Canola Adaptation and Production in the Southern High Plains

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Texas AgriLife Extension Service & New Mexico State University

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The long-term goal of this project is to develop a canola management system that could replace up to 10% (400,000 acres) of winter wheat in the Southern High Plains. Since 2006, less than 1,000 acres of canola has been grown annually, mostly among producers who are 'just trying' canola, seedblocks, limited contracting, and grazing canola. The interest in biodiesel—though unfortunately the 15 Mgy plant at Clovis, NM stopped construction—remains modest among farmers, and producers appear interested in the weed control options that conventional winter and Roundup Ready canola offer. Furthermore, Producers Co-op Oil Mill, Oklahoma City, is edging delivery points closer to the region.

A brief summary of status and impact results for project components are outlined below. Three major test sites suffered various maladies that precluded any and all research test results.

1) Winter freeze injury killed the canola tests at Etter, TX, (planted 9/22/07) as all plants died in late December 2007 through early January 2008. We believe more irrigation might have increased winter survival as well as planting about two weeks earlier. Tests lost at the Etter site include variety trial, N rate, forage yield, and weed control.
2) Excessive weed pressure infested the irrigated test site at Halfway, TX, and we were not able control the weeds with labeled herbicides (bromoxynil, clopyralid; glyphosate could not be used due to testing of both conventional and Roundup Ready varieties). Tests lost (yield data) included variety trial, N rate, forage yield, but planting date and insect tests provided meaningful data.
3) Significant storm damage affected the Artesia variety trial, planting date, and N rate trials.
4) Dryland variety trials at Halfway (5% stand) and Muleshoe (20%), TX were not worth harvesting, and the weed control trial at Vernon, TX was not planted due to dry soil. The High Plains variety trials planted a couple of weeks earlier could have taken advantage of early September rains, but subsequent dry conditions would have still severely limited rainfall (e.g., Halfway, 1.5" rain, Sept07-Apr08, 1.4" in May before physiological maturity).

In some ways these lost trials were a surprise if not worse to our research team, and I believe it repositioned our thinking in terms of what we must do to develop a successful production program for canola in the Southern High Plains. These initial experiences point out to all of us that canola requires more attention and management than the relatively low maintenance of winter wheat. This point will be emphasized to current and prospective canola growers in our Extension programs to ensure that they have the information needed to manage canola in an agronomically sound fashion to ensure their best potential for success.

Variety Trials

2007, Irrigated, Halfway and Etter (froze out), TX; Clovis and Artesia, NM

The primary test sites with 16 varieties were Halfway and Clovis. The Halfway test site under pivot was hit heavily with perennial weeds on newly broke ground. Stands were fairly good, but due to weed pressure, selected yields were collected for a few varieties averaging only 620 lbs./A in spite of a combined 1." of rainfall and 12" of irrigation. Yields at Clovis ranged from 311 to 1,280 lbs./A (KS3074), with a trial average of 710 lbs./A. In light of the levels of irrigation applied (12") the yields are considered unsatisfactory although winter moisture was particularly low (). Delayed planting by about 2 weeks (late September) may have contributed to lower stand establishment reducing yields.

The Artesia, NM flood irrigated test site received significant hail storm damage before and wind storm damage after mowing in advance of harvest and pod shattering losses were high. All varieties yielded less than 400 lbs./acre (unadjusted for storm damage estimates) at each of two planting dates in spite of irrigation levels that ranged from 25 to 30".

As noted above, dryland trials planted Sept. 19 and 20 at Muleshoe (rainfall 1.8", Sept07-Apr08; 1.7" in May08) and Halfway, TX (rainfall 1.5", Sept07-Apr08; 1.4" in May08) did not

achieved a sufficient stand due to essentially no rainfall after seeding. The consensus is that we should consider dryland seeding as soon as moisture conditions are favorable after Sept. 1.

Spring canola—The Farmington, NM test site elevation above 5,400' has not led to good fall-planted winter canola survival and yield in past NMSU trials. Spring canola testing, in conjunction with multi-state canola testing programs, were supported with CSREES funds. Eighteen varieties were tested in an April seeding, with trial yield range from 358 to 2,014 lbs./A (top was Hyola 357 Magnum RR; average 975 lbs./A), using 20" of irrigation due part to only 0.6" of rainfall during the growing season.

2008 Canola tests in place: four irrigated sites in TX (one with poor stand) & NM, and one dryland site (TX) which failed to achieve a stand due to no rainfall.

Germplasm Evaluation

Dr. Dick Auld, Texas Tech, used CSREES funds to supplement and expand data collection from 2007-2008 national and regional canola trials as well as fund evaluation of early generation canola lines planted in two trial sites near Lubbock, TX. Tests had limited stand establishment due to a driving rain which occurred two days after planting (24 Sept 07) which compacted the soil. Severely reduced stand establishment prevented the development of agronomic data beyond stand establishment on these trials. Spring stand counts were made to estimate winter survival of all trials but the highly variable fall stand prevent the development of an accurate data base. Most varieties among the three trials established at less than 4 plants per square meter.

Repeat trials are in place for 2008-2009, and are in good condition at one site and reduced stand at the second location.

Planting Date

Sharp results have been obtained for delayed canola planting at Texas and New Mexico planting sites. The current Great Plains Canola Production guide (2006) notes that the Texas Panhandle and eastern NM have a suggested range of planting dates of 9/12-10/6, and 9/15-10/10 for the Lubbock/Halfway/Artesia locations.

The first two years of results at Halfway, TX have demonstrated that delayed plantings are severely hurting stands or leading to outright death of essentially all canola plants at the latest of three planting dates (Table 1). Although fall 2007 plantings at Etter, TX did not include a planting date comparison, there even well established canola planted at dates similar to Halfway in 2007 still resulted in complete death of plants.

Similar results have also been achieved at Clovis and Artesia, NM. The 2007 trials found few plants surviving the early and mid-October planting dates at Clovis (no yields vs. 886 lbs./A when planted ~Sept. 25). The Artesia, much further to the south, found no canola survival planted Oct. 30, 2007 vs. Oct. 9 and earlier. These data affirm the unfortunate experience of a few producers in the region who have not planted canola in timely fashion and had minimal stand.

Table 1. Halfway, TX canola planting date stand ratings and winter survival (percent of primary planting date, 2007 & 2008.

Year	Stand Rating†	
	Late Fall	Early Spring
2007		
Sept. 20	100	95
Oct. 5	80	40
Oct. 18	15	2
2008		
Sept. 23	100	100
Oct. 7	30	20
Oct. 20	10	0

†Ratings are a percentage of the fall stand achieved at the first planting date.

Additional canola planting date tests are repeated at Clovis as well as Halfway in 2009.

Nitrogen Fertility

Fertilization tests for 2007 were completed at Clovis with no significant effect on yield of either fall N (30 lbs. N/A) or spring topdress N. Yields were less than 575 lbs./A in all cases as other factors impacted these tests more than N leading to low yields.

As noted above trial sites were lost at Etter (freeze), Halfway (weeds), and compromised at Artesia (storm damage). Trials are being repeated in 2008-2009.

Forage Biomass for Grazing

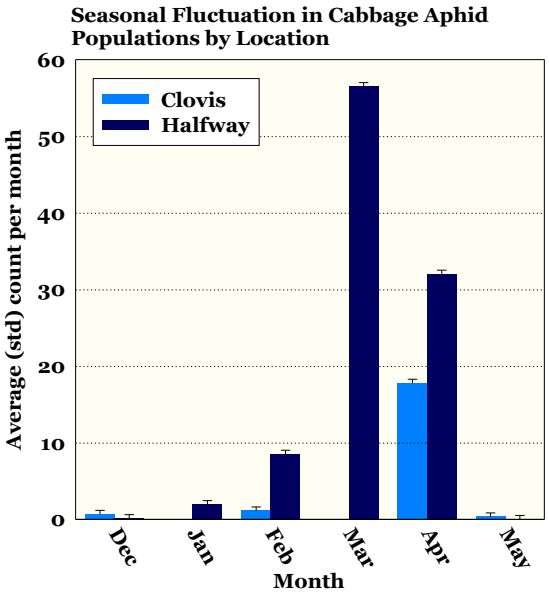
Due to producer interest in the potential for grazing in canola, tests were in place at Halfway and Etter (froze out) in 2007-2008. In general, the Halfway test was deemed to have insufficient growth through mid-January 2008 to merit mowing for forage yield, effect on continued growth, and seed yield. Similar results occurred in 2008, but plots were mowed Feb. 27 at Halfway, forage yield collected, and observations begun on regrowth. Forage removal using a bagging lawn mower was gauged at 25, 60, and 90% removal of biomass. Canola was not yet bolting, and in comparison to popular wheat varieties, TAM 112 was in initial jointing (the recommended time to remove cattle from grazing if grain yield is desired). Halfway test plots will be measured for seed yield of 'Wichita' vs. unmowed plots.

Texas Extension staff has followed closely the winter canola grazing program of Allen Brinkerhoff, Bailey Co., TX, who has planted dryland canola in early September 2007 and 2008. Mr. Brinkerhoff's early experience is that he must plant the canola earlier if needed to take advantage of the opportunity to get his stand established. Otherwise, in a dry year the stand is not achieved, and he must consider planting wheat to reduce the potential shortfall on forage. On the other hand, Mr. Brinkerhoff has achieved modest forage yield in 2008 for fall and early winter grazing in spite of dry conditions (rainfall 0.6" in Sept08, 2.5" in Oct08, none for Nov08-Jan09). The current stand is grubbed down and any rainfall appears it will generate renewed growth though the level of diamondback moth larvae may limit regrowth potential if rains occur. Mr. Brinkerhoff, based on stocker cattle weight gain, estimates he has achieved $109/A return on the grazed canola, but significantly less with wheat for the 2008-2009 cropping season.

Insects in Canola

Canola planted in the fall on the Southern High Plains is host to a number of insect pests. In total, nine insect species were collected in 2007-2008 canola (two species of beneficials). Two aphid species, cabbage (Fig. 1) and turnip, were the most predominant pests at both Clovis and Halfway field locations, and they occurred mainly in March-April.

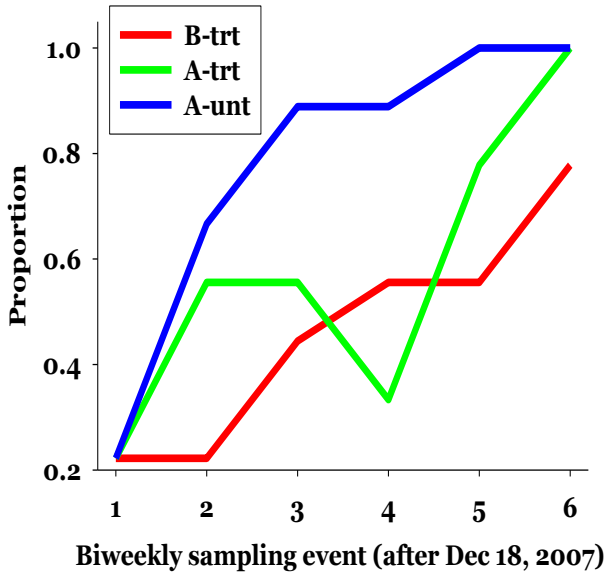
Fig. 1. Cabbage aphid observations in Southern High Plains winter canola, 2007-2008.



At the Halfway location, highest numbers of both aphid species were collected from untreated canola, and the proportion of infested plants in untreated plots increased faster over time than in plots with seed treatments (Fig. 2). Seed insecticide treatments demonstrated potential though not necessarily agronomic reductions in aphid populations up to four months after seeding, a longer range of protection (up to 2 months) than is normally expected from seed treatments.

Results also show that average weights of infested (combined number of aphids and thrips) and non-infested plants for all three seed treatment groups from both field locations, and it is seen that larger plants were consistently more susceptible than smaller plants. This is an important aspect as early planting (in early fall) may be an advantage from an agronomic perspective so that canola plants are well-established before the winter. However, such well-established plants may also be an attractive host for late-season pests in the fall/early winter when most other hosts are senescing.

Fig. 2. Proportion of infested plants due to seed insecticide treatment (2) vs. untreated canola seed, Halfway, TX, 2007-2008 (planted Sept. 20, 2007). One treatment significantly reduced insect numbers through the winter.



Herbicide Testing in Winter Canola

Planned herbicide treatment tests for Roundup Ready winter canola included spring and fall treatments of glyphosate and rate treatments of pre-plant incorporated trifluralin. The test was lost at Etter in 2007-2008 (freeze), and thin stands emerged on part of the 2008-2009 trial. Similar results have occurred at the Vernon dryland test site (no planting in 2007 due to no soil germination moisture).

Canola Irrigation

Irrigation tests for canola were not part of the original 2007-2009 project. Dr. Angadi, however, conducted surface drip irrigation at Clovis, NM on spring canola in 2007 and 2008 (Table 2). Rainfed spring canola (11.3" rainfall) yielded well, and supplemental irrigation (up to 10") increased yields up to 1,200 lbs./A more. Timing of irrigation suggested that in this trial irrigation applied earlier in the season (vegetative growth) benefited yield more than did irrigation during the reproductive stage. This result, however, may be highly dependent upon the timing of natural rainfall.

Winter canola irrigation is now part of the expanded 2008 CSREES project in conjunction with Colorado State University (see below).

Table 2. Effect of water regimes (surface drip irrigation) and time of applications on seed yield of spring canola at Agricultural Science Center, Clovis, NM (2007/2008).

Treatments†		Actual total water use (inches)‡	Seed yield (lbs./A)	HI
Rain fed	**1-0-0-0-0**	11.3	1,488	0.24
Limited	**1-1-1-1-1**	14.2	1,610	0.20
8" Vegetative. Limited (early)	**1-1-2-2-2**	18.1	2,225	0.28
8" Reproductive Limited (late)	**2-2-2-1-1**	16.2	2,001	0.25
Full (weekly replacement)	**F-F-F-F-F**	20.4	2,432	0.28
12" Vegetative Limited (early)	**1-1-3-4-3**	21.8	2,582	0.30
12" Reproductive Limited (late)	**2-4-3-2-1**	19.2	2,172	0.27
0.75 Weekly Replacement	**S-S-S-S-S**	17.5	2,061	0.26

†Timing and amount of irrigation treatments corresponding to progressive growth stage of winter canola. The lower the number the more irrigation in the applied treatment.
‡Irrigation plus precipitation

Canola Economics

Canola budgets will be developed at the conclusion of the 2009 winter canola harvest.

Extension Education

Our first canola production meeting in the CSREES project was conducted at Clovis, NM on Aug. 29, 2008 as an add-on to the NMSU field day. Nineteen attended the canola program. Additional canola presentations have been made as part of a USDA-RMA workshop on oilseed crops (Dec. 10 & 11, 2008, Plainview & Wichita Falls, TX). Texas Extension's Calvin Trostle has noted current USDA-funded work on winter canola at over 12 spring meetings to let producers know about new USDA research in the High Plains. Producers have been most interested in the potential for winter Roundup applications to control winter weeds common to their wheat production. Companion questions also arise about marketing and delivery locations.

Two canola turn-row meetings are scheduled in April 2009 for Clovis and Halfway to highlight field research and introduce interested area growers to canola and its production.

Comments from the farmer panel of the July OSU-KSU canola education program in Enid, OK were compiled for distribution to Southern High Plains producers interested in canola. Upon completion of the revised Great Plains Canola Production handbook, Texas and New Mexico colleagues will revise a drafted mini canola production guide to complement the OSU-KSU document with information and recommendations relevant to the Southern High Plains.

Supplement to USDA-CSREES Canola Project

Improving Canola Adaptation using Deficit Irrigation and Cropping Management in the Southern High Plains

1 Sept 2008-31 August 2009

Texas A&M System & NMSU joint with Colorado State University

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CRIS _____
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Calvin Trostle, Principal Investigator

Additional CSU Collaborators: Abdel Berrada, Perry Cabot, Jim Valliant

The goals of the 2008-2009 project include expanding Southern High Plains winter canola research to Colorado.

Additional primary objectives that were added to the work of the original CSREES project include irrigation timing and amount of winter canola at Halfway, TX; Clovis, NM, and Rocky Ford, CO, and irrigation of spring canola at Yellow Jacket, CO. Test treatments are in place as noted for winter canola, and irrigation treatments are being applied. Growth has been fair at best at the Halfway site due in part to minimal rainfall and the apparent accumulation of salts on the surface from the surface drip irrigation.

A second major objective is the testing of winter canola harvest aids including diquat to minimize shattering of canola before harvest. Research test plot area is in place at Halfway, Clovis, and Rocky Ford.

Finally, this program seeks to expand canola Extension education activities to prospective Colorado producers.