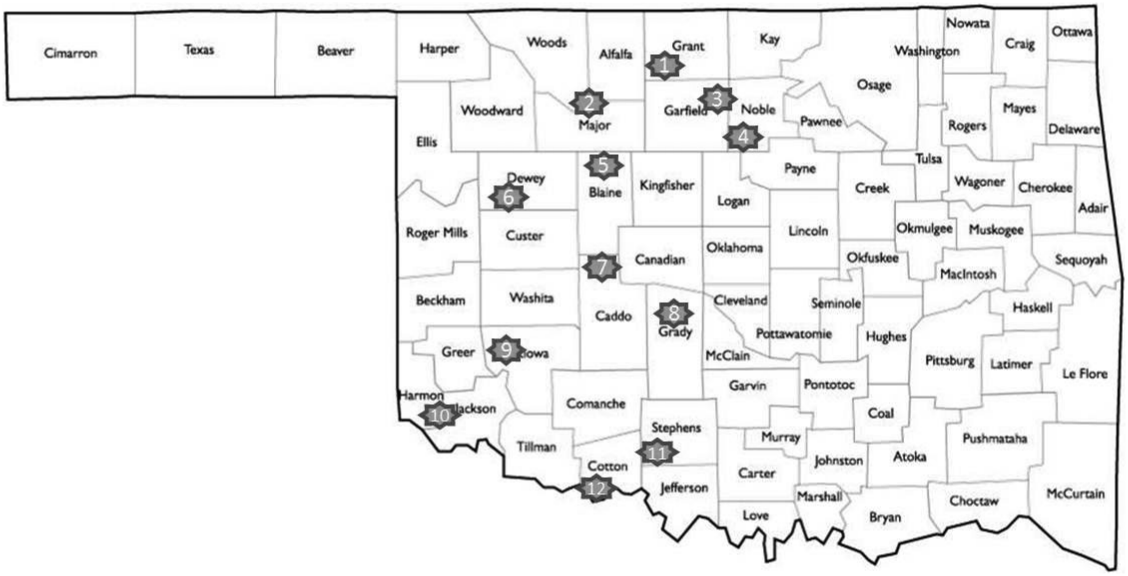
Table 11. Yield (Bu/A) comparisons pooled across locations.

Cultivar	*North I40*	*South I-40*	*NT*	*CT*
DKW 41-10	26.8	28.1	24.9	36.0
DKW 44-10	30.6	28.9	25.8	39.7
DKW 46-15	32.2	28.9	28.2	35.8
DKW 47-15	37.5	31.1	30.5	37.3
HyClass 110	33.6	32.3	30.1	35.2
HyClass 115	39.3	32.9	32.0	37.8
HyClass 125	35.1	32.0	31.0	34.6
HyClass 154	33.5	31.6	29.2	36.8
Mean	33.6	30.7	28.9	36.6
LSD (P=0.05)	11.372	6.181	7.015	6.056
CV	23.04	18.62	20.56	11.24

All yields adjusted to a 10 percent moisture content basis.
NT = No-till, CT = Conventional Till
Randlett data was excluded due to severe shatter loss.

Demonstration plot locations:

Partners in Progress
OILSEED



1. Grant County: Northeast of Nash
2. Major County: West of Orienta
3. Garfield County: North of Garber
4. Noble County: West of Perry
5. Blaine County: Southwest of Okeene
6. Dewey County: West of Putnam
7. Caddo County: Northwest of Hinton
8. Grady County: Chickasha Research Station
9. Kiowa County: Southwest of Hobart
10. Harmon/Jackson County: Southwest of Duke
11. Stephens County: Southwest of Comanche
12. Cotton County: West of Randlett

OKLAHOMA STATE UNIVERSITY

RESEARCH