Partners in Progress
OILSEED

Oilseed Research at OSU 2013

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-1040

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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 oilseed program. Together, we have survived and are looking forward to a brighter future.

Our *2013 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
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.

Partners in Progress - Oilseed

Oklahoma's oilseed producers face many challenges from nature as they grow and market their crops. It's accepted that water availability is the single most important factor limiting agricultural production around the world and that certainly holds true for Oklahoma, as well. Since the old axiom that we really can't do much about the weather also applies, then growers must focus on the areas where something can be done. And in Oklahoma, understanding what can be done requires knowledge that comes through unbiased research and education.

Crops planted in Oklahoma have changed little over time and introducing a new one, which will gain widespread acceptance, is rare. The recent introduction of canola, which has demonstrated excellent potential to complement the largely uninterrupted wheat culture of the state, is proving to be a fortunate exception to the rule. Through experience, producers have come to understand more about this crop and its potential for producing good net returns per acre, as well as gaining the benefit of improving wheat yields when the wheat crop is grown in rotation with canola.

Canola plantings in the state continue to increase at an exponential rate. From an initial planting of only 42,000 acres of canola in 2008, almost a quarter million acres of the crop were planted in 2012. Without question, this increase would not have been possible without the knowledge gained through university research and Extension programs and conveyed to growers.

During a time of shrinking state and federal government budgets and support for research and outreach programs, grower support is particularly critical. Each year, the OOC has provided more than half of the check off funds contributed by growers through oilseed sales to support research and Extension programs at OSU, thus investing in their own prosperity.

Growers understand they need the information that comes from the objective and timely research conducted by their land-grant university. But the benefits don't end there. Partnerships between producers and their university are effective in making real contributions to enhancing the state's economy and reducing food costs for consumers.

The OOC made its first financial contribution to OSU research and Extension in 2011, and followed with funding for projects in 2012 and 2013. The results of the 2013 work are contained in the following pages. This is the continuation of what is expected to be a long and productive relationship between Oklahoma oilseed growers and the university. Oklahoma's oilseed producers are proud to partner with OSU and therefore to be Partners in Progress.

Ron Sholar
Executive Director
Oklahoma Oilseed Commission

Partners in Progress OILSEED

Biology and Management of Black Leg Disease of Winter Canola

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M.J. Stamm
Agronomy Dept., Kansas State University

2012-2013 progress made possible through OOC support

- **In screening the National Winter Canola Variety Trial for reaction to black leg, five of the six commercially grown RoundUp® Ready varieties were the most susceptible entries.**
- **Disease pressure was low in fungicide trials, and while there was a trend for reduced levels of black leg following fungicide treatment, yields did not differ among treatments.**

Reaction of the National Winter Canola Variety Trial to black leg, 2013

The objective of this study was to evaluate the reaction of winter canola genotypes to black leg in comparison to the regional standards of *DKW* and *HYClass* cultivars. The trial was located at the Cimarron Valley Research Station in Perkins in a field of Konawa fine sandy loam previously cropped to corn. The herbicide Treflan 4E at 1.5 pts/A was incorporated into the soil prior to planting on Oct. 2, 2012. Entries were seeded at a rate of 5 lb/A with a grain drill. Plots consisted of seven 25-ft-long rows spaced 7 in. apart. The experimental design was a randomized complete block with three replications separated by a 10-ft-wide fallow buffer. Plots were inoculated with the black leg fungus (*Leptosphaeria maculans*) by spreading artificially infested oat kernels and naturally infested canola stubble along the center of each plot at the seedling stage on Oct. 10, 2012. Plots were top dressed with granular fertilizer (108-0-0 lb/A NPK) on Feb. 19, 2013. Insects were controlled with Warrior 1F at 3 fl oz/A on May 1, 2013. Rainfall during the cropping period totaled 0.87 in. for October, 0.65 in. for November, 0.6 in. for December, 1.76 in. for January, 3.29 in. for February, 0.54 in. for March, 5.1 in. for April, and 7.01 in. for May. Plots were swathed on June 3, 2013 and harvested with a small-plot combine June 12. Yields were adjusted to 10 percent moisture. Black leg was assessed on the stubble after swathing June 7, 2013. Disease incidence (the percentage of plants with black leg cankers) and severity (the level of internal stem decay from 0-5) were assessed by uprooting plants and examining basal cross sections of 10 stems/plot May 16.

Rainfall was below normal in the fall and mostly above normal from February through April. The dry conditions in the fall delayed black leg development and the leaf spot phase of the disease did not appear until the spring. Leaf spots from black leg became widespread in April during budding and flowering stages. Black leg cankers developed on basal areas of most stems near the soil line at moderate levels compared to previous trials atharvest. The reference cultivars (*DKW* and *HYClass*) generally had the highest levels of disease unlike previous trials in which they were intermediate (Table 1). *HYClass* 115W was most susceptible while KSUR21, MH07J14, Safran and Chrome were the most resistant. Yields differed among entries and plot yields were negatively correlated with black leg incidence (r=-0.24, P<0.01), although the relationship was not strong.

Control of black leg with fungicides

Fungicides trials were conducted on the variety DKW 46-15 at the Entomology and Plant Pathology Research Farm in Stillwater in a field of Easpur loam previously cropped to wheat. The field received granular fertilizer (270-0-0 lb/A N-P-K) prior to seeding at 5 lb/A with a grain drill on 2 Oct 2012. The herbicide Roundup Pro 4L at 1.5 pt/A was applied post-emergence on 21 Nov 2012. Plots consisted of seven 25-ft-long rows spaced 7 inches apart. The experimental design was a randomized complete block with four replications separated by a 10-ft-wide fallow buffer. Plots were inoculated with the black leg fungus by spreading artificially infested oat kernels and naturally infested canola stubble along the center of each plot at the seedling stage Oct. 9, 2012. 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 26 gals/A at 40 psi. Insects were controlled with Warrior® 1F at 3 fl oz/A on 1 May 2013. Rainfall during the cropping period totaled 0.61 in. for October, 0.45 in. for November, 0.43 in. for December, 1.0 in for January, 3.11 in for February, 1.12 in. for March, 5.33 in. for April, and 6.22 in. for May. Plots were swathed June 11, 2013 prior to harvest with a small plot combine June 14. Yields were adjusted to 10 percent moisture. Black leg was assessed on the stubble after swathing June 12, 2013. Disease incidence and severity were assessed by uprooting plants and examining basal cross sections of 10 stems/plot.

Evaluation of fungicides

Fungicides representing different mode-of-action groups were applied in the fall and evaluated for protecting against stem canker development in the spring. Quadris is a *group 11* (strobilurin) registered for use on canola. Topsin is an older *group 1* fungicide with activity against diseases similar to black leg. Topsin is registered for white mold (Sclerotinia) control on canola in North Dakota and two surrounding states. Endura® and Fontelis® are *group 7* fungicides with activity on white mold. Endura® is registered for use on canola for white mold control. Quash®, Proline® and Folicur® are group 3 (triazole) fungicides. Quash® and Proline® are registered for use on canola. Prophyt is a phosphorous acid fungicide registered for use on canola, but with doubtful activity against black leg. Treatments were applied at early rosette (2 to 4 leaves) and at mid-rosette (6 to 8 leaves) growth stages.

Rainfall was more than 7 inches below normal (30-year avgerage) from October to January, and nearly normal over the rest of the cropping period. Because of the dry conditions in the fall, leaf spot did not appear until March, and was widespread in April. Most plants had stem cankers at harvest, but disease severity was low and most cankers did not completely girdle the plants. All fungicide treatments numerically reduced canker severity

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Table 1. Reaction of the National Winter Canola Variety Trial to black leg disease in Perkins, 2013.

Entry	Black leg Incidence (%)[z]	Black leg Severity (0-5)[y]	Yield (lbs/A)
HYClass 115W	93.3 ab[x]	3.37 a	1,784 h-q
DKW 47-15	96.7 a	3.00 ab	1,310 n-q
DKW 41-10	96.7 a	2.90 abc	1,376 m-q
DKW 44-10	93.3 ab	2.90 abc	3,079 abc
HYClass 125W	93.3 ab	2.83 a-d	1,819 h-q
Bayer2	93.3 ab	2.77 a-e	1,520 k-q
NK_Petrol	96.7 a	2.63 a-f	2,142 d-n
KS4428	93.3 ab	2.53 a-g	2,584 a-i
Virginia	80.0 a-d	2.47 a-h	3,03 ab
KSR07352S	93.3 ab	2.43 b-i	1,100 pq
46W94	86.7 a-d	2.37 b-j	1,196 opq
NK_Technic 125W	93.3 ab	2.33 b-k	2,460 b-i
Bayer1	86.7 a-d	2.33 b-k	1,214 opq
Baldur	83.3 a-d	2.33 b-k	1,773 h-q
DKW 46-15	80.0 a-d	2.30 b-l	1,445 l-q
VSX-3	83.3 a-d	2.30 b-l	2,456 b-j
Riley	83.3 a-d	2.27 b-m	2,592 a-h
Sitro	96.7 a	2.23 b-m	1,471 k-q
Safran	93.3 ab	2.23 b-m	1,827 h-q
HPX 7228	83.3 a-d	2.20 b-m	2,498 a-i
46W99	86.7 a-d	2.20 b-m	1,581 j-q
SY_Regata	76.7 a-d	2.20 b-m	2,017 f-o
Flash	86.7 a-d	2.13 b-m	1,856 h-q
PT211	73.3 bcd	2.10 b-m	2,227 c-m
HPX 7341	96.7 a	2.10 b-m	1,817 h-q
Kiowa	86.7 a-d	2.10 b-m	2,155 d-n
Claremore	83.3 a-d	2.07 c-m	2,037 f-o
Wichita	80.0 a-d	2.07 c-m	1,659 i-q
Dimension	73.3 bcd	2.03 c-m	2,998 a-d
Rumba	70.0 cd	2.00 c-m	2,771 a-f
MH09H19	80.0 a-d	1.97 d-n	2,011 f-o
Sumner	76.7 a-d	1.93 d-n	1,183 opq
Hornet	93.3 ab	1.93 d-n	1,371 m-q
TCI16	80.0 a-d	1.93 d-n	2,288 c-l
NPZ1005	83.3 a-d	1.93 d-n	2,753 a-g
TCI17	73.3 bcd	1.90 e-n	2,282 c-l
X10W443C	70.0 cd	1.87 e-n	2,292 c-l
Inspiration	76.7 a-d	1.87 e-n	2,751 a-g
TCI/F13	66.7 de	1.83 f-n	1,006 q
KSR07363	70.0 cd	1.73 f-n	1,530 k-q
Griffen	70.0 cd	1.70 g-n	2,292 c-l
Edimax	76.7 a-d	1.70 g-n	2,098 e-n
KS4476	73.0 bcd	1.67 g-n	2,937 a-e
X12W377C	70.0 cd	1.60 h-n	2,242 c-m
X10W665C	73.3 bcd	1.57 h-n	1,900 f-p
Gladius	70.0 cd	1.53 i-n	1,779 h-q
Rossini	80.0 a-d	1.53 i-n	3,353 a
MH09E3	90.0 abc	1.53 i-n	2,447 b-j
Dynastie	73.3 bcd	1.50 j-n	1,886 g-p
KSUR21	80.0 a-d	1.43 k-n	1,945 f-p
MH07J14	70.0 cd	1.40 lmn	2,622 a-h
Safran	66.7 de	1.37 mn	2,336 b-k
Chrome	46.7 e	1.07 n	3,170 ab
LSD (P=0.05)[w] (P=0.05)[v]	21.5	0.90	876
c.v.[v]	16.3	26.76	26

z Percentage of plants with black leg.
y Internal stem decay from black leg from 0 to 5 scale where 0 = no disease, 1 = 25% of the stem with decay, 2 = 50% of the stem with decay, 3 = 75% of the stem with decay, 4 = 100% of the stem with decay, 5 = dead plant.
x Values in a column followed by the same letter are not statistically different at P=0.05 according to Fisher's least significant difference.
w Least significant difference.
v Coefficient of variation.

compared to the nontreated check, but the effects of treatment were not statistically significant (Table 2). Yields did not differ among treatments because of the late disease development.

Evaluation of application timing on control of black leg of winter canola with fungicides, 2013

The fungicides Quadris and Quash, registered for use on canola, were applied at various timings in the fall and early winter with the objective of protecting against 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.

Rainfall was more than 7 in. below normal (30-year avgerage) from October to January, and nearly normal over the rest of the cropping period. Because of the dry conditions in the fall, leaf spot did not appear until March, and was widespread in April. Most plants had stem cankers at harvest, but disease severity was low and most cankers did not completely girdle the plants (Table 3). Difference in levels of disease and yield were not apparent and treatment effects were not statistically significant.

Yield response of winter canola varieties to black leg

The objective of this trial was to use inoculation timing and different levels of variety resistance to measure yield loss from the disease. Canola varieties representing a range of reactions to black leg were selected based on results from previous screening trials in Georgia. The varieties *HYClass* 107W (susceptible), *DKW* 46-15 (moderately susceptible), and *HYClass* 154W (moderately resistant) were planted Oct. 2, 2012, at the Cimarron

Table 2. Effects of fungicides on control of black leg of winter canola in Stillwater, 2013.

Treatment and rate/A[z]	*Black leg* Incidence (%)[y]	*Black leg* Severity (0-5)[x]	*Yield (lbs/A)*
Nontreated check	85 a[w]	2.1 a	2,245
Quadris 2.08F 6.2 fl oz	70 a	1.4 a	2,090
Endura 70WG 5 oz	70 a	1.5 a	2,052
Quash 50WG 4 oz	75 a	1.6 a	1,939
Proline 4F 5.7 fl oz	65 a	1.1 a	2,030
Folicur 3.6F 7.2 fl oz	85 a	1.7 a	2,048
Topsin 70W 1.0 lb	65 a	1.5 a	1,978
Priaxor 4.17F 4 fl oz	67 a	1.5 a	2,134
ProPhyt 4.2L 2 pt	65 a	1.3 a	1,876
Fontelis 1.67F 1 pt	85 a	1.4 a	2,282
LSD (P=0.05)[v]	NS[u]	NS	NS

[z] Applications were made on Oct. 30, 2012 and Nov. 20, 2012.
[y] Percentage of stems with black leg cankers.
[x] Internal stem decay from 0 to 5 where 0 = no disease, 1 = 25% of the stem with decay, 2 = 50% of the stem with decay, 3 = 75% of the stem with decay, 4 = 100% of the stem with decay, 5 = dead plant.
[w] Values in a column followed by the same letter are not significantly different according to Fisher's least significant difference test at P=0.05.
[v] Least significant difference.
[u] NS=treatment effect not significant at P=0.05.

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Table 3. Effect of application timing on control of black leg with the fungicides Quadris® and Quash® in Stillwater, 2013.

Treatment and rate/A (timing)[z]	Black leg Incidence (%)[y]	Severity (0-5)[x]	Yield (lb/A)
Non-treated check	82 a[w]	1.5 a	2,160 a
Quadris 2.08F 6.2 fl oz (ER)	87 a	1.6 a	1,831 a
Quadris 2.08F 6.2 fl oz (ER, MR)	72 a	1.4 a	2,107 a
Quadris 2.08F 6.2 fl oz (MR)	77 a	1.5 a	2,215 a
Quadris 2.08F 6.2 fl oz (MR, LR)	82 a	1.5 a	2,225 a
Quash 50WG 4 oz (ER)	70 a	1.5 a	2,162 a
Quash 50WG 4 oz (ER, MR)	82 a	1.5 a	2,087 a
Quash 50WG 4 oz (MR)	72 a	1.3 a	2,167 a
Quash 50WG 4 oz (MR, LR)	80 a	1.6 a	1,933 a
LSD (P=0.05)[v]	NS[u]	NS	NS

[z] Applications were made at growth stages early rosette (ER) on Oct. 30, 2012, at mid-rosette (MR) on Nov. 20, 2012, and at late rosette (LR) on Dec. 17, 2013.
[y] Percentage of stems with black leg cankers.
[x] Internal stem decay from black leg from 0 to 5 scale where 0 = no disease, 1 = 25% of the stem with decay, 2 = 50% of the stem with decay, 3 = 75% of the stem with decay, 4 = 100% of the stem with decay, 5 = dead plant.
[w] Values in a column followed by the same letter are not significantly different according to Fisher's least significant difference test at P=0.05.
[v] Least significant difference.
[u] NS=treatment effect not significant at P=0.05.

Valley Research Station in Perkins in a field of teller loam previously fallowed. Entries were seeded at a rate of 5 lbs/A with a grain drill. The herbicide Roundup Pro 4L at 1.5 pt/A was applied post-emergence Nov. 21, 2012. Plots were top dressed with granular fertilizer (110-0-0 lb/A N-P-K) Feb. 19, 2013. Insects were controlled with Warrior 1F at 3 fl oz May 1, 2013. 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 timing while split plots were the canola varieties. Whole plots were surrounded by noninoculated buffer plots planted with DKW 46-15. Split plots consisted of seven 25-ft-long rows spaced 7 in. apart. Whole plots were inoculated with the black leg fungus growing on oat kernels, and with stubble from an infested canola field at seedling (2 to 3 leaves), early rosette (6 to 8 leaves) and late rosette (12 to 15 leaves) growth stages in the fall; and at bolting (first flower bud) in the spring. Rainfall was the same as the other trial located at Perkins. Plots were harvested and evaluated for disease.

explain, please

The dry conditions in the fall delayed black leg development and the leaf spot phase of the disease did not appear until the spring. Black leg cankers developed on basal areas of most stems near the soil line, but did not develop sufficiently to kill plants prior to harvest. Both disease incidence and severity were highest for the seedling and rosette inoculation timings compared to the noninoculated check or inoculation at bolting in the spring (Table 4). Levels of disease were highest for DKW 46-15 compared to the other varieties. Yield data was compromised because of harvest errors that led to missing data for 17 of the 60 plots. Yields did not differ among inoculation timings or varieties. Plot yields were not correlated with black leg incidence or severity indicating the disease did not impact yield.

What does (S), (MS), and (MR) mean?

Table 4. Effects of inoculation timing and variety on black leg disease and yield in Perkins, 2013.

Inoculation timing[z]	*HC 107W (S)*	*DKW46-15 (MS)*	*HC 154W (MR)*	*Average*
Black leg incidence (%)[y]				
Check	55.0	67.5	32.5	51.7 b[x]
Seedling	80.0	92.5	62.5	78.3 a
Early rosette	74.4	80.0	52.5	68.9 ab
Late rosette	52.5	77.5	62.5	64.2 ab
Bolting	37.5	70.0	52.5	53.3 b
Average	59.8 a	77.5 b	52.5 a	
Black leg severity (0-5)[v]				
Check	1.0	1.1	0.5	0.9 bc
Seedling	1.5	2.3	0.9	1.6 a
Early rosette	1.1	2.1	1.0	1.4 ab
Late rosette	0.8	1.6	0.9	1.1 abc
Bolting	0.4	1.2	0.8	0.8 c
Average	1.0 b	1.7 a	0.8 b	
Yield (lbs/A)				
Check	2,836	2,476	3,157	2,823 a
Seedling	3,460	2,864	2,820	3,048 a
Early rosette	2,491	2,567	2,773	2,610 a
Late rosette	2,190	3,033	2,877	2,699 a
Bolting	2,958	2,618	3,225	2,934 a
Average	2,787 a	2,711 a	2,970 a	

[z] Inoculation dates were seedling=Oct. 31, 2012, early rosette=Nov. 21, 2012, late rosette= Dec. 17, 2012, and bolting=April 5, 2013.

[y] Percentage of plants with black leg.

[x] Values in a column or row followed by the same letter are not statistically different according to Tukey's Mean Separation Test.

[w] Least significant difference, NS=treatment effect not significant at P=0.05.

[v] Internal stem decay where 0 = no disease, 5 = stem completely girdled by black leg.

where does the notation for footnote "w" go?

Impact of In-Furrow Di-ammonium Phosphate on Canola Production

D. Brian Arnall
Department of Plant and Soil Sciences

This study was established in the fall of 2012 to evaluate the impact of Di-ammonium 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. In some cases, this may work, however, there is the potential for increased failures. Two sites were selected that would typically receive some form of phosphorus fertilizer. The first location, Lahoma, had a soil test 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. Canola was drilled with a John Deere double disk drill on 15-in. rows. Throughout the season the plots were sensed with a GreenSeeker® sensor to record plant biomass, vigor and stand. At maturity the plots were swathed prior to harvesting with a plot combine. Sub-samples were analyzed for oil content and quality.

Table 5. Treatment structure applied at all locations.

Treatmentt	*lbs DAP w/seed*	*lbs N/P seed*	*N pre-plant*	*Top-dress N*
1	0	0/0		
2	0	0/0	50	75
3	0	0/0	50 N/50 P	75
4	15	3/7	47	75
5	30	5.5/14	44.5	75
6	45	8/21	42	75
7	60	11/27.5	39	75
8	75	13.5/34/5	36/5	75
9	0	0/0	0	125
10	15	3/7	0	122
11	30	5.5/14	0	121.5/5
12	45	8/12	0	117
13	60	11/27.5	0	114

Perkins (Acidic soil)

Treatment 1 Check 0N 0P

Treatment 2. N Broadcast 0P

Treatment 3. NP Broadcast

Treatment 4. NP banded 15lbs DAP

Treatment 6. NP banded 45lbs DAP

Treatment 8. NP banded 75lbs DAP

Figure 1. Images collected from Perkins research station near crop maturity.

Lahoma (Low P soil)

Treatment 1
Check 0N 0P

Treatment 2.
N Broadcast 0P

Treatment 3.
NP Broadcast

Treatment 4.
NP banded 15lbs DAP

Treatment 6.
NP banded 45lbs DAP

Treatment 8.
NP banded 75lbs DAP

Figure 2 a-f. Images collected from Lahoma research station near crop maturity.

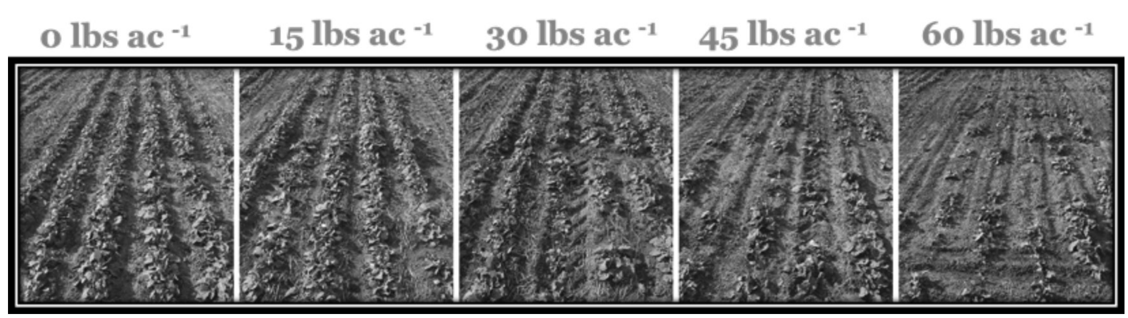

Figure 3. Early images of stand from Lahoma.

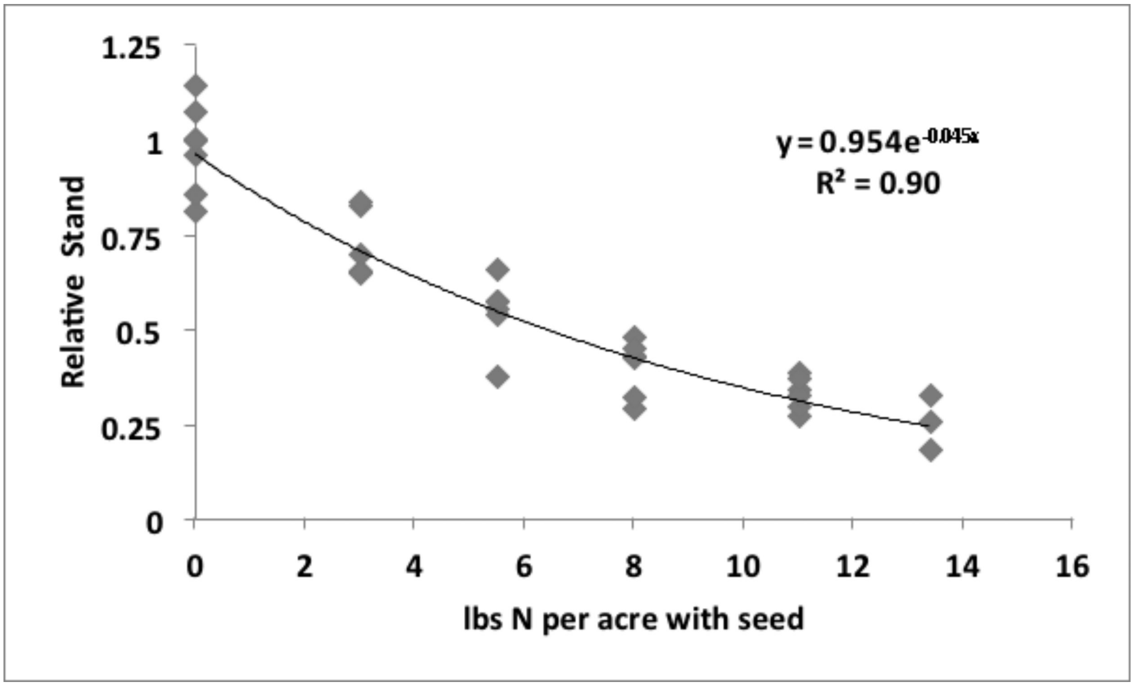

Figure 4. Relationship between N rate and relative stand when compared to the check.

Conclusion

For both years and sites, stand was negatively impacted by DAP placed with seed at 15 lbs DAP/A^{-1}, but observations were made of stand reduction at 30 lbs DAP/A^{-1}. Placing 5 lbs/A^{-1} of N or more with canola seed at planting will negatively impact stand. A reduction in stand does not always mean there will be a reduction in yield. At all sites and years, NDVI values for in-season growing measurements, treatments that received pre-plant N had higher NDVI values than those that did not receive pre-plant N. Yields at Lahoma 2011-2012 saw no significant difference in yields due to canola being a compensatory crop, excluding the check (zero fertilizer) having the lowest yielding treatment. Lahoma, 2012-2013, the 50 N 30 P_2O_5 treatment of only broadcast application had the highest yielding treatment while the check (zero fertilizer) had the lowest yielding treatment. Yields at Perkins, 2011-2012, were exceptionally low due to unusually warm and dry weather patterns. Yields at Perkins for 2012-2013 with increased soil moisture availability saw an increase in yield production. Similar results were found at Perkins 2012-2013 as those of Lahoma 2012-2013. Both sites for 2011-2012 oil content was only affected by treatments that did not receive P fertilizer. In these treatments oil quality was increased with P fertilizer. Seed protein was not affected by fertilizer treatment. Perkins site 2012-2013, seed protein was higher in treatments that received little or no pre-plant broadcasted N fertilizer. Treatments that received both pre-plant N and top-dress N had lower seed protein concentrations. Lahoma 2012-2013 produced different results when looking at seed protein. The check produced the lowest seed protein, while all other treatments that received fertilizer were significantly higher in seed protein. However, seed protein was highest for the check (zero fertilizer) than all other treatments.

what is NDVI?

From this research, an iPhone app is being developed in which a producer can input crop, row width, and fertilizer source and be provided a safe rate.

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

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2012-2013 progress made possible through OOC support

- **No benefit has been found of insecticides in the absence of common pests.**
- **Confirmed previous calendar scouting procedures for common pests was adequate.**

We continued to develop data on the efficacy and yield benefit of selected insecticides for control of diamondback moth (DBM). These experiments were established at two locations to follow up on some observations reported in 2012, which suggested our producer cooperator in Drummond obtained a higher yield in his canola than was harvested in the research plots, despite being planted with the same variety. The difference was the producer sprayed his plots at first detection of DBM, while we waited until moth populations reached economic thresholds. The objectives were to:

1. Evaluate and demonstrate the efficacy and cost effectiveness of a nonpyrethroid insecticide for DBM (and other foliage-feeding caterpillars) management in canola.
2. Evaluate effect of early spraying an insecticide on canola yield.
3. Develop a comprehensive and efficient scouting plan for monitoring all key and occasional insect pests of winter canola in the Southern Plains.

Experiments were arranged in a replicated randomized complete block design with four replications. Plots were established in Perkins October 2, 2012, and Duke October 3, 2012. Ten fields were sampled throughout the growing season to monitor pests, including seed pod weevil.

Objective 1

Selected insecticides were applied as foliar treatments to evaluate efficacy against DBM. Riley canola was planted Oct. 2, 2012 (Perkins) and Oct. 3, 2012 (Duke) in 12-in. rows in plots measuring 10 ft x 10 ft. The treatments listed below were applied to designated plots, and all plots were sampled according to protocol. Sprays were initiated at first detection of DBM infestations to evaluate their effect on control, residual activity and yield potential for control of DBM. The plots in Perkins were sprayed on Nov. 12, 2012, and in Duke Nov. 13, 2012.

Post treatment sampling for DBM (and cabbage looper, if present) was conducted at 7, 14, 21, 28, 35 and 110 days after treatment to quantify larval density. On each sampling date, 10 plants per plot were randomly selected and carefully examined for DBM larvae. Larval DBM numbers were extremely low to absent. The effect of these insecticide treatments on yields was estimated at the Perkins location by harvesting a 5 ft x 10 ft strip 1 June 1, 2013, and the Duke location by harvesting three plants per plot June 7, 2013.

One replication was lost at the Duke location, so three replications were used to harvest yield. Plant stand at the Duke location was poor, and the plots received a total of 7.88 in. of precipitation from planting through harvest. Yield was estimated by harvesting three plants per plot.

Objective 2

Locations for plots to determine the effect of early insecticide sprays on canola yield were established (Perkins and Duke, randomized complete block design, with four reps) in the fall of 2012. Plot size was 10 ft x 70 ft. Harvested plot size for Perkins was 5 ft x 70 ft. Harvested plot size for Duke was 10 plants per plot. Plots were sprayed Nov. 12, 2012 (Perkins), and Nov. 13, 2012 (Duke), and harvested June 1, 2013 (Perkins) and June 7, 2013 (Duke).

Yield was variable. There were no significant differences in yield between treatments at either location.

Table 6. Replicated DBM Insecticide Efficacy Trials – Perkins, 2012-2013.

Treatment	*Reps*	*Product (rate)*	*Yield bu/A*
1	4	Coragen 3.5 oz/A	20.74
2	4	Coragen 5 oz/A	28.53
3	4	Brigade 2.0 oz/A	24.00
4	4	Brigade 2.6 oz/A	28.62
5	4	Mustang 4 oz/A	24.70
6	4	Proaxis 1.92 oz/A	20.08
7	4	Proaxis 3.84 oz/A	20.61
8	4	Warrior 0.96 oz/A	23.52
9	4	Warrior 1.92 oz/A	24.96
10	4	Water	21.13

Table 7. Replicated DBM Insecticide Efficacy Trials – Duke, 2012-2013.

Treatment	*Reps*	*Product (rate)*	*Yield bu/A*
1	3	Coragen 3.5 oz/A	6.08
2	3	Coragen 5 oz/A	8.20
3	3	Brigade 2.0 oz/A	7.45
4	3	Brigade 2.6 oz/A	9.55
5	3	Mustang 4 oz/A	5.82
6	3	Proaxis 1.92 oz/A	4.82
7	3	Proaxis 3.84 oz/A	6.72
8	3	Warrior 0.96 oz/A	9.43
9	3	Warrior 1.92 oz/A	9.36
10	3	Water	8.72

Table 8. Replicated DBM Insecticide Efficacy Trials – Perkins, 2012-2013.

Treatment	*Product (rate)*	*Yield bu/A*
Treated	Warrior 1.92 fl oz/A	22.20
Untreated	Water 20 gpa	22.08

Table 9. Replicated DBM Insecticide Efficacy Trials – Duke, 2012-2013.

Treatment	*Product (rate)*	*Yield grams/plant*
Treated	Brigade 2.0 oz/A	53.56 gm
Untreated	Water 20 gpa	60.45 gm

Objective 3

Ten canola fields were sampled throughout the western half of Oklahoma to describe seasonal activity of the insect pests. These fields were visually scouted about 21 days apart (depending on weather conditions) to document pest species and life stages. Canola aphids (cabbage, green peach and turnip aphids) were virtually nonexistent over much of the canola acreage. The drought likely had some detrimental influence on establishment of aphids in the fall crop. DBM was nearly absent, as well. We found higher than expected levels of leafhoppers, but no other pest of significance was recorded.

2012-2013 Winter Canola Demonstration Plots

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2012-2013 progress made possible through OOC support

- **Thirteen locations seeded across western Oklahoma.**
- **Thirteen field tours held in April with more than 300 attendees.**
- **Diammonium phosphate (18-46-0) applied in-furrow at seeding reduced canola stands, but not yields.**

Introduction

Interest in producing winter canola in Oklahoma is at an all-time high. Since winter canola is a new crop for many producers, the need for production education is very important to limit the risks associated with learning a new crop in this region. Basic variety trials have been established across western Oklahoma to serve as an educational tool for new canola producers hungry for more information. These trials will provide local variety data for producers, as well as host spring field tours.

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.

Another objective of these plots was to help demonstrate the response of canola to fertilizer applied directly with the seed at planting. Some producers prefer to apply some fertilizer with their grain drills at planting, but there have been a few concerns about how much fertilizer canola can handle when applied directly with the seed. OSU has performed similar trials to help determine safe application rate recommendations. For these plots, three treatments were compared, a nonfertilized check, 30 lbs/A of 18-46-0 (DAP) applied in-furrow, and 90 lb/A of DAP applied in-furrow. When determining these three treatments it was anticipated a slight stand loss at the 30 lb rate, which may be noticeable, and a greater stand loss at the 90-lb rate.

Materials and Methods

There were 13 demonstration plots planted throughout western Oklahoma. Site locations according to the nearest town included: Taloga, Fairview, Miami, Perry, Garber, Nash, Custer City, Cordell, Hinton, Hobart, Altus, Walters and Oklahoma City. All locations had a minimum of three replications. Due to the drought conditions, early October freezes and more continued drought, seven locations did not establish into a desirable stand. Typical plot maintenance included fertility and pesticide applications.

The cultivars in these trials included: Dekalb DKW 41-10, DKW 44-10, DKW 46-15, DKW 47-15, Croplan *HYClass* 115, *HYClass* 125, DL Seeds DL 302266, Pioneer 46W94, and 46W99. All cultivars were glyphosate resistant. The two cultivars from Pioneer were hybrids, and all other cultivars were open pollinated varieties.

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

Fertility treatments were established within the variety trials. The cultivar *HYClass* 125 was used for the in-furrow treatments. The DAP 18-46-0 fertilizer was applied directly with the canola seed at planting. Stand counts were recorded late fall. The demonstration plots were direct harvested with a small plot conventional combine.. Harvest data was only utilized at five of the locations, which included Perry, Miami, Nash, Walters and Oklahoma City.

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 April 8-12 and April 25, 2013. Approximately 300 producers in attendance visited 13 destinations over a 6-day period. 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, Executive Director), Brian Arnall (OSU, Nutrient Specialist), Josh Bushong (OSU, Canola Extension Specialist), Tom Royer (OSU, Entomology Specialist), and John Damicone (OSU, Plant Pathology Specialist).

The consensus was the tours were very successful. Many producers were inquisitive and enthusiastic about the potential of canola production in their operations. Attendance was up 15 percent from last year.

All locations were set back multiple times due to the late spring freezes and ice storm events in April and into May. The typical flowering period, which usually takes three to four weeks, was extended to five to six weeks. Early maturing varieties were impacted by these freeze events, more so than the mid to late maturing varieties.

The yield results varied from location to location (Table 10). Early maturing cultivars often had more shatter loss. The trial near Walters had the most shatter loss. The Nash location had some shatter loss (0 to 30 percent), which was more prevalent in the early maturing varieties (15 to 30 percent).Due to the late spring freeze events, it should be advised to review multiple year variety results when selecting any particular variety.

The in-furrow DAP treatments impacted fall canola stands as predicted (Table 11). Since canola compensates well with lower plant populations, the yield results did not statistically differ among the treatments (Table 12). What does not show in the data is that there was a noticeable delay in maturity among the three treatments, with the high rates of in-furrow DAP being delayed the most. Since these treatments had a lower plant population, the plants produced more secondary branches to fill the open pod canopy, which delayed maturity. Under normal growing conditions without late spring freezes, there may have been a larger difference among the treatments.

These demonstration plots will be continued next year thanks to the support of the OOC.

Table 10. Seed oil content (%) and yield (lbs/A) results for each location.

	Perry		Miami		Nash*		Walters*		OKC	
Cultivar	*Oil*	*Yield*	*Oil*	*Yield*	*Oil*	*Yield*	*Oil*	*Yield*	*Oil*	*Yield*
	—%—	—lbs/A—	—%—	—lbs/A—	—%—	—lbs/A—	—%—	—lbs/A—	—%—	—lbs/A—
DKW 41-10	39.4	1,639.5	38.9	2,139.5	37.3	1,109.6	31.7	72.8	37.2	2,544.7
DKW 44-10	39.6	1,739.3	41.4	2,269.0	37.9	1,868.5	34.2	233.5	38.2	3,131.4
DKW 46-15	41.2	1,768.6	41.3	1,737.1	40.2	1,601.2	34.2	160.1	39.9	2,735.4
DKW 47-15	40.5	1,835.3	41.1	1,945.2	39.1	1,561.9	35.1	241.9	39.8	2,555.0
HyClass 115	41.2	1,935.0	41.2	1,807.1	40.6	1,207.7	34.5	196.1	40.2	2,820.0
HyClass 125	41.5	1,800.5	41.7	2,122.6	40.5	987.7	34.5	232.8	39.5	2,610.8
DL 302266	41.4	1,842.1	44.0	1,881.1	42.1	2,194.9	33.8	108.0	40.1	2,807.5
46W94	40.0	2,317.4	44.3	2,691.1	40.9	1,807.9	36.1	417.9	40.4	3,125.0
46W99	41.4	2,175.5	43.6	2,925.5	41.1	1,600.3	37.0	448.5	40.2	3,048.9
Grand Mean	40.7	1,894.8	41.9	2,168.7	40.0	1,548.9	34.6	234.6	39.5	2,819.8
LSD (P=0.05)	NS	290.2	2.0	NS	0.8	NS	NS	72.9	0.4	367.7
CV	2.1	8.9	2.8	17.6	1.1	16.3	3.5	17.9	0.6	7.5

All yields adjusted to a 10 percent moisture basis.

*Locations with shatter loss.

Table 11. Stand loss from applying DAP in-furrow directly with canola seed at planting.

Location	*HC 125 Stand* ---Plants/A---	*30 lbs/A DAP Stand Reduction* ---%---	*90 lbs/A DAP Stand Reduction* ---%---
Perry	196,264	49	78
Miami	N/A	N/A	N/A
Nash	238,082	16	57
Walters	248,605	19	45
Altus	287,496	29	74
Mean	242,612	28	64

Table 12. In-furrow DAP influence on oil content (%) and yield (lbs/A) for each location.

	Perry		*Miami*		*Nash**		*Walters**	
	Oil ---%---	*Yield* ---lb/a---	*Oil* ---%---	*Yield* ---lb/a---	*Oil* ---%---	*Yield* ---lb/a---	*Oil* ---%---	*Yield* ---lb/a---
HC 125	41.5	1,800.5	41.7	2,122.6	40.9	9.87.7	34.5	232.8
HC 125 + 30 lbs DAP	40.7	1,736.6	42.5	2,099.2	40.8	916.5	35.2	250.8
HC 125 + 90 lbs DAP	41.0	1,486.0	42.3	1,660.3	40.2	599.7	34.8	285.2
Grand Mean	41.1	1,674.4	42.2	1,960.7	40.6	834.6	34.8	256.3
LSD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
CV	1.3	16.3	2.1	15.8	0.9	23.3	2.4	21.5

All yields adjusted to a 10 percent moisture basis.

*Locations with shatter loss.

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