



PREEMERGENCE HERBICIDE TESTING ON SESAME IN 2007

June 2, 2008

The American Sesame Growers Association (ASGA) sponsored preemergence (PRE) herbicide research in three locations in 2007:

1. Lorenzo, TX, conducted by Peter Dotray of Texas Tech University, Texas AgriLife Research, and Texas AgriLife Extension Service, Lubbock, TX.
2. Uvalde, TX, conducted by James Grichar of Texas AgriLife Research, Beeville, TX.
3. Stillwater, OK, conducted by Chad Godsey of Oklahoma State University, Stillwater, OK.

The herbicides and rates were slightly different in each experiment. The following herbicides were tested: s-metolachlor (Dual Magnum), linuron (Lorox and Linex), diuron (Direx), linuron + diuron (Layby Pro), combinations of s-metolachlor and linuron, and propazine (MiloPro). S-metolachlor, linuron, and diuron are presently used in commercial sesame in other countries. Layby Pro is a premix of linuron and diuron in a 50/50 ratio. Propazine was added to the Lorenzo experiment because of the need to find an herbicide that controls morningglory (*Ipomea*) which is becoming a more prevalent weed with the advent of Roundup-tolerant cotton.

Overall conclusions.

- In the Lorenzo and Uvalde experiments, as has been seen before, s-metolachlor, linuron, and diuron reduce stands as the rate is increased, but at the 1x rate of each herbicide, sesame compensates by branching, and the yields are comparable to the non-treated controls.
- Propazine appears to damage the sesame most, but the data was incomplete and needs to be retested.
- The Stillwater experiment showed that planting sesame in dry soil, applying s-metolachlor, and then irrigating, damages sesame substantially. Planting sesame into dry soil and watering up is not recommended with or without herbicides. In the same experiment, applying the s-metolachlor 2 days after planting/irrigating did not damage the sesame.

Lorenzo experiment. The following PRE herbicides were tested at 0.5x, 1x, and 2x rates: s-metolachlor (Dual Magnum), linuron (Linex), diuron (Direx), premixed linuron plus diuron (Layby Pro), and propazine (MiloPro). MiloPro was an added herbicide and was not applied within the triple replication layout of the other herbicides but were in adjacent plots. Thirty units of nitrogen were applied in the Spring. Prior to planting, glyphosate (Roundup) was sprayed to control existing weeds. There was an adequate planting rain. Sesame (Sesaco 32) was planted on June 18 using a commercial 8 row planter on 40 in. beds. Herbicides were applied the day after planting on the 2 center rows in a 24 ft. 4-row plot. There was a 0.7 in. rain two days after planting and the field was under a pivot. There were 4 irrigations with 0.8 in. water each, and 3.7 in. of rain between planting and physiological maturity. About 5 units of nitrogen were added with each pass of the pivot. The following data was taken:

- 28 days after application (DAA) – number of seedlings in 1 ft. (actual counts were made for 6.5 ft.).
- 127DAA – while harvesting yield samples, the number of plants harvested was converted to plants in 1 ft. (actual counts were made for 9.6 ft.). The propazine tests were not carried beyond 42 days because of carry-over damage from other herbicide experiments.
- 28DAA, 42DAA, and 55DAA – Injury ratings were taken at specified days after application. 0% = no damage and 100% = sesame death.
- Yield samples were taken 127 days after application. The yield sample was 1/1280 ac and was taken at the time that the field was dry enough that it could have been combined. The yields in the propazine area were affected by carry-over herbicides from other experiments and thus not compared.

There was very little weed pressure in the field and thus it was decided to make the whole experiment a weed free experiment and just be concerned about the effects of the chemicals on the sesame.

Herbicide	Rate	Plant stand in 1 ft.		Injury (%)			Yield
	Product/ac	28DAA	127DAA	28DAA	42DAA	55DAA	lbs/ac
Weed free check	-	10.7	6.4	0	0	0	1,107 a-e [†]
Dual Magnum	0.675 pt	9.6	6.6	7	8	10	1,042 de
Dual Magnum	1.33 pt	7.5	5.0	20	18	12	1,015 e
Dual Magnum	2.66 pt	9.6	5.8	18	17	12	1,058 cde
Linex	1.0 pt	11.0	6.7	3	2	0	1,142 a-e
Linex	2.0 pt	8.2	5.6	18	15	7	1,140 a-e
Linex	4.0 pt	5.2	6.4	58	53	20	1,130 a-e
Direx	1.0 pt	12.5	6.7	0	0	0	1,257 a
Direx	2.0 pt	9.4	6.1	13	13	5	1,204 abc
Direx	4.0 pt	7.6	5.2	17	18	6	1,080 b-e
Layby Pro	1.0 pt	12.3	6.7	2	3	2	1,074 b-e
Layby Pro	2.0 pt	9.3	6.4	10	7	5	1,184 a-d
Layby Pro	4.0 pt	8.4	6.1	27	35	13	1,226 ab
MiloPro	1.0 pt	7.9	0.0	12	12		
MiloPro	1.5 pt	7.6	0.0	45	30		
MiloPro	2.0 pt	6.6	0.0	63	58		
MiloPro	2.4 pt	5.9	0.0	78	70		
Dual Magnum + Linex	0.675 pt + 1.0 pt	10.4	5.9	10	10	7	1,063 cde
Dual Magnum + Linex	0.675 pt + 2.0 pt	5.9	5.2	28	30	13	1,010 e
Dual Magnum + Linex	1.33 pt + 1.0 pt	9.1	5.6	10	13	8	1,070 cde
Average		9.1	6.1	14	14	7	1,110

[†]Means followed by same letter do not significantly differ (P=.10, Duncan's New MRT)

- The 28 day stand counts show a progressive reduction in stand from lowest to highest herbicide rate. However, all stands are considered adequate since the minimum desirable stand is 3 plants in 1ft.
- As usual, the sesame thins itself down from planting to harvest, and thus the stands 127 days after application were lower than those taken 28 days after application. S32 is a branching type where the branches compensate for lower stands. Thus, at the end there was not much difference in terms of final stand, on visual injury, or in yield.
- All of the PRE herbicides tested may have an initial reduction in stand, but the sesame compensated and provided comparable yields to the check plots.
- The injury was rated in terms of setting the plants back (lower plant height) compared to the adjacent non-sprayed rows 40 in. to each side. There was no discoloration of the leaves.
- The MiloPro damage was severe at all but the 1.0 pt/ac rate. Additional research should be done before using this chemical.
- With the exception of MiloPro, all of the herbicides were tested at a 1x rate in a separate system test using the PRE herbicides applied the same day as above and postemergence directed (PDIR) sprays 28 days later. There was no appreciable loss in yield when using the 1x herbicide rate (see the system (SYS) experiment results). In the PRE and SYS experiments the final average plant stand per foot (6.1 and 6.2) and yields (1,110 and 1,164) were virtually identical.

Uvalde experiment. The following PRE herbicides were tested at 0.5x, 1x, and 2x rates: s-metolachlor (Dual Magnum), linuron (Lorox), diuron (Direx), premixed linuron plus diuron (Layby Pro). In the previous fall, 40 units of nitrogen were applied. Two weeks prior to the pre-irrigation, glyphosate (Roundup) was applied to control pre-existing weeds. After pre-irrigation, the beds were harrowed, which further controlled weeds. Sesame (Sesaco 32) was planted on June 2 using a commercial 10 row planter on 30 in. beds. Herbicides were applied two days after planting to the 2nd and 3rd rows in a 30 ft.

5-row plot. There was a 0.3 in. rain three days after planting. The field was under furrow irrigation. The field was cultivated 36 days after planting, and 30 units of nitrogen were added. There were 35.3 in. of rain from planting until physiological maturity. This unusual amount of rain set back the sesame and made it chlorotic, but once the rains diminished, the sesame recovered its healthy color. There was no significant weed pressure throughout all of the herbicide area. The following data was taken:

- 28DAA – number of seedlings in 1 ft. (actual counts were made for 6.5 ft.).
- 134DAA – while harvesting the yield samples, the number of plants harvested was converted to plants in 1 ft. (actual counts were made for 12.8 ft.).
- WC – Weed control ratings were taken 28 DDA, 0% = no control and 100% = total control. All the herbicides effectively controlled grasses and *Amaranthus* with the only weed being hophornbean copperleaf, locally known as t-weed (*Acalypha ostryifolia*). The t-weed was at the seedling stage at 30 days after planting and the S32 canopied over, and the weeds were not a factor.
- 14DAA, 28DAA, 53DAA, and 65DAA – Injury ratings were taken at specified days after application. 0% = no damage and 100% = sesame death.
- Yield samples were taken 134 days after application. The yield sample was 1/1280 ac and was taken at the time that the field was dry enough that it could have been combined. To the north of the field across a road, the farmer applied glyphosate to sorghum while the sesame was in the mid-bloom stage of the reproductive phase. The drift affected the plants for the first 60 feet of the experiment, and thus, the yield data could not be statistically compared.

Herbicide	Rate Product/ac	Plant stand in 1 ft.		WC (%) 28DAA	Injury (%)			
		28DAA	134DAA		14DAA	28DAA	53DAA	65DAA
Weed free check	-	12.2	9.1	0	0	0	0	0
Dual Magnum	0.675 pt	19.5	7.9	63	0	3	7	0
Dual Magnum	1.33 pt	11.3	8.2	72	0	10	7	0
Dual Magnum	2.66 pt	12.5	8.8	83	2	30	20	4
Lorox	1.0 pt	12.3	9.4	48	0	3	0	0
Lorox	2.0 pt	14.8	8.4	68	0	7	7	0
Lorox	4.0 pt	13.4	8.7	75	0	17	8	2
Direx	1.0 pt	12.5	10.2	87	0	7	3	0
Direx	2.0 pt	14.5	9.4	92	2	8	13	3
Direx	4.0 pt	12.0	7.0	99	10	37	30	11
Layby Pro	1.0 pt	14.0	9.9	70	3	0	0	0
Layby Pro	2.0 pt	14.6	8.2	78	0	17	8	0
Layby Pro	4.0 pt	13.0	9.8	95	2	10	7	1
Dual Magnum + Lorox	0.675 pt + 1.0 pt	10.5	9.6	90	3	17	17	1
Dual Magnum + Lorox	0.675 pt + 2.0 pt	15.2	9.4	92	0	8	3	0
Dual Magnum + Lorox	2.0 pt ^a + 1.0 pt	11.0	5.8	99	20	80	57	28
Average		13.4	8.8	76	3	16	12	3

^aThis rate of 2.0 pt/A is higher than the 1.33 pt/A rate in Lorenzo above

- The 28 day stand counts were very erratic because the different planter boxes put out different rates of seeds at different depths. Thus, for example, the count of the Dual Magnum 0.5 rate of 128 had two replications that had high stand beds. Thus, there is no conclusive stand reduction data in the Uvalde nursery. All stands are considered adequate since the minimum desirable stand is 3 plants in 1 ft.
- As usual, the sesame thins itself down from planting to harvest and thus the stands 134 days after herbicide application were lower than those taken 28 days after application. S32 is a branching type where the branches compensate for lower stands. Thus, at the end there was no difference in terms of final stand or visual injury with the exception of the higher rate of the mixture of Dual Magnum and Lorox and the 2x treatment with Direx.
- All of the PRE herbicides tested may have an initial reduction in stand, but the sesame compensated and provided comparable yields to the check plots.

- Injury was rated in terms of setting the plants back (lower plant height) compared to the adjacent non-sprayed rows 30 in. to each side. There was a leaf discoloration in only one of the treatments – the 2x rate of Direx. There was a yellow splotching that disappeared after 30 days.
- All of the herbicides were tested at a 1x rate in a separate system test using the PRE herbicides applied the same day as above and postemergence directed (PDIR) sprays 28 days later. Results showed that at 1x there was no appreciable loss in yield (See the system experiment results). For both the PRE and SYS tests, the average final stands were 8.8 plants per foot.

Stillwater experiment. Only s-metolachlor (Dual Magnum) was tested at 0.5x, 1x, 1.5x and 2x rates. Sesame (an experimental early variety) was planted into dry soil 0.5 to 0.75 in. deep on Aug 2 using a research drill with 15 in. row spacing. The last recommended planting date for the area is July 4, but with no early frost, the variety terminated normally. In one experiment, Dual Magnum was applied after planting and before irrigation with 1 inch of water; in a second experiment, Dual Magnum was applied 2 days after planting/irrigation. Sesame stands were recorded 2 weeks after planting, and sesame was harvested with a small plot combine on Nov 13. The following data was taken:

- Plants per square foot.
- Yield in pounds/acre.

Treatment	Pre-irrigation		Post-irrigation	
	plants ft ²	yield	plants ft ²	yield
Control	10.3 a [¶]	936 a [¶]	10.7	928
0.5 pt	7.4 b	849 a	10.3	959
1.0 pt	3.1 c	600 b	11.0	769
1.5 pt	2.0 c	494 bc	10.1	965
2.0 pt	0.9 c	337 bc	8.3	1003

[¶] Means labeled with the same letter for a given depth are not different at $\alpha = 0.05$.

- In the US it is not recommended to plant sesame in dry soil and then water up. Normally, sesame is planted after a pre-irrigation or after a planting rain. Herbicides are normally applied 0-2 days after planting. If there is a pivot, a 0.3-0.7 inches of water are applied 2-3 days after the herbicide is applied which normally corresponds to the sesame seedlings emerging from the soil. This study of planting in dry soil and pre-irrigation application is one of only 2 known experiments where s-metolachlor did substantial damage: In 1984 in Arizona, Dual applied as a pre-plant incorporated damaged the sesame substantially.
- When using a 1x herbicide rate with either method of application, the yields are commercially usable since the break-even yield is 330 lbs/ac.
- The ability of sesame to compensate for low populations is shown by the use of the 2x pre-irrigation rate, the stand was 9% of the control and yet the yield was 36% of the control and for the 1x rate the stand was 30% and yield was 64% of the control.

PRE herbicide work in 2008

The American Sesame Growers Association (ASGA) will sponsor preemergence (PRE) herbicide research in four locations in 2008: Lorenzo, TX, conducted by Peter Dotray; Uvalde, TX, conducted by James Grichar ; and Stillwater and Lahoma, OK, conducted by Chad Godsey.

In Lorenzo and Uvalde experiments, the following chemicals will be used: s-metolachlor, linuron, diuron, linuron + diuron, propazine, fluometuron (Cotoran). Fluometuron is used as a PRE for sesame in other countries and hopefully, will help in the problem with morningglory.

In Uvalde there will also be a variety screening using 9 varieties with different genotypes with 1x rate spraying of s-metolachlor, linuron, diuron, linuron + diuron, propazine, fluometuron, chlorsulfuron + metsulfuron (Finesse), and imazapic (Cadre). The Finesse is not planned as a PRE - it will be screened to see if sprayed on wheat prior to planting sesame, there is damage. Previous work has indicated that Cadre may be selective to certain genotypes.

In the Stillwater and Lahoma experiments, only s-metolachlor and linuron + diuron will be used.